

# INDEX

The locators in the index include both chapter and page numbers, e.g., **30:1,5** indicates that the reference is to chapter 30, pages 1 and 5. Numbers, such as 2-hour, are alphabetized as if spelled out. Because extensive racial/ethnic variation data are presented with many conditions discussed, the index entries for race/ethnicity reflect only where specific data are presented, e.g., A1c variations. Where there is race/ethnicity information pertinent to a particular group, e.g., American Indian/Alaska Native, it will be found under the index entry for that ethnic group. Tables, figures, and appendices are not indexed.

## A

- A1c.** See Glycated hemoglobin (A1c)
- Abacavir sensitivity, 12:4**
- Abatacept**  
in prevention of type 1 diabetes, **37:6–7**  
teplizumab efficacy, **37:12**
- ABCC8 gene**  
gliclazide response, **14:10**  
neonatal diabetes mellitus, **7:10**  
p.Ser1369Ala polymorphism, **14:10**  
sulfonylurea receptor encoding, **7:5**
- Abdominal circumference (AC).** See Fetal abdominal circumference
- Abdominal obesity.** See also Obesity  
adiponectin levels with, **13:18–19**  
association with smoking, **33:23**  
with binge eating disorder, **33:21**  
with breastfeeding after gestational diabetes, **15:13**  
with Cushing syndrome, **6:15**  
by diabetes status, treatment, age, **9:14**  
diagnosis of metabolic syndrome, **18:9**  
enhanced cytokine production with, **25:20**  
with general obesity, **9:14**  
with metabolic syndrome, **13:21**  
in metabolic syndrome diagnosis, **19:10**  
in normal weight individuals, **13:12**  
obstructive sleep apnea association, **25:29**  
in schizophrenia, **33:22**  
stroke risk factors, **19:10**  
waist circumference measurement of, **9:14**
- Abdominal pain, 27:9**
- ABO/9q34 variants, 12:12**
- Absolute insulin deficiency, 1:6; 2:3**
- Acanthosis nigricans**  
congenital generalized lipodystrophy, **7:14,16**  
diagnosis of type 2 diabetes in youth, **15:2**  
familial partial lipodystrophy, **7:17,18,19**  
insulin resistance syndrome type A, **7:12**
- Acarbose**  
diabetes development after, **38:11**  
lowering of postprandial hyperglycemia, **38:8**  
prevention study, **38:12**
- Acarbose Cardiovascular Evaluation (ACE), 38:11**
- Accelerator hypothesis, 11:13; 15:11**
- ACCORD studies**  
A1c levels and cardiovascular risk, **1:24**  
blood pressure control and mortality, **36:10**  
blood pressure control effects, **16:14; 18:17; 21:24**  
glycemic control and dementia, **16:15**  
intensive control and cardiovascular disease, **22:47**  
intensive glycemic control effects, **16:13; 18:14–15**  
intensive vs. conventional insulin therapy in, **19:13**  
lipid control effects, **16:14; 18:16; 21:25**  
macrovascular effects of glucose control, **18:14–15**  
metabolic memory with prolonged hyperglycemia, **21:23**  
neuropathy evaluation and outcomes, **23:5–7,11**  
retinopathy outcomes, **21:23–24**  
statin therapy benefits, **16:14**  
therapeutic strategies and cognitive decline, **24:10–12**
- ACR (albumin:creatinine ratio)**  
albuminuria, **22:2**  
elevated albuminuria classification, **22:3**  
for indication of albumin excretion, **22:12**  
with peripheral arterial disease, **20:9–10**  
predictive value with glomerular filtration rate, **22:22**  
renal disease in youth with diabetes, **15:20**  
stroke risk prediction with, **19:3,10**
- Acromegaly, 6:15**
- Actigraphy, 25:6,9,21,29–30**
- Action for Health in Diabetes (Look AHEAD) cohort.** See Look AHEAD
- Action in Diabetes and Vascular Disease (ADVANCE) trial.** See ADVANCE trial
- Action to Control Cardiovascular Risk in Diabetes (ACCORD).** See ACCORD studies
- Activities of daily living (ADL).** See also Instrumental activities of daily living (IADL)  
definition of, **34:2**  
diabetes and morbidity status, **34:8**  
diabetes association with, **34:3**  
home health care needs with diabetes, **40:51–52,57–58**  
limitations in nursing home residents, **40:48**  
prevalence by demographic factors, **34:4–5**  
trends in national estimates, **34:9–11**
- Actos (pioglitazone) ACT NOW study, 38:10**
- Actos Now for the Prevention of Diabetes (ACT NOW), 38:10**
- Acute insulin response (AIR)**  
insulin secretion capacity measure, **13:17**  
measurement for first-phase response, **13:17**  
with sleep restriction, **25:2**
- Acute metabolic complications**  
DKA, **17:1–5**  
hyperglycemic hyperosmolar state, **17:6–8**  
hypoglycemia, **17:9–13**  
lactic acidosis, **17:8–9**
- Acute painful small fiber neuropathy, 23:3**
- Acute renal failure**  
chronic hypertension/gestational diabetes risks, **5:33**  
with contrast-induced nephropathy, **22:39**  
with diabetes and pyelonephritis, **30:10**  
pregestational diabetes vs. controls, **5:25**
- AD dementia**  
amnesic cognitive impairment progression to, **24:3**  
association with diabetes, **24:4–5**  
cerebrovascular mechanisms for, **24:4**  
diabetes link, **24:3**  
genetic causes of, **24:3**  
hyperinsulinemia as risk factor, **24:4,13**  
manifestation of Alzheimer's disease, **24:1**  
memory effects in, **24:1–2**  
mixed pathology in, **24:2**  
non-cerebrovascular-diabetes links, **24:4–5**  
prevalence and projections for, **24:2–3**  
risk factors for, **24:3**  
treatment or prevention recommendations for, **24:3**  
vascular comorbidity with diabetes, **24:8**
- ADCY5 gene, 14:8**
- Adipocytes**  
adiponectin production, **13:18**  
CAV1 mutation in, **7:16**  
defective differentiation with PPAR $\gamma$  mutation, **7:19**  
effects of sleep restriction, **25:11**  
factors from, **25:20**  
perilipin 1 in, **7:19**  
premature apoptosis in, **7:19**  
reduced differentiation in lipodystrophy, **7:20**  
seipin in, **7:15–16**  
thiazolidinediones and development of, **32:12**
- Adipocytokines/adipokines**  
in Bardet-Biedel and Alstrom syndromes, **6:16**

- in congenital generalized lipodystrophy, **7:15**  
 impaired adipose tissue secretion of, **13:18**  
 with obstructive sleep apnea, **25:20**  
 sleep and circadian disturbances, **25:20**  
 systemic inflammatory response and, **25:10**
- Adiponectin**  
 in abdominal obesity, **13:18–19**  
 in congenital generalized lipodystrophy, **7:15**  
 effects of, **13:18**  
 gene polymorphisms, **38:11**  
 relative hypoinsulinemic state and, **6:17**  
 sleep apnea-related glucose metabolism abnormalities, **25:20**  
 type 2 diabetes risk and, **13:19**
- Adipose gene expression regulator**, **14:11**
- Adipose tissue**  
 AGPAT2 expression in, **7:15**  
 circadian regulation of, **25:24**  
 congenital generalized lipodystrophy, **7:13**  
 familial partial lipodystrophy, **7:17,19,20–21**  
 hyperleptinemia association with, **22:38**  
 inflammatory markers from, **23:7**  
 inflammatory pathways in, **13:18–19**  
 PPARG expression in, **7:19**  
 reactive oxygen species effects on, **25:20**  
 in type 2 diabetes, **13:18; 15:2**
- Adipose tissue-derived inflammatory markers**, **23:7**
- Adipose-infiltrating macrophages**, **13:19**
- Adiposity**. *See also* Abdominal obesity; BMI (body mass index); Obesity; Waist circumference  
 fetal overgrowth, **5:56**  
 generalized and central with diabetes, **20:11**  
 insulin resistance in older adults, **16:1**  
 neonatal, **5:50; 13:12**  
 of offspring, **4:13; 5:74; 13:12–13**  
 prevalence in youth, **15:34**  
 reproducibility of measurements, **18:10–11**
- Adult diabetic physical/metabolic characteristics**  
 A1c, **9:3–4**  
 blood pressure status, **9:17–18**  
 BMI and waist circumference, **9:14–16**  
 C-reactive protein, **9:23**  
 data sources and limitations, **9:1–2**  
 family history of diabetes, **9:13**  
 fasting insulin levels, **9:11–12**  
 fasting plasma glucose, **9:4–6**  
 fibrinogen, **9:23**  
 glycemia in untreated diagnosed diabetes, **9:7–10**  
 glycosylated hemoglobin, **9:3–4**  
 high-density lipoprotein cholesterol, **9:19–20**  
 inflammation markers, **9:23**  
 laboratory evaluation techniques, **9:2**
- low-density lipoprotein cholesterol, **9:20–21**  
 parity, **9:23**  
 self-reported health, **9:24**  
 testing methods, **9:2**  
 total cholesterol, **9:18–19**  
 triglycerides, **9:21–22**  
 2-hour plasma glucose, **9:6–7**  
 untreated diagnosed diabetes, **9:7**
- Adult Treatment Panel criteria**, **1:19**
- Adult-onset diabetes mellitus**, **1:1,2; 15:1**
- Adult-onset type 1 diabetes**, **2:4**
- Adults**  
 adverse consequences of tooth loss, **31:34–35**  
 diagnosed diabetes incidence, **3:16**  
 duration of diabetes, **8:8–9**  
 dysglycemia prevalence, **3:14**  
 national estimates of disability and causes, **34:9**  
 overall prediabetes prevalence, **3:13**  
 prevalence and incidence of type 1 diabetes, **2:10–13**  
 type 1 diabetes onset, **2:4–5**  
 type 1 diabetes prevalence in U.S., **2:10–11**  
 visual impairment with diabetes, **21:2**
- ADVANCE trial**  
 A1c levels and cardiovascular risk, **1:24**  
 blood pressure control effects on retinopathy, **21:25**  
 cardiovascular disease prevention, **16:13**  
 in geriatric population, **16:13**  
 high ACR/low eGFR, **22:22**  
 intensive glycemic control effects, **16:13**  
 micro-/macrovascular association with blood pressure, **19:12**  
 risk factor control in stroke, **19:13**
- Advanced glycation endproducts (AGEs)**. *See also* Receptor for AGEs  
 accumulation in articular cartilage, **32:16–17**  
 accumulation in kidney disease, **22:31**  
 autofluorescence measurement, **1:16**  
 bone fragility in type 2 diabetes, **32:12**  
 contribution to bone fragility, **32:3**  
 diabetes complications and, **1:16; 19:10–11**  
 dietary source for, **22:35**  
 formation of, **1:15**  
 in kidney disease, **22:54**  
 links to glycemia, **24:4**  
 markers for, **21:22**  
 with periodontal disease, **31:24**  
 and receptors in dementia, **24:4**  
 relation to dementia, **22:9; 24:4**  
 sRAGE in neuropathy pathogenesis, **23:7**  
 stroke risk predictors, **19:10–11**
- Aerobic organisms**, **30:14**
- Affected sibpair (ASP) families**  
 genetics of type 1 diabetes study design, **12:2**
- major histocompatibility complex linkage demonstration, **12:6–7**
- Affymetrix GeneChip 500K Mapping Array Set**, **12:6**
- Africa, chronic HBV and HCV infection in**, **26:10**
- African descent**  
 African-specific alleles, **12:3–4**  
 founder (AGPAT2) mutation, **7:15**  
 risk of albuminuria, **22:14**  
 type 1b diabetes in, **15:2**
- Afro-Caribbean**, lower extremity amputation risk in, **20:25**
- Age**. *See also* Children and adolescents; Diabetes in youth  
 cataract association with, **21:33–35**  
 changes in A1c with, **1:11**  
 chronic hypertension with pregestational diabetes and, **5:33**  
 diabetes prevalence age <20 years, **2:5**  
 diagnosed, undiagnosed, and total prevalence, **3:9**  
 diagnosed diabetes incidence, **3:16**  
 diagnosed diabetes prevalence by, **3:4–5**  
 ESRD incidence rate by age groups, **22:27**  
 glaucoma association with, **21:36**  
 maternal mortality and, **5:21–22**  
 measure of initiation of type 1 diabetes, **12:12**  
 prediabetes prevalence, **3:13**  
 racial/ethnic differences in age at onset of type 2 diabetes, **22:27**  
 retinopathy improvement with, **21:26**  
 sexual dysfunction in men, **28:8**  
 type 1 diabetes incidence, **2:6**  
 type 2 diabetes incidence in youth, **3:16**
- Age-related macular degeneration (AMD)**, **21:38**
- Age-related macular edema**, **21:38**
- Ageing, Demographics, and Memory Study**, **24:3**
- AGPAT2 gene**  
 in congenital generalized lipodystrophy type 1 diabetes, **7:15**  
 mutations with congenital generalized lipodystrophy, **7:1,15**
- AHSCT (nonmyeloablative autologous hematopoietic stem cell therapy)**, **37:14**
- AKT2 gene**  
 familial partial lipodystrophy, **7:19–20**  
 mutation in familial partial lipodystrophy, **7:1,19**
- Alanine aminotransferase (ALT)**. *See* ALT (alanine aminotransferase)
- Alanine risk variants in HLA genes**, **12:5**
- Alaska Natives**. *See* American Indian/Alaska Native
- Albumin excretion rate (AER)**, **15:20; 22:12**
- Albumin:creatinine ratio (ACR)**. *See* ACR (albumin:creatinine ratio)
- Albuminuria**. *See also* Macroalbuminuria; Microalbuminuria  
 albumin-to-creatinine ratio, **22:2**

- as biomarker of ESRD progression, **22:9**  
classification of, **22:3**  
death rates with albuminuria elevation, **22:20**  
elevation in diabetic kidney disease, **22:5–6,12–19**  
major causes of death with, **22:20**  
as marker for nephropathy, **22:3**  
mechanisms for, **22:10**  
in MODY, **7:4**  
morbidity/mortality thresholds for disease associations, **22:19**  
mortality risk with type 1 diabetes, **22:20**  
normalization with glycemic control, **22:12**  
podocyte changes and, **22:8–9**  
prevalence in type 2 diabetes by duration, **22:14**  
prevalence of persistent, **22:12**  
relationship with hyperfiltration, **22:6**  
spontaneous regression in diabetes, **22:17**  
in staging of chronic kidney disease, **22:3**
- Albuminuria, moderate.** See Microalbuminuria
- Albuminuria, severe.** See Macroalbuminuria
- Alcohol consumption**  
cancer and diabetes risk factors, **29:6**  
congenital malformation prediction by, **5:10**  
diabetes and prediabetes, **10:9–10**  
in diabetes care, **33:23**  
liver and gallbladder disease, **26:13**  
relation to distal symmetrical polyneuropathy, **23:12**  
relationship to retinopathy, **21:27**  
risk of hypoglycemia, **17:11**  
in shift workers, **25:26**  
type 2 diabetes risk and, **13:9**
- Alfacept, 37:13**
- Alendronate, 32:14**
- Aliskiren, 22:50**
- Aliskiren Trial in Type 2 Diabetes Using Cardiorenal Endpoints (ALTITUDE), 22:50–51**
- Allegheny County Type 1 Diabetes Registry (ACR)**  
childhood-onset mortality in type 1 diabetes, **35:12**  
incidence of type 1 diabetes, **15:6**  
life expectancy and mortality trend, **35:5–6,7**  
mortality classification used in, **35:8**  
mortality in diabetes of youth, **15:38**  
tooth loss with type 1 diabetes, **31:33**  
type 1 diabetes mortality, **35:3–4**
- Alleles, associative testing for over-representation, 14:2**
- Alpha cells, pancreatic effects of, 6:7**
- Alpha-1 antitrypsin (AAT) study, 37:13**
- Alpha-glucosidase inhibitors**  
acarbose in prevention study, **38:8,9,11**  
glucose intolerance progression to diabetes effects, **1:19**  
oral glycemic control, **39:2**
- in postprandial hyperglycemia, **38:8**  
prediabetes-diabetes progression effects, **38:13**  
use in geriatric population, **16:14**  
voglibose study, **38:9**
- Alpha-linolenic acid (ALA)**  
cardiac autonomic neuropathy therapy, **23:8,9**  
intake/*FADS1* and *FADS2* interactions, **11:16**  
in Western diet, **11:12**
- Alpha-tocopherol, 11:13**
- Alpha-Tocopherol, Beta-Carotene Cancer Prevention study, 29:8**
- Alstrom syndrome**  
congenital syndromes with diabetes risk, **6:16**  
function of cilia in, **7:12**
- ALT (alanine aminotransferase)**  
association with fetuin-A, **13:20**  
diabetes association, **26:5**  
diabetes mortality association, **26:7**  
liver injury estimates, **26:3–4**  
nonalcoholic steatohepatitis and diabetes status, **13:20**  
prediction of incident diabetes, **26:5**
- Alzheimer's disease (AD).** See also AD dementia; Cognitive impairment with diabetes  
characteristic lesions in, **24:1,3**  
definition of pathologic process, **24:1**  
prevalence of dementia, **24:2**
- Ambulatory care with diabetes, 40:1–25**  
data sources, **40:2–3**  
electronic contacts for care, **40:20–22**  
emergency department visits, **40:20–26**  
office visits, **40:3–7**  
outpatient visit frequency, **40:8–14**  
payment sources for, **40:20**  
type of outpatient visit, **40:15–19**
- American Academy of Family Physicians, 1:23**
- American Academy of Pediatrics**  
diabetes management recommendations, **41:12**  
hyperbilirubinemia guidelines, **5:71**  
neonatal hypoglycemia management, **5:69**
- American Academy of Periodontology (AAP), joint survey with Centers for Disease Control and Prevention, 31:4–5,8–9,15,17,23**
- American Association of Clinical Endocrinologists, 18:15**
- American College of Cardiology Foundation (ACCF), 19:14**
- American College of Obstetricians and Gynecologists (ACOG)**  
gestational diabetes screening recommendations, **1:28–29; 4:2**  
hypertensive disorders of pregnancy, **5:30**  
maternal mortality coding, **5:21**  
pregestational diabetes blood glucose recommendations, **5:72**
- American Diabetes Association (ADA)**  
A1c cutpoint for screening, **1:26**  
A1c endorsement of, **1:13**  
adiposity measurement recommendations, **18:10**  
blood pressure goals, **18:17**  
clinical practice guidelines, **41:3**  
community screening recommendations, **1:23,26**  
comparisons of A1c and other glycemic measures, **1:14**  
criteria for DKA, **17:1**  
diabetes definition, **2:3**  
diagnostic criteria for diabetes, **36:1,2**  
etiologic classification of diabetes, **15:3**  
forms of diabetes, **1:3**  
gestational screening recommendations, **1:28–29; 4:2**  
glycemia cutoffs and definitions, **13:16**  
hypoglycemic episode categories, **17:9**  
impaired glucose tolerance cutpoints  
acceptance by, **1:13**  
neuropathy classification for clinical use, **23:2**  
optimal first trimester A1c levels, **5:10**  
peripheral arterial disease screening recommendations, **20:3**  
physiologic framework for classification of, **15:1–2**  
Provider Recognition Program, **41:2**  
recommended screening tests, **1:6**  
revision of classification, **1:13**  
revision of glycemic control guidelines, **18:15**  
risk classification for diabetes, **20:21**  
risk scores from clinical factors, **1:23**  
screening for diabetic kidney disease, **22:4**  
screening for type 1 diabetes, **1:27**  
screening time recommendations, **4:4**  
Standards of Medical Care for pregestational diabetes, **5:72**  
stroke risk control recommendations, **19:12,14**  
undiagnosed and prediabetes criteria, **9:2**
- American Heart Association (AHA)**  
clinical practice guidelines, **41:3**  
exercise guidelines, **19:11**  
stroke risk control recommendations, **19:12,14**
- American Indian.** See American Indian/Alaska Native
- American Indian reservations**  
U.S. centers for SEARCH, **15:4**  
U.S. vs. non-U.S. countries diabetes prevalence, **2:2**
- American Indian/Alaska Native.** See also Pima Indian studies  
A1c for screening, **1:26**  
albuminuria with type 2 diabetes, **22:18,30**  
cardiovascular risks with diabetes, **22:21**  
childhood and adolescent incidence, **2:6**

- degree of heritage and kidney disease, **22:29,34**
- diabetes as risk for stroke, **19:1**
- fetal overnutrition with maternal diabetes, **15:12–13**
- foot ulcers, **20:17**
- Gila River Indian Community periodontitis study, **31:9,15,17,20**
- GWAS for, **14:9**
- impaired glucose tolerance in, **1:18**
- Indian Health Service records for, **2:5**
- lower extremity amputation risk in, **20:24**
- metabolic syndrome prevalence, **13:23**
- neuropathy prevalence, **23:10**
- obesity prevalence in youth, **15:12**
- obesity trends in, **15:12**
- Ojibwa-Cree community, **15:12**
- Oklahoma Indians, **13:23; 21:29; 22:18,30; 23:10**
- pregestational diabetes prevalence during pregnancy, **5:17–18**
- prevalence by county, **3:8**
- prevalence of diagnosed diabetes, **3:4**
- progression of kidney disease in, **22:18–19**
- retinopathy prevalence in, **21:29**
- screening in youth, **1:14; 15:4**
- type 2 diabetes common variants in, **14:8**
- type 2 diabetes incidence in youth, **3:16; 15:9**
- type 2 diabetes prevalence, **3:5–6**
- type 2 diabetes prevalence in youth, **1:14; 15:9**
- American Medical Association Diabetes Measures Group, 41:2**
- American Stroke Association, 19:14**
- Amino acid residues**
- foreign peptide binding effects, **12:4**
- in HLA genes, **12:4–5**
- Amino acid sequence**
- association-function relation, **14:10**
- nonsynonymous single nucleotide polymorphisms, **12:6**
- Amnestic mild cognitive impairment, 24:2**
- Amniotic fluid insulin concentration, obesity in childhood, 15:13**
- Amputation.** See Lower extremity amputation
- Amyloid**
- Alzheimer's disease characteristic, **24:1**
- cascade effects of insulin, **24:3**
- cerebrospinal fluid levels as marker, **24:4**
- clearance and insulin in brain, **24:4,13**
- glucose metabolism derangement and brain pathology, **24:5**
- islet toxicity in type 2 diabetes, **1:6**
- Anaerobic organisms, 30:13,14; 31:23**
- Androgen deprivation therapy (ADT), 29:13**
- Anencephaly, 5:65**
- Angiotensin II receptor blocker (ARB)**
- blood pressure management with stroke and diabetes, **19:12**
- with diabetes in youth, **15:20**
- in kidney disease, **22:49**
- modification of ESRD risk with, **22:32**
- retinopathy effects of, **21:25**
- valsartan NAVIGATOR study, **38:9**
- Angiotensin-converting enzyme (ACE) inhibitor**
- albuminuria improvement with, **22:18**
- blood pressure management with stroke and diabetes, **19:12**
- cardiovascular event reduction with, **38:12**
- with diabetes in youth, **15:20**
- DREAM study with, **38:9**
- effect on retinopathy progression, **21:24**
- renoprotective effect in type 2 diabetes, **22:49**
- Anglo-Danish-Dutch Study of Intensive Treatment in People with Screen Detected Diabetes in Primary Care (ADDITION)**
- health behaviors changes in, **1:27**
- screening benefits, **1:24–25**
- Ankle-brachial index (ABI)**
- hemostatic factors with low, **20:8**
- in peripheral arterial disease, **20:3**
- Annular pancreas, 7:11**
- Anorectal atresia, 5:60**
- Anorexia nervosa**
- characteristics of, **33:19**
- type 1 diabetes mortality with, **35:4**
- Anorexigenic neuropeptides, 25:20**
- Antepartum hemorrhage, 5:24–25**
- Anti-CD3 monoclonal antibody intervention studies**
- otelixizumab, **37:11,12**
- teplizumab, **37:11**
- tertiary prevention trials, **37:11–12**
- Anti-CD20 monoclonal antibody, 37:12–13**
- Antigen-presenting cells (APCs), 12:2–3**
- Antihyperglycemic medications (non-insulin).** See also Glucose-lowering agents
- biguanide drugs, **5:36**
- blood pressure and diabetic status, **9:17**
- diabetes treatment, **39:2–3**
- expenditures for, **40:59,62,65,70–71**
- gene encoding for drug target, **14:2**
- General Practice Research Database data, **5:36**
- genes encoding targets for, **14:2**
- guidelines for use, **18:15**
- healthcare expenditure data for, **40:62,65**
- lactic acidosis incidence with, **17:8**
- in lipodystrophy management, **7:1**
- patterns of use by age, **39:2–3**
- preconception use of, **5:11,36**
- for prevention of dementia, **24:13**
- trends in use of, **39:3**
- use in older patients, **41:7**
- use in pregnancy, **5:11**
- use with pancreatitis-related diabetes, **6:7**
- Antihypertensive medications**
- nephropathy prevalence and use of, **5:29**
- patient expenditure for, **40:62–63,65**
- use in early pregnancy, **5:11**
- Anti-IL-1 $\beta$  monoclonal antibody, 37:13**
- Anti-inflammatory factors/mechanisms**
- adiponectin, **13:18–19**
- alpha-1 antitrypsin, **37:13**
- in Bardet-Biedel syndrome, **6:16**
- with cardiovascular disease, **18:12**
- docosahexaenoic acid, **37:5**
- fibrinogen, **18:12**
- genes related to fatty acid metabolism, **11:16**
- in type 1 diabetes intervention studies, **37:14**
- Anti-insulin receptor antibodies, 6:15**
- Anti-islet autoantibodies.** See Glutamic acid decarboxylase autoantibodies (GADA); Insulinoma associated-2 autoantibodies (IA-2A)
- Antiplatelet/aspirin management, 18:17–18**
- Antithymocyte globulin (thymoglobulin) ATG, 37:13**
- Anxiety disorders/symptoms**
- causal issues and mechanisms linking diabetes to, **33:18–19**
- generalized anxiety disorder and diabetes complications, **33:18**
- generalized anxiety disorder symptoms, **33:16**
- lifetime anxiety diagnosis with diabetes, **33:18**
- measurement issues, **33:18**
- panic disorder, **33:16**
- patient factors related to prevalence, **33:18**
- posttraumatic stress disorder symptoms, **33:16**
- prevalence, **33:16–19**
- prevalence in youth, **33:18**
- social phobia, **33:16**
- treatment and intervention, **33:19**
- Apgar scores**
- with maternal diabetes, **5:48–49**
- with newborn macrosomia, **5:56**
- Apnea-hypopnea index (AHI), 25:14**
- APOE- $\epsilon$ 4 gene**
- dementia risk with and without diabetes, **24:8**
- diabetic neuropathy association, **21:29**
- genetic susceptibility for dementia, **24:3**
- polymorphism, **21:25**
- retinal hard exudates with diabetes, **21:25**
- retinopathy association, **21:29**
- Apolipoprotein E allele, 21:29.** See also APOE- $\epsilon$ 4 gene
- Apolipoproteins**
- glycemic control associations, **15:28**
- HDL formation, **22:35**
- in late-onset dementia, **24:3**
- retinopathy association, **21:25**
- role in vascular risk, **18:8–9**
- Apoptosis**
- in benign prostatic hyperplasia, **28:4**
- in diabetes of youth, **15:10**
- gene regulation of, **7:10**
- glucotoxicity effect on beta cells, **11:13**

- in hemochromatosis, **6:10**  
in lipodystrophies, **7:19**  
mitochondrial gene mutation and, **7:9**  
during nephrogenesis, **22:42,43**  
in steatohepatitis, **26:5**  
zinc finger gene regulation of, **9:16**
- Appetite regulation**  
hormones in, **25:10**  
leptin in, **22:37–38**  
melanocortin receptor in, **7:11**  
sleep restriction effects on, **25:11**
- Appropriate Blood Pressure Control in Diabetes trial, 19:11**
- Appropriate-for-gestational age infants (AGA)**  
birth trauma in, **5:58–59**  
birth trauma with vaginal delivery, **5:59**  
hyperbilirubinemia in, **5:71**  
neonatal encephalopathy incidence, **5:49**  
neonatal hypoglycemia rates, **5:70**  
neonatal morbidities in, **5:56**
- Area under the receiver-operator-characteristic curve**  
A1c cutpoint analysis, **1:9**  
prediction of fatty liver disease, **26:2**  
prediction of type 1 diabetes risk, **12:10**  
type 2 diabetes risk prediction, **13:24**
- Arginine risk variant in HLA genes, 12:5**
- ARIC study**  
A1c levels and cancer risk, **24:8**  
A1c vs. fasting plasma glucose for diagnosis of diabetes, **36:2–3**  
ankle/brachial index and stroke risk, **20:14–15**  
biomarkers for cardiovascular disease prediction, **18:12**  
diabetes prediction of cognitive decline, **24:8**  
glycemic measures in, **1:21**  
IL-18 levels and type 2 diabetes, **13:19**  
metabolic syndrome prevalence, **13:22**  
metabolic syndrome traits and diabetes risk, **13:24–25**  
periodontitis and central retinal vein diameter with type 2 diabetes, **31:15**  
physical activity and retinopathy, **21:27**  
race/ethnicity in stroke risk in diabetes, **19:7**  
racial/ethnic differences in retinopathy, **21:27–28**  
type 2 diabetes and sRAGE association, **19:10–11**
- Arizona.** See also Pima Indian studies  
age-adjusted total preexisting diabetes during pregnancy, **5:13–14**  
albuminuria with type 2 diabetes, **22:18,30**  
diabetes/glaucoma association, **21:37**  
metabolic syndrome in, **13:23**  
offspring risks with gestational diabetes, **4:13**  
prevalence of diagnosed diabetes, **3:4**  
trends in type 2 diabetes in youth, **15:15**
- type 2 diabetes/periodontitis association, **31:15**  
U.S. centers for SEARCH, **15:4**  
U.S. vs. non-U.S. populations, **2:2**
- Arkansas**  
hypoglycemia levels and literacy scores, **5:69**  
pregestational diabetes prevalence, **5:5**  
racial/ethnic differences in stroke in diabetes, **19:7**
- Arterial stiffness**  
in diabetes of youth, **15:34**  
subclinical cardiovascular disease with diabetes, **15:27–28**
- Arteriolar hyalinosis, 22:9**
- Arthritis**  
comorbid diseases with diabetes, **16:11; 33:7**  
intervention for functional status impairment, **34:12**  
national estimates of disability and causes, **34:9,11**  
prevalence and risk factors for, **32:14–15**  
prevalence with diabetes, **39:4**
- Asian Indian immigrants.** See also Asian/Pacific Islander  
metabolic syndrome prevalence, **13:22**  
type 1b diabetes in, **6:18**  
type 2 diabetes prevalence in, **3:7–8**
- Asian/Pacific Islander.** See also Asian Indian immigrants; Meta-analyses; other specific Asian subgroups  
birth weight and type 2 diabetes risk, **13:13**  
BMI cutpoint recommendation for diabetes risk, **18:10**  
cataracts in type 2 diabetes, **21:33**  
chronic HBV and HCV infection in, **26:10**  
depressive episode or symptoms, **33:9**  
diabetes risk in, **13:4**  
disability and diabetes association, **34:3**  
ESRD incidence rate in, **22:27–30**  
fulminant diabetes in, **1:3**  
GWAS for, **14:9**  
HBcAb prevalence with diabetes, **26:10**  
HLA associations in, **12:3**  
lower extremity amputation risk in, **20:24–25**  
metabolic syndrome prevalence, **13:22**  
prediabetes prevalence, **3:13**  
pregestational diabetes prevalence during pregnancy, **5:17–18**  
prevalence in type 2 diabetes by duration, **22:14**  
screening in youth, **1:14**  
sleep apnea rates, **25:12**  
type 1b diabetes in, **15:2**  
type 2 diabetes common variants in, **14:8**  
type 2 diabetes in youth, **15:2**
- Aspartate aminotransferase (AST).** See AST (aspartate aminotransferase)
- Aspartic acid risk variant in HLA genes, 12:5**
- Aspergillosis, 30:16**
- Aspirin prophylaxis study**  
dose-dependent effects on A1c, **1:12**  
effect on cardiovascular events, **18:17**  
preeclampsia prevention, **5:33**  
preterm delivery in diabetic women with, **5:45**  
stillbirth rate with low-dose, **5:37**  
use with diabetes, **39:6–7**
- Association testing for type 2 diabetes links, 14:2**
- AST (aspartate aminotransferase)**  
liver injury measurement, **26:3–4**  
prediction of incident diabetes, **26:5**
- Asthma**  
comorbidity with diabetes, **5:6**  
maturation impairment of immune system, **15:11**  
prevalence in children and adolescents, **2:2**  
Th2 overactivation and, **11:11**
- Asymptomatic diabetes.** See Prediabetes
- Atenolol, 19:12**
- Atherosclerosis pathophysiology**  
insulin-like growth factor-1 association, **19:11**  
in stroke mechanisms, **19:3**  
subclinical, **18:13**
- Atherosclerosis Risk in Communities (ARIC) study.** See ARIC study
- Atorvastatin, 36:10**
- ATP3 metabolic syndrome.** See Metabolic syndrome
- ATP-regulated potassium channel (K<sub>ATP</sub>), 7:4–5**
- Attention deficit/hyperactivity disorder, 2:2**
- Atypical antipsychotic medications**  
diabetes induced by, **6:11**  
type 2 diabetes risk with, **33:1,22,24**
- Australian Carbohydrate Intolerance Study in Pregnant Women (ACHOIS), 4:10–11,13**
- Australian studies/population**  
cardiovascular autonomic neuropathy, **15:27**  
change in type 1 diabetes genotype, **11:3**  
diabetes registries, **2:5**  
diabetic retinopathy prevalence in youth, **15:18–20**  
disability with diabetes, **34:3**  
gestational hypertension prevalence in, **5:34**  
GI symptom turnover in, **27:5**  
Intranasal Insulin Trial (INIT 1), **37:6**  
major malformations with type 2 diabetes, **5:62**  
major maternal morbidity and mortality measures, **5:24**  
microalbuminuria prevalence in diabetic youth, **15:24**  
preeclampsia rates in, **5:34**  
prevalence of DKA at diagnosis, **17:2**
- Austria**  
glycemic control trends, **15:28**  
pediatric type 2 diabetes prevalence, **15:9**

prevalence of DKA at onset, **15:17; 17:2**

**Autism spectrum disorders**

in children and adolescents, **2:2**

risks in offspring with maternal diabetes, **5:76**

**Autoantibodies measurement standardization, 15:2**

**Autoantibody-negative type 2 diabetes, 1:5**

**Autoantibody-positive type 2 diabetes, 1:5**

**Autoimmune diabetes**

autoantibody presence with, **2:3**

autoimmune polyendocrine syndromes, **6:14**

BCG vaccine for, **11:9**

criteria for diabetes in youth, **15:3**

diagnosis and screening for, **1:6**

early life diet in, **15:11**

environmental factors, **6:13–14**

foreign peptide binding in, **12:4–5**

immune response initiation, **37:2**

immunodysregulation polyendocrinopathy enteropathy X-linked, **6:14–15**

initiation of, **37:2**

latent autoimmune diabetes of adults, **27:9**

in neonates, **7:9**

onset in obese persons, **2:3–4**

rubella and, **6:4**

sleep quality associated with, **25:9**

viral infections and, **11:4**

in youth, **15:3**

**Autoimmune disease**

foreign peptide binding in, **12:4–5**

functional candidates for, **12:6**

initiation of, **12:4**

KIAA0350 gene for susceptibility to, **12:6**

MHC region in, **12:2**

other diseases with type 1 diabetes, **1:3; 11:10; 39:6**

self and non-self, **12:2**

susceptibility gene mapping for, **12:8–9**

**Autoimmune gastritis, 27:15–16**

**Autoimmune polyendocrine syndromes (APS), 6:14**

**Autoimmune response.** See Type 1 diabetes

immune response

**Autoimmune thyroid disease, 6:15; 12:12**

**Autoimmune type 1 diabetes (type 1a), 1:3**

**Autoimmunity criteria for diabetes in youth, 15:3**

**Autoimmunity-Blocking Antibody for**

**Tolerance in Recently Diagnosed Type 1**

**Diabetes (AbATE) Trial, 37:12**

**Automation to Simulate Pancreatic Insulin**

**RResponse (ASPIRE) study, 17:13**

**Autonomic neuropathy.** See also

Cardiovascular autonomic neuropathy

diabetic cystopathy and, **28:4**

risk factors for diabetic kidney disease,

**22:39–40**

role in infections in diabetic patients, **30:4**

**Autosomal dominant lipodystrophies,**

**7:17–20**

**Autosomal recessive lipodystrophies,**

**7:13–17**

**Avon Longitudinal Study (England), 5:75**

**B**

**B<sub>2</sub>-microglobulin, 22:2,9**

**BABYDIAB study**

BCG vaccine and beta cell function, **11:9**

cesarean section interaction with immune response genes, **11:16**

dietary exposure and type 1 diabetes risks, **11:13**

islet autoimmunity risk with gluten, **11:10**

respiratory infection predictive of islet

autoimmunity, **11:7**

seroconversion as marker for type 1

diabetes, **37:2**

type 1 diabetes and enterovirus infection, **11:5–6**

in type 1 diabetes in youth predicted by weight gain, **15:11**

**BABYDIET study**

delayed gluten exposure, **37:5**

enterovirus infections, **11:5**

gluten triggering autoimmunity, **27:14**

respiratory infections and autoimmunity, **11:7**

**Bacillus Calmette-Guérin (BCG)**

in prevention of type 1 diabetes, **11:9; 37:11**

risk of type 1 diabetes with, **11:9**

**Bacterial infections.** See also Infections asso-

ciated with diabetes

of skin and soft tissue, **30:11–12**

**Bacteriuria, asymptomatic, 22:55–56;**

**28:20; 30:9**

**Bacteroides infections, 30:13**

**Baltimore Eye Survey, 21:7**

**Baltimore Longitudinal Study of Aging**

**(BLSA)**

all-cause mortality association of tooth loss, **31:41**

fasting glucose and prostate size, **28:5**

glucose metabolism derangement and brain pathology, **24:5**

progressive development of type 2

diabetes, **13:16**

**Baltimore-Washington Cooperative Young**

**Stroke Study, 19:8**

**Baltimore-Washington Infant case-control**

**study, 5:68**

**Bardet-Biedel (BB) syndrome, 6:16**

**Bariatric surgery to treat diabetes, 39:10**

**Beaver Dam Eye Study (BDES)**

age-related macular edema, **21:38**

cortical (lens) opacities, **21:34**

in diabetic vs. nondiabetic persons, **21:36**

dry eye association with diabetes, **21:37**

duration of type 2 diabetes and impairment, **21:4**

lens opacity with diabetes, **21:34**

microaneurysms in, **1:16**

visual impairment with type 2 diabetes,

**21:4**

**Becaplermin, 20:22**

**Behavioral intervention**

hypoglycemia management, **17:13**

modifiable risk factors for type 2 diabetes, **13:1**

type 2 diabetes risk factors, **13:6–12**

**Behavioral Risk Factor Surveillance System**

**(BRFSS).** See BRFSS data

**Belarus, breastfeeding promotion in, 13:13**

**Belfast Northern Ireland center (HAPO**

**STUDY), 4:13**

**Belgian Diabetes Registry, 37:6**

**Berardinelli-Seip Congenital Lipodystrophy**

**2 (BSCL2), 7:15**

**Beta blockers, 6:11–12**

**Beta cell dysfunction/function**

abatacept effects, **37:6–7,12**

accelerated growth in early life, **15:11**

acute insulin response and proinsulin

levels, **13:17**

apoptosis in diabetes in youth, **15:10**

autoantibody appearance with injury, **37:2**

autoimmune destruction in youth, **15:2**

circadian disruption effects, **25:26**

in combined types 1 and 2 diabetes, **1:5**

cortisol effects on, **25:19**

decline of function in, **1:3**

dysfunction in type 2 diabetes, **13:17**

enterovirus tropism for, **11:4**

etiology of dysfunction in pregnancy, **4:3**

genetic variants affecting, **14:7–8**

glucose sensitivity changes, **37:3**

glucose toxicity effects on, **7:19**

IL-1 $\beta$  effects on, **37:13–14**

markers for, **13:17**

melatonin receptors in, **25:28**

meta-analysis for, **14:9**

mitochondrial gene mutation and apoptosis, **7:9**

in monogenic diabetes, **1:4**

nonimmune causes of dysfunction, **1:3**

pathophysiology of injury, **6:5**

PAX4 and development, **7:7**

plasmid-encoded proinsulin effects, **37:14**

postprandial hyperglycemia effects on,

**38:8**

proinsulin elevation as failure marker,

**18:11**

proinsulin measurement and ratio, **13:17**

proinsulin peptide effects, **37:14**

regulation of apoptosis, **7:10**

rotavirus infections of, **11:8**

secretory capacity measurement, **13:17**

smoking effects on, **13:16**

teplizumab and abatacept for, **37:5**

in type 1 diabetes, **1:1,3,5**

type 1 diabetes risk factors, **11:13**

in type 2 diabetes patients, **1:5**

in type 2 diabetes transition, **13:16–17**

**Beta-hemolytic streptococci, 30:12–13**

**Beta-hydroxybutyrate ( $\beta$ -OHB) levels**

- in DKA, 17:1
- fasting, 5:3,36
- home measurement of, 17:5
- in lactic acidosis, 17:8

**Beta-trace protein, 22:2,9**

- Biguanide drugs.** See also Metformin
  - antihyperglycemic medications data from, 5:36
  - phenformin, 17:8
  - prevention studies, 38:2

**Binge eating disorder (BED)**

- abdominal obesity with, 33:21
- characteristics of, 33:19
- diabetes control in, 33:20–21

**Biomarkers.** See also Cytokines; *specific markers and diseases*

- adiponectin, 13:18
- for beta cell injury, 37:2
- cerebrospinal fluid amyloid levels, 24:4
- coagulation markers, 13:19–20
- C-reactive protein, 13:19
- cytokines and adipokines, 13:18
- elevated glucose levels, 1:13
- endothelial dysfunction markers, 13:20
- fetuin-A, 13:20
- glycated albumin, 1:15
- high-sensitivity C-reactive protein as, 19:10
- hyperproinsulinemia, 18:11
- immune markers for type 1 diabetes, 2:10
- for initiation of type 1 diabetes, 12:12
- insulin-like growth factors, 13:20
- interleukin-6, 13:19
- liver enzymes, 13:20
- prediabetes definition by, 9:2
- prediction of heart/cardiovascular disease, 18:12
- proinflammatory cytokines, 13:19
- proinsulin with beta cell failure, 18:11
- seroconversion for type 1 diabetes, 37:2
- serum cystatin C, 22:1
- serum fatty acids for meat and milk, 11:10
- sex hormones, 13:20–21
- single nucleotide polymorphism mapping for, 12:8
- TNF $\alpha$ , 13:19

**Biothesiometer, 20:18****Birth defects**

- coding consensus for, 5:35
- limitations of data on, 5:11
- in mothers with diabetes, 5:66
- oral contraceptive use in early pregnancy, 5:11
- type 2 diabetes in pregnancy and, 5:10

**Birth trauma**

- cesarean deliveries for, 5:46
- fetal overgrowth and, 5:56
- with pregestational diabetes, 5:59
- with vaginal delivery, 5:59

**Birth weight.** See also Fetal overnutrition; Macrosomia

- ADCY5 association, 14:8

- birth trauma association with, 5:58–59
- birth trauma risk association, 5:56
- category criteria, 13:13
- excess fetal size, 5:49
- of liveborn infants in maternal diabetes, 5:55–56
- in MODY3, 7:5
- with preexisting diabetes, 5:50
- proportionate/disproportionate LGA, 5:59
- relation to adult obesity, 15:12
- shoulder dystocia and trauma, 5:57–58
- type 2 diabetes risk association, 13:13

**Black Women's Health Study, 13:14; 25:24****Black/African American.** See also Sea Island Gullah African Americans

- African-specific HLA haplotypes, 12:3–4
- albuminuria in, 22:18
- arterial stiffness in, 15:34
- brachial plexus palsy risks in, 5:58
- complication-specific mortality with type 1 diabetes, 35:8–9
- dementia prevalence in, 24:3
- excess mortality with type 1 diabetes, 35:5–6
- familial partial lipodystrophy in, 7:18
- glycated albumin levels in, 3:15
- HbA<sub>1c</sub> prevalence with diabetes, 26:10
- hypertension and heart disease risk, 18:9
- lung cancer incidence, 29:8
- progression of kidney disease in, 22:18
- proinflammatory cytokines in, 13:19
- race as risk factor for prostate cancer, 29:9
- region of U.S. residence, 8:9–10
- retinopathy screening disparities, 15:18
- risk factors for peripheral arterial disease, 20:7
- self-reported diabetes, 15:8
- sleep and glycemic control in, 25:9
- sociodemographic characteristics, 8:6
- stillbirth rates, 5:37
- telephone access, 8:14
- thyroid cancer in, 29:10
- type 1 diabetes early mortality in, 35:7
- type 1b diabetes in, 6:18
- with undiagnosed diabetes, 8:20
- world region of residence, 8:10

**Bladder cancer**

- meta-analysis for medication association, 29:13
- pioglitazone and thiazolidinedione studies, 29:11

**Blindness.** See Visual impairment**Blood pressure control.** See also

- Hypertensive disorders of pregnancy
  - albuminuria progress with, 22:48–49
  - in care of diabetes patients, 41:4–5
  - clinical trials on control of risk factors, 18:17
  - by diabetes status, 9:17
  - diastolic vs. systolic in pregnancy outcomes, 5:33
  - geriatric diabetes, 16:14

- NHANES data by diabetes type, 9:17
- prediction of retinopathy with elevation, 21:23
- stroke and heart disease effects of, 18:17

**Blot hemorrhages (retinal), 21:12****Bmal-1 gene, 25:24,27****BMI (body mass index)**

- brachial plexus palsy risk with maternal, 5:58
- calculation of, 9:2
- cancer association with, 29:6
- cardiovascular disease association with, 18:11
- clinical risk categories for type 2 diabetes, 13:11
- criteria for screening in youth, 1:14
- by diabetes status, treatment, age, 9:11–13
- endometrial cancer risk and, 29:9
- evening chronotype association, 25:27
- factors in increased prevalence of diabetes, 3:19–20
- general obesity measurement, 9:14
- gestational diabetes association, 4:5
- GGT level interaction with, 13:20
- and incidence of type 1 diabetes, 11:13
- and increased diabetes prevalence, 3:19–20
- leptin/ghrelin levels with sleep duration, 25:11
- myocardial infarction risk association, 18:10
- nonpregnant women, 5:6
- osteoarthritis and diabetes risk factors, 32:16–17
- in pediatric patients with type 2 diabetes, 15:2
- prenatal detection of malformations, 5:67
- with previous gestational diabetes, 4:12
- relation to retinopathy, 21:26
- for risk assessment in Asian subgroups, 26:6
- risk for progression to diabetes, 1:18
- rosiglitazone prevention and, 38:9
- subclinical cardiovascular disease relation to, 18:10
- thyroid cancer association, 29:10
- total diabetes prevalence, 3:19
- in type 1b diabetes, 15:2
- waist circumference measures with, 13:12

**Bogalusa Heart Study**

- increase in overweight in childhood, 15:12
- liver enzymes, 13:20

**Bone complications**

- alendronate for bone loss, 32:14
- bone density with diabetes, 32:3,7–10
- bone fragility in, 32:2
- bone mineral density, 32:9
- bone structure with diabetes, 32:12
- diabetes duration and fracture risk, 32:14
- diabetic complications as risk factor, 32:12
- economic cost of fractures, 32:1–2
- fall frequency with diabetes, 32:10–11

- fall prevention, **32:14**  
 falls in nursing home populations, **32:11**  
 falls resulting in fracture, **32:2**  
 fracture data sources, **32:2–3**  
 fracture prevalence with type 2 diabetes, **32:4–5**  
 fracture prevention, **32:14**  
 fracture rate in diabetes, **32:6–7**  
 fracture risk in nursing home residents, **32:5**  
 fracture risk with insulin use, **32:12–13**  
 fracture risk with thiazolidinedione medications, **32:12**  
 fractures, **32:2**  
 hip fracture in diabetic women, **32:6**  
 non-spine fractures with type 2 diabetes, **32:9**  
 osteoporosis prevalence with diabetes, **32:9**  
 osteoporosis treatment for prevention, **32:14**  
 prediction of fracture risk with type 2 diabetes, **32:12**  
 raloxifene and vertebral fractures, **32:14**  
 relative hip fracture rates and risks with type 1 diabetes, **32:3**
- Bovine insulin exposure, 37:3**
- Brachial plexus palsy (BPP)**  
 with shoulder dystocia, **5:58–59**  
 transient vs. permanent with maternal diabetes, **5:59**  
 with vaginal delivery, **5:59**
- Bradford-Hill cause-effect criteria, 6:10**
- Breastfeeding**  
 after gestational diabetes, **15:13**  
 for infants of diabetic mothers, **5:73–74**  
 obesity in offspring in maternal diabetes, **4:13**  
 obesity protective effect, **13:13; 15:13**  
 type 2 diabetes protective effect, **15:13**
- BRFSS data**  
 cost of diabetes model, **40:59**  
 dental care utilization, **31:39**  
 depressive disorders and symptoms, **33:4**  
 diabetic foot ulcers, **20:20; 23:14**  
 diagnosed diabetes prevalence plateau in, **3:17**  
 foot and eye care, **41:8**  
 health insurance coverage, **42:11**  
 healthcare utilization and insurance coverage, **42:11**  
 intended pregnancy and health-related behaviors, **5:12**  
 medication use and self-care practices, **39:1–14**  
 oral health, **31:32**  
 periodontitis prevalence, **31:6**  
 physical activity, **10:12**  
 prevalence of diabetes, **36:3**  
 prevalence of diabetes in women of child-bearing age, **5:4,5**  
 prevalence of heart disease with/without diabetes, **18:4**
- race/ethnicity variations in depression, **33:9**  
 retinopathy care and insurance, **21:11**  
 screening in heart disease patients, **1:24**  
 survey for diabetes surveillance, **2:5**  
 tooth loss/missing teeth with diabetes, **31:32**  
 type 2 diabetes/prediabetes county level prevalence, **3:8–9**
- BSCL2 gene**  
 congenital generalized lipodystrophy, **7:15–16**  
 mutations with congenital generalized lipodystrophy, **7:1**
- Bulimia nervosa, 33:19**
- Bupropion therapy, 33:22**
- Burning mouth syndrome, 31:38**
- 
- C**
- C10orf159, type 1 diabetes risk, 12:8**
- Cadmium levels in blood, 20:9**
- Calcineurin inhibitors, 6:11**
- California.** See also Kaiser Permanente Northern California; Kaiser Permanente Southern California; Rancho Bernardo Study  
 age-adjusted total preexisting diabetes during pregnancy, **5:13–14**  
 brachial plexus palsy risk factors, **5:58**  
 chronic hypertension with pregestational diabetes, **5:33**  
 deliveries with pregestational diabetes, **5:15,16–17**  
 early induction for birth trauma prevention, **5:59**  
 gestational diabetes prevalence, **4:7**  
 gestational diabetes prevalence trends, **4:7**  
 Hispanic/Latino population, **3:7**  
 maternal morbidity with acute myocardial infarction, **5:23**  
 metabolic syndrome in, **13:23**  
 Multi-Ethnic Study of Atherosclerosis, **31:6**  
 nephropathy prevalence data, **5:29**  
 permanent brachial plexus palsy estimates, **5:59**  
 preconception planning/counseling, **5:8**  
 preeclampsia rates with chronic hypertension, **5:34**  
 preeclampsia rates with pregestational diabetes, **5:34**  
 preeclampsia/eclampsia with gestational diabetes, **5:34–35**  
 pregestational diabetes prevalence during pregnancy, **5:17–18**  
 severe maternal morbidity with postpartum abruption, **5:25**  
 shoulder dystocia with vaginal delivery, **5:56–57**  
 stillbirth/weight gain relation, **5:43**  
 surveillance system for pregestational diabetes and pregnancy, **5:13**  
 total diabetes percentages, **8:9**
- U.S. centers for SEARCH, **15:4**  
 U.S. vs. non-U.S. countries diabetes prevalence, **2:2**
- California Health Discharge Database, 5:24**
- California Health Interview Survey (CHIS), 3:8**
- California Men's Health Study, 28:6**
- Canadian Cerebral Palsy Registry, 5:49**
- Canadian Diabetes Association, 4:4; 5:72**
- Canadian Hospital Morbidity database, 5:23**
- Canadian Normoglycemia Outcomes Evaluation (CANOE), 38:9–10,13**
- Canadian studies**  
 cesarean delivery in diabetic women, **5:46**  
 chronic hypertension rates >10%, **5:33**  
 classification of diabetes in children/adolescents, **2:4**  
 deliveries with pregestational diabetes, **5:15**  
 independent diabetes association with, **5:37**  
 major malformations with type 2 diabetes, **5:62**  
 nephropathy prevalence data, **5:29**  
 nephropathy prevalence in youth, **15:20,23**  
 preeclampsia in type 1 vs. 2 diabetes, **5:35**  
 pregestational diabetes in pregnancy trends, **5:15**  
 pregnancy planning and glycemic control, **5:8**  
 prevalence of retinopathy in diabetes of youth, **15:18**  
 shoulder dystocia with vaginal delivery, **5:56**  
 surveillance system for pregestational diabetes and pregnancy, **5:13**  
 type 2 diabetes in Aboriginal youth, **15:10**  
 undifferentiated diabetes in pregnancy trends, **5:15**
- Canadian Task Force on Preventative Health Care**  
 A1c cutpoint for screening, **1:26**  
 diabetes screening recommendations, **1:23**
- Canagliflozin, cardiovascular benefits of, 18:15**
- Canagliflozin Cardiovascular Assessment (CANVAS) trial, 18:15**
- Canakinumab, 37:13**
- Cancer and diabetes, 29:1–21**  
 in adults with and without diabetes, **29:2–4**  
 alcohol consumption, **29:6**  
 androgen deprivation therapy, **29:13**  
 bladder cancer, **29:9**  
 breast cancer, **29:8**  
 breast cancer chemotherapy, **29:13**  
 cancer incidence, **29:4**  
 cancer mortality, **29:4–7**  
 cancer recurrence and second cancer, **29:14**

- cancer treatment in diabetic patients, **29:14**
- care after cancer diagnosis, **29:14**
- causal pathways hypothesized, **29:6–7**
- colorectal cancer, **29:7**
- confounding by indication, **29:12**
- diabetic complications in cancer patients, **29:14–15**
- dietary factors, **29:6**
- endometrial cancer risk, **29:9**
- hematologic cancers, **29:10**
- hepatitis B or C virus and risk for liver, **29:7**
- hyperglycemia influence on cancer, **29:7**
- immortal time bias, **29:12**
- incretin-based therapies, **29:12**
- infection and sepsis risks, **29:14–15**
- insulin and, **29:11–12**
- insulin glargine use and, **29:11–12**
- kidney cancer, **29:9**
- liver cancer, **29:7**
- lung cancer, **29:8**
- metformin and cancer risks, **29:10–11**
- methodologic considerations, **29:12**
- mortality with diabetes in cancer patients, **29:13–14**
- non-modifiable shared risk factors, **29:5**
- obesity, **29:6**
- pancreatic cancer, **29:7–8**
- pancreatic resections, **29:13**
- physical activity, **29:6**
- prostate cancer, **29:9**
- risk of death with kidney disease and diabetes, **22:22**
- risks with insulin, **29:11–12**
- shared risks, **29:5–7**
- smoking, **29:6**
- stage at cancer diagnosis, **29:14**
- steroid therapy, **29:13**
- thiazolidinedione cancer risks, **29:11**
- thyroid cancer, **29:10**
- treatment effects on diabetes complication, **29:15**
- tumor growth with hyperinsulinemia, **29:14**
- uterine cancer, **29:8–9**
- weight gain with breast cancer chemotherapy, **29:13**
- Cancer Registry, lung cancer-diabetes association, 29:8**
- Candesartan, retinopathy effects of, 21:24–25**
- Candida albicans, 30:5,9,11; 31:38**
- Candidate causal genes**
- adiponectin gene polymorphisms, **38:11**
  - for diabetic kidney disease, **22:43**
  - diabetic kidney disease relationship, **22:43**
  - HLA class II alleles in type 1 diabetes, **11:3**
  - polymorphism, **38:9**
  - related to dietary exposures, **11:16**
  - for retinopathy, **21:29**
  - for type 1 diabetes risk, **12:8**
  - type 2 diabetes associations, **14:6**
- CANRISK calculator, 1:23**
- Capillary blood glucose (CBG), 1:26**
- Captopril, 22:48–49**
- Capture-recapture analyses, 2:5**
- Carbohydrate metabolism. See also Glucose metabolism**
- clinical presentation of derangement, **1:6**
  - in diabetes, **1:2**
  - with estrogen/progesterone contraceptives, **6:13**
  - medications affecting, **17:6**
  - progression to diabetes, **1:17**
  - tests for diagnosis, **1:2**
- CARDIA study**
- GGT levels associated with diabetes incidence, **13:20**
  - objective measures for sleep quality, **25:9**
- Cardiac autonomic neuropathy. See Cardiovascular autonomic neuropathy**
- Cardiometabolic derangement**
- death certificate limitations for determining, **36:3**
  - with evening chronotype, **25:27**
  - lifestyle intervention effects on, **38:15**
  - markers in offspring of mothers with diabetes, **5:74**
  - pathways for impact of sleep duration on, **25:12**
  - REM-related sleep apnea and, **25:17**
- Cardiomyopathy**
- in Alstrom syndrome, **7:12**
  - BSCL2 mutations, **7:15**
  - in congenital generalized lipodystrophy, **7:14**
  - LMNA mutations, **7:19,20**
  - maternal mortality from, **5:22**
  - maternally inherited diabetes and, **7:9**
  - neonatal morbidity with hypertrophic, **5:68**
- Cardiovascular autonomic neuropathy (CAN)**
- with diabetes in youth, **15:26–27**
  - esophageal dysmotility and, **27:8**
  - glucose levels in diabetes in youth, **23:13**
  - glycemia association with, **15:27**
  - glycemic control in type 2 diabetes, **23:13**
  - heart rate and hyperglycemia association, **23:13–14**
  - incidence and prevalence, **23:12**
  - metabolic memory in, **23:13**
  - onset and course of, **23:13**
  - risk factors, **23:13**
  - symptoms of, **23:6**
  - tests for, **15:27; 23:6–7**
  - treatment of, **23:9**
- Cardiovascular autonomic reflex tests (CARTs), 23:6–7**
- Cardiovascular congenital abnormalities, 5:65**
- Cardiovascular disease (CVD). See also Heart disease and diabetes**
- aspirin prophylactic use with diabetes, **39:6–7**
  - diabetes in older adults, **16:6–7**
  - diabetic kidney disease as risk factor for, **22:19**
  - glycemic risk factors for complications, **1:24**
  - high-sensitivity C-reactive protein in, **19:10**
  - mortality in diabetic persons, **36:8**
  - mortality with macroalbuminuria, **22:20**
  - with previous gestational diabetes, **4:12**
  - subclinical markers for, **15:34; 18:13**
  - type 1 diabetes mortality with duration >20 years, **35:9**
- Cardiovascular disease risk factors**
- acarbose effects on, **38:12**
  - ADDITION study, **1:27**
  - arterial stiffness in youth, **15:34**
  - blood glucose in screening for, **1:22–23**
  - coronary artery calcification association with, **15:37**
  - diabetes in youth
    - dyslipidemia, **15:33**
    - elevated blood pressure, **15:29,33**
    - glycemic control, **15:29**
  - diabetic kidney disease as, **22:19–24**
  - in geriatric diabetes, **16:5–6**
  - glycemic measures for prediction of, **1:18**
  - hyperglycemia, **18:7–8**
  - hypertension, **18:9**
  - insulin resistance, **18:11–12**
  - lipids and lipoproteins, **18:8–9**
  - metabolic syndrome, **18:9–10**
  - mortality with cardiac autonomic neuropathy, **15:27**
  - obesity, **18:9–11**
  - obesity and insulin resistance in youth, **15:33–34**
  - presence of diabetes, **36:1**
  - with previous gestational diabetes, **4:12**
  - pulse-wave velocity association with, **15:34**
  - type 1 diabetes mortality and, **35:11**
- Cardiovascular Health Study**
- intermittent claudication, **20:7–8**
  - racial/ethnic differences in retinopathy, **21:27**
  - type 2 diabetes risk and adiponectin levels, **13:19**
- Cardiovascular Outcomes Following Ertugliflozin Treatment in Type 2 Diabetes Mellitus Participants With Vascular Disease (VERTIS CV) trial, 18:15**
- Cardiovascular system malformation, 5:62**
- Caries, 31:36–38**
- Carotid artery**
- intimal-medial wall thickness and periodontitis, **31:15**
  - RAGE association with atherosclerosis, **19:11**
  - stenting, **19:16**
  - stroke risk and bruits, **19:9**
- Carotid endarterectomy (CEA), 19:16**
- Carotid intima media thickness (cIMT)**
- acarbose effects on, **38:12**
  - cardiovascular risk stratification, **18:13**

- in diabetes of youth, **15:34–37**  
 periodontal disease as risk for, **31:15**
- Carpenter-Coustan gestational diabetes criteria**, **4:7,10**
- CARS (cysteinyl-tRNA synthetase) gene**, **22:43**
- Case-control studies**. See also DPP study; SEARCH for Diabetes in Youth study  
 allelic spectrum for type 2 diabetes expansion, **14:6**  
 anti-HCV antibody association with subsequent diabetes, **26:8**  
 Baltimore-Washington Infant Study, **5:68**  
 benign prostatic hyperplasia and dysglycemia, **28:5**  
 biases in medication-cancer risk studies, **29:10–11**  
 breastfeeding and type 1 diabetes risk association, **11:9**  
 cataract prevalence, **21:34**  
 contraception exposure risks, **5:13**  
 corneal epithelial fragility values in type 2 diabetes, **21:37**  
 corticosteroid treatment and hyperglycemia risk, **27:15**  
 cow's milk exposure meta-analysis, **11:9–10**  
 diabetes and gallstone disease association, **26:15,18**  
 diabetes as tuberculosis risk factor, **30:17**  
 diabetes-cancer risk associations, **29:7,9,10**  
 eating disorders and type 1 diabetes in adolescents, **33:19**  
 enteroviral infections at diagnosis of type 1 diabetes, **11:4**  
 ever vs. never breastfeeding, **5:74**  
 foot ulcer and vibratory insensitivity association, **23:14**  
 genetic risk score calculation, **13:5**  
 genetic risk studies for type 1 diabetes, **12:2**  
 genotype associated with type 1 diabetes, **12:6–7**  
 gestational diabetes and periodontitis association, **31:22**  
 glycemic control and dyslipidemia, **15:33**  
 growth in children with type 1 diabetes vs. without diabetes, **11:13**  
 low birth weight association with chronic kidney disease risk, **22:42**  
 major malformations with maternal diabetes, **5:60,65,67**  
 melatonin secretion and type 2 diabetes development, **25:28**  
*MTNR1B* and abnormal glucose metabolism, **25:28**  
 National Birth Defects Prevention Study, **5:11**  
 neonatal seizures with maternal type 1 diabetes, **5:49**  
 nitrosamine consumption and type 1 diabetes risk, **11:14**
- obesity as independent risk factor for diabetes, **5:10**  
 periodontitis and gestational diabetes risk, **31:14**  
 periodontitis severity and erectile dysfunction, **31:16**  
 periodontitis severity and other disease associations, **31:16**  
 plaque and periodontal health in children with type 1 diabetes, **31:21**  
 pneumococcal bacteremia with diabetes, **30:8**  
 preterm birth and type 1 diabetes association, **11:15**  
 serum  $\alpha$ -tocopherol and diabetes risk, **11:13**  
 Stillbirth Collaborative Research Group, **5:37,43**  
 transient vs. permanent brachial plexus palsy, **5:59**  
 type 1 diabetes risk and psychological stress, **11:15**  
 type 1 diabetes-associated single nucleotide polymorphisms, **12:10**  
 vitamin D exposure in infancy, **11:11–12**  
 waist-to-hip ratio association with myocardial infarction, **18:10–11**
- Cataracts**  
 with diabetes, **21:33–34**  
 extraction of, **21:35–36**  
 vs. lens opacities, **21:34**  
 prevalence of, **21:34**  
 risk factors with type 1 diabetes, **21:34–35**  
 risk with diabetes types, **21:1**  
 risk with diuretic use, **21:34**
- Catecholamines**. See also Sympathetic nervous system activity  
 effects on insulin sensitivity, **25:19**  
 impaired release in diabetes, **17:9**
- Causative Classification of Stroke System**, **19:2**
- Cause-effect relationship criteria**, **6:10**
- CAVI (caveolin-1) gene**  
 mutations with congenital generalized lipodystrophy, **7:1,15–16**  
*PTRF* regulation of expression of, **7:16**
- CDC Maternal Mortality Study Group**, **5:21**
- CDC Pregnancy Mortality Surveillance System**, **5:21**
- CEL (carboxyl-ester lipase) gene in MODY7**, **7:7**
- Celiac disease (CD)**  
 detection by IgA antibodies, **27:13**  
 diagnosis of, **27:12–13**  
 epidemiology of, **27:10–12**  
 genetic predisposition to, **27:9**  
 gluten as trigger for diabetes, **27:14**  
 gluten-free diet effects on A1c, **27:14**  
 gluten-free diet for management, **27:13–14**  
 histologic changes in small intestine, **27:9–10**
- immune response to gluten, **27:9**  
 latent autoimmune diabetes of adults with, **27:9**  
 prevention of, **27:12**  
 symptoms of, **27:12–13**  
 tissue transglutaminase autoantigen in, **27:9–10**  
 type 1 diabetes association, **27:11–12**
- Cell adhesion molecules**  
 endothelial dysfunction markers, **13:20**  
 levels in obstructive sleep apnea, **25:20**  
 in proinflammatory and insulin resistance pathways, **13:19**
- Cellular memory**. See Metabolic memory
- Centers for Disease Control and Prevention (CDC)**. See also BRFSS data; NHANES data; NHIS data  
 American Academy of Periodontology joint survey, **31:4–5,8–9,15,17,23**  
 diabetes risk factor control trends, **41:3**  
 Division of Diabetes Translation, **2:2–3**  
 maternal mortality studies, **5:21**  
 maternal mortality surveillance, **5:21**  
 sociodemographic data from, **8:2**  
 surveys for diabetes surveillance, **2:5**
- Central macular edema**. See Macular edema
- Central nervous system malformations**, **5:62**
- Central obesity**. See Abdominal obesity
- Central/South Americans**. See also Hispanic ethnicity  
 cyclophosphamide and thymoglobulin, **37:14**  
 diagnosed diabetes prevalence, **3:6–7**  
 fasting and impaired glucose predictive power, **1:20**  
 prediabetes prevalence, **3:14**  
 total dysglycemia prevalence, **3:14–15**  
 undiagnosed diabetes prevalence, **3:12–13**
- Cerebral amyloid angiopathy**, **24:4**
- Cerebral edema**  
 with DKA in youth, **17:3,5**  
 with lactic acidosis, **17:8–9**
- Cerebral palsy**, **5:49**
- Cerebrovascular disease/events**  
 albuminuria and stroke risk, **19:10**  
 cognitive impairment with, **24:1–2**  
 comorbidity with diabetes, **16:5,11**  
 hormonal contraception and risks for, **5:13**  
 hypercoagulability link with, **19:11**  
 hyperglycemic hyperosmolar state precipitation risk, **17:6**  
 mortality trends with diabetes in pregnancy, **5:22**  
 in nursing home residents, **40:47**  
 pathophysiology of stroke, **19:3**  
 pregestational diabetes and hypertension in, **5:33**  
 premature mortality with diabetes, **40:68**  
 risk management for, **19:12–14**  
 risk with peripheral arterial disease, **20:13**  
 subclinical cerebrovascular disease, **24:3**  
 tooth loss association, **31:16**

- vascular cognitive impairment, **24:3**
- Cesarean delivery**  
 birth size and, **5:59**  
 confounding of stroke data, **5:22**  
 in diabetic women, **5:46**  
 interaction with *IFIH1* gene, **11:16–17**  
 maternal complications of diabetes, **5:25**  
 postpartum wound infection, **5:24**  
 for prevention of birth injury, **5:59**  
 pulmonary embolism association, **5:24**  
 rates with diabetes, **5:46,58**  
 shoulder dystocia rates with, **5:57**  
 sleep disturbance relation to, **25:21**  
 venous plasma glucose levels and, **4:8**
- Charcot neuroarthropathy**  
 complication of diabetic neuropathy, **23:14**  
 etiology of, **20:18**  
 foot deformity with, **23:5**  
 sensory abnormality with, **32:18**
- Chicago Childhood Diabetes Registry**  
 diabetes in children and adolescents, **2:6–7**  
 mortality in diabetes of youth, **15:38**  
 type 1 diabetes surveillance, **2:5**
- Children and adolescents.** See also Diabetes in youth  
 age for testing, **1:14**  
 birth month and seasonal patterns for type 1 diabetes, **2:7**  
 chronic diseases in, **2:2**  
 classification of diabetes in, **2:3; 15:1–4**  
 comparison with international rates, **2:7**  
 complications of diabetes in, **15:13–38**  
 criteria for screening, **1:14**  
 diabetes-periodontitis interactive effects, **31:18–21**  
 DKA treatment recommendations for, **17:5**  
 early mortality with type 1 diabetes, **15:38–39; 35:9**  
 eating disorder prevalence, **33:19**  
 glycemic tests comparisons, **1:14**  
 hyperglycemic hyperosmolar state incidence in, **17:6**  
 incidence of DKA in established diabetes, **17:2**  
 incidence of type 1 diabetes in U.S., **2:6–7; 15:5–6**  
 ketosis with types 1 and 2 diabetes, **15:2–3**  
 life expectancy predictions for, **36:8**  
 maternal diabetes consequences for, **4:12–13**  
 metabolic syndrome prevalence, **13:23–24**  
 new-onset diabetes in youth, **15:2**  
 prevalence of overweight in youth, **15:12**  
 prevalence of type 1 diabetes in U.S., **2:5; 15:4–5**  
 race/ethnicity projections for type 1 diabetes, **2:10**  
 SEARCH study, **2:2,5; 15:4**  
 seasonality of type 1 diabetes, **2:7–9**  
 temporal trend in, **2:9–10; 15:6,9–10**
- tooth eruption rate with diabetes, **31:36**  
 type 1 diabetes prevalence, **2:5; 15:4–5**  
 type 2 diabetes prevalence and incidence, **3:17; 15:8–9**  
 U.S. population incidence, **2:6**  
 U.S. population prevalence, **2:5**
- Children's Hospital of Pittsburgh (CHP)-based type 1 diabetes registry**, **35:3–4**
- Chinese Americans.** See also Asian/Pacific Islander  
 dental visits with insurance, **31:39**  
 metabolic syndrome prevalence, **13:22**  
 periodontal disease prevalence, **31:6**  
 retinopathy prevalence, **21:29**  
 sleep quality and insulin resistance association, **25:9**
- Chinese/Taiwanese studies.** See also Asian/Pacific Islander  
 A1c for screening, **1:26**  
 Da Qing study, **1:25; 38:5**  
 diabetes and gallstone disease, **26:15**  
 diagnosed diabetes prevalence, **3:7–8**  
 gestational diabetes regression, **1:29**  
 glucose measures and diabetes risk, **1:20**  
 glycated albumin and fasting glucose correlation, **1:15**  
 immunotherapy trials, **37:14**  
 lifestyle intervention trial, **1:19**  
 lung cancer-diabetes association, **29:8**  
 new-onset diabetes risk with HCV infection, **26:10**  
 sleep quality and glycemic control association, **25:9**
- Cholesterol measures/control**  
 for cardiovascular risk associated with diabetes, **36:10**  
 heart disease association with, **18:8–9**  
 levels with claudication, **20:8**
- Cholesterol-lowering medications**  
 expenditures for, **40:66**  
 treatment in diabetes, **39:5–6**
- Chorioamnionitis**, **5:24**
- Chromosomes**  
 6q24, **7:9–10**  
 11p15.5 regulation of *INS* gene transcription, **7:5**  
 12q13 and type 1 diabetes susceptibility, **12:6**  
 12q24 and type 1 diabetes susceptibility, **12:6**  
 16p13 region and type 1 diabetes susceptibility, **12:6**  
*INS* gene mutations in 11p15.5, **7:10–11**
- Chronic bilirubin encephalopathy**, **5:71**
- Chronic distal symmetric polyneuropathy.** See Distal symmetrical polyneuropathy
- Chronic hypertension with pregestational diabetes**  
 diagnostic criteria in pregnancy, **5:33**  
 maternal deaths with, **5:22**  
 maternal stroke/cerebrovascular complications, **5:33**  
 prepregnancy rates of, **5:33**
- prevalence of, **5:33**  
 rates of poor pregnancy outcomes with, **5:33**  
 stillbirth rates, **5:37**  
 treatment in pregnancy, **5:33**  
 types 1 and 2 diabetes, **5:33**
- Chronic inflammatory demyelinating polyneuropathy (CIDP)**, **23:3**
- Chronic kidney disease (CKD).** See also Diabetic kidney disease; Kidney disease associated with diabetes  
 associated with diabetes, **22:56–57**  
 defined, **22:3**  
 with diabetes, **22:4**  
 diagnosis of diabetic kidney disease, **22:4**  
 equations for GFR estimation, **22:3**  
 estimated prevalence by type of diabetes, **22:12**  
 management with diabetes, **22:54**  
 prognosis of infections with, **22:22**  
 staging developments in, **22:2**
- Chronic Kidney Disease Epidemiology Collaboration**, **22:3**
- Chronic pancreatitis (CP)**  
 diagnosis and treatment of, **6:7–8**  
 hereditary/genetic pancreatitis, **6:8**  
 prevalence of diabetes with, **6:7**
- Chronotype**, **25:27–28**
- CIDEA (cell death-inducing DNA fragmentation factor a-like effector c) gene**, **7:17**
- Ciliopathy, heterogeneous**, **6:16; 7:12**
- Circadian disturbances.** See Sleep and circadian disturbances
- Circadian system**  
*CRY2* gene, **14:8**  
 genes and regulation of, **25:24**  
 glucose metabolism, **25:20–21,24–30**  
 melatonin regulation of, **25:28**  
 misalignment, **25:24,27**  
 morning/evening chronotype, **25:27–28**  
*MTNR1B* gene, **14:8**
- Cirrhosis (end-stage liver disease)**  
 correlation with prevalence of diabetes, **6:10**  
 diabetes prevalence and liver function, **26:11**  
 fatty liver disease progression to, **26:2,6**  
 with hemochromatosis, **6:9**  
 late development with lipodystrophy, **7:14**  
 liver transplantation, **26:11–13**  
 new-onset diabetes incidence with, **26:11**  
 portal hypertension and diabetes risk, **26:11**
- Class I (HLA-A and -B) loci**  
 diabetes association with, **12:3**  
 HLA-B\*39:06 (susceptible) in type 1 diabetes, **12:4**  
 HLA-B\*57:01 (protective) in type 1 diabetes, **12:4**  
 type 1 diabetes association, **12:4**
- Class II (HLA-DR, -DQ, and -DP) loci**, **12:3**
- Classification of diabetes.** See also Screening for diabetes

- ADA revision of, **15:1**  
 combined types 1 and 2 diabetes, **1:4–5**  
 current classification problems, **1:6**  
 etiologic classification for, **15:3**  
 gestational diabetes, **1:4**  
 by healthcare provider report, **2:4**  
 high-risk glycemic state prevalence, **1:17–18**  
 issues with current methods, **1:6**  
 markers of diabetes in youth, **15:3**  
 monogenic, **1:4**  
 pediatric diabetes challenges, **15:2–3**  
 by phenotypic characteristics, **1:6**  
 prediabetes, **1:5–6**  
 SEARCH approach for, **15:3–4**  
 SEARCH study grouping for, **2:4**  
 secondary and other specific types, **1:4**  
 Stage 1 of type 1 diabetes, **37:2–3**  
 subsets of diabetes, **6:1–29**  
 type 1 diabetes, **1:3; 15:2**  
   clinical stages of, **37:5**  
   identification, **2:3**  
 type 2 diabetes, **1:3–4; 15:2**  
 in youth, **15:1–2**
- Clinical attachment loss (CAL)**, **31:3–4**
- Clinical presentation**  
 congenital generalized lipodystrophy, **7:13–15**  
 of diabetes, **1:16**  
 hemochromatosis, **6:9**  
 indicators of, **1:15**  
 maturity-onset diabetes of youth, **7:4**  
 monogenic diabetes, **7:2**  
 signs and symptoms of diabetes, **17:4**  
 of stroke, **19:3**  
 of transient neonatal diabetes, **7:10**  
 in type 1 vs. type 2 diabetes, **1:3–4**  
 types 1 and 2 diabetes in youth, **15:2**
- Clinical proteinuria**. See Macroalbuminuria
- Clinically significant macular edema (CSME)**, **21:16**
- Clock (circadian locomotor output cycles kaput) gene**, **25:24,27,28**
- Clostridium difficile infection**, **30:13,14–15**
- Cod liver oil**  
 supplement in infancy, **11:11–12**  
 type 1 diabetes risk and intake of, **11:16**
- Cognitive behavioral therapy (CBT)**, **33:21**
- Cognitive impairment with diabetes**, **24:1–20**  
 A1c level prediction of change in type 1 diabetes, **24:7**  
 adults with type 1 diabetes, **24:6**  
 advanced glycation endproducts, **24:4**  
 amnesic impairment and prevalence, **24:2–3**  
 amyloid clearance and insulin in brain, **24:4,13**  
 APOE-ε4 and genetic susceptibility, **24:3**  
 APOE-ε4 association with dementia, **24:8**  
 biases of diabetes/dementia studies, **24:8**  
 cerebrovascular-diabetes links, **24:3–4**  
 decline with type 2 diabetes, **24:8**  
 dementia association with diabetes, **24:8**  
 dementia characteristics, **24:2**  
 depression effects on cognitive function, **24:11**  
 diabetes and dementia mechanism relationships, **24:4**  
 diabetes and vascular dementia relationship, **24:8**  
 diabetes medications and dementia risk, **24:13**  
 ethnic differences in dementia, **24:3**  
 executive-frontal abilities, **24:1,2**  
 functional impairment from hypoglycemic events, **24:12–13**  
 histologic changes in, **24:3**  
 hypoglycemia and dementia relationship, **24:12**  
 intensive treatment effects, **24:6–7,10,12**  
 lifestyle intervention effects, **24:12**  
 measurement of function, **24:1–2**  
 non-amnesic impairment, **24:2,3**  
 noncerebrovascular-diabetes links, **24:4**  
 non-genetic risk factors for dementia, **24:3**  
 in offspring with maternal diabetes, **5:75**  
 performance testing methods for, **24:1–2**  
 prevention and, **24:13**  
 relation to cognitive performance, **24:13**  
 subclinical cerebrovascular disease and, **24:3**  
 vascular cognitive impairment, **24:3**  
 white matter disease, **24:4**  
 with and without type 2 diabetes, **24:8**
- Cohort study advantages and characteristics**, **36:5**
- Cohorts for Heart and Aging Research in Genomic Epidemiology (CHARGE)**, **13:5**
- Collaborative Atorvastatin Diabetes Study (CARDS)**, **18:16; 19:10**
- College of American Pathology (CAP)**  
 A1c measurement recommendations, **1:9,10**  
 hemoglobinopathies effects on measurements, **1:12**
- Colorado Birth Certificate Registry**, **5:49**
- Colorado Insulin Dependent Diabetes**, **2:5**
- Colorado studies**  
 change in type 1 diabetes genotype, **11:3**  
 dyslipidemia and glycemic control in youth, **15:33**  
 gestational diabetes prevalence, **4:7**  
 neonatal seizures with maternal diabetes, **5:49**  
 prevalence of diagnosed diabetes, **3:4**  
 subclinical cardiovascular disease, **15:37**  
 U.S. centers for SEARCH, **15:4**  
 U.S. vs. non-U.S. countries diabetes prevalence, **2:2**
- Colorectal cancer with diabetes**, **29:7**
- Combined types 1 and 2 diabetes**, **1:5; 15:3**
- Community screening recommendations**, **1:26**
- Comorbidity indexes**, **5:4**
- Complications of diabetes**  
 acute complications in youth, **15:1,13–17**  
 acute metabolic complications, **17:1–19**  
 bone and joint, **32:1–22**  
 cancer and diabetes, **29:1–21**  
 cardiovascular disease in youth, **15:34–38**  
 cognitive impairment with, **24:1–19**  
 conditions of aging, **16:15–16**  
 delivery complications, **5:16,45**  
 disability and, **34:1–15**  
 foot ulcers, **20:19; 23:14–15**  
 gastrointestinal manifestations of, **27:1–22**  
 of geriatric diabetes, **16:13–15**  
 gestational diabetes, **4:1–17**  
 heart disease and, **18:1–30**  
 hyperglycemic hyperosmolar state, **17:6**  
 infections associated with, **30:1–25**  
 kidney disease in, **22:1–84**  
 liver and gallbladder disease in, **26:1–23**  
 lower urinary tract symptoms in men, **28:4–6**  
 lower urinary tract symptoms in women, **28:10–20**  
 maternal mortality with, **5:22**  
 microvascular complications in youth, **15:17–27**  
 mortality in type 1 diabetes, **35:1–16**  
 mortality trends in type 2 diabetes, **36:1–14**  
 ocular functions and diseases with, **20:1–49**  
 oral health and, **31:1–49**  
 peripheral and autonomic neuropathy in, **23:1–20**  
 peripheral arterial disease, **20:1–34**  
 with pregnancy, **5:1–101**  
 pregnancy-related stroke and hypertensive disorders, **5:22–23**  
 psychiatric/psychosocial issues, **33:1–34**  
 sexual dysfunction in men, **28:6–10**  
 sexual dysfunction in women, **28:20–21**  
 sleep and circadian disturbances effects, **25:1–44**  
 stroke and, **19:1–23**  
 urologic diseases and sexual dysfunction in, **28:1–26**
- Computer assisted sensory examination (CASE)**, **23:6**
- Confocal microscopy of cornea**, **23:6**
- Congenital generalized lipodystrophy (CGL)**, **7:13–17**  
 AGPAT2 mutations, **7:15**  
 BSCL2 mutations, **7:15–16**  
 CAV1 mutation, **7:16**  
 clinical presentation, **7:13–15**  
 differential diagnosis in, **7:16**  
 molecular diagnosis of, **7:16**  
 prevalence and incidence, **7:13**  
 PTRF mutations, **7:16**
- Congenital heart defects**  
 obesity association with, **5:10**  
 pregestational diabetes, **5:67**  
 in utero diabetes exposure, **5:66**

- Congenital malformations/anomalies.** See also Major malformations/anomalies defined, **5:59**  
 diabetes-obesity gene interactions for, **5:10–11**  
 fetal sex-associated risk, **5:66**  
 first trimester glycemic control prediction of, **5:10**  
 interpregnancy interval for diabetic women, **5:7**  
 with maternal diabetes, **5:59–67**  
 multiple, same infant, **5:65–66; 7:11**  
 neonatal diabetes association with, **7:10**  
 periconception maternal nutrition and metabolic changes, **5:11**  
 preconception care of diabetic women, **5:7–8**  
 prediction by vascular disease, **5:10**  
 pregnancy terminations for, **5:43**  
 in second pregnancies, **5:10**  
 stillbirth with, **5:43**
- Congenital rubella syndrome (CRS), 11:7–8**
- Congenital syndromes with diabetes risk**  
 Alstrom syndrome, **6:16**  
 Bardet-Biedel syndrome, **6:16**  
 Down syndrome, **6:16**  
 Prader-Willi syndrome, **6:16–17**  
 Turner syndrome, **6:17**  
 Williams syndrome, **6:17**
- Congenital viral infections**  
 cytomegalovirus, **6:4–5**  
 rubella, **6:4**
- Congestive heart failure**  
 with diabetes in older adults, **16:5–7**  
 economic impact of, **22:3**  
 familial partial lipodystrophy, **7:18–19**  
 Medicare budget expenditures, **22:2**  
 prevalence in men and women, **18:4**  
 risk with intensive treatment, **18:15**  
 with rosiglitazone, **24:13; 38:9**  
 statin therapy, **38:12**  
 thiazolidinedione medications and, **18:15**
- Conjugated linoleic acid, 11:10**
- CONQUER randomized controlled trial, 38:10**
- Consolidation of memory, 24:1–2**
- Constipation, 27:2,8**
- Contact lens use with diabetes, 21:37**
- Continuous glucose monitoring, 17:12–13**
- Continuous subcutaneous insulin infusion (CSII), 5:25; 17:2**
- Contraception for diabetic women**  
 ADA guidelines on, **5:7**  
 hormonal contraceptive complications with diabetes, **5:12–13**  
 not using contraception, **5:8**  
 preconception care, **5:11–13**  
 reasons for low utilization, **5:12**  
 safety of methods for, **5:12**
- Contrast-induced nephropathy, 22:39**
- Cooperative Health Research in the Region of Augsburg (KORA), 13:19**
- Cornea**  
 changes with type 1 diabetes, **21:37**  
 confocal microscopy, **23:6**  
 corneal ulcers in type 1 diabetes, **21:37**  
 dry eye association with diabetes, **21:37**  
 epithelial fragility with type 2 diabetes, **21:37**  
 lesions and dry eye, **21:37**
- Coronary artery calcification (CAC)**  
 cardiac event prediction with, **15:37**  
 cardiovascular disease risk stratification, **18:13**  
 cardiovascular risk factors, **15:27–28**  
 in diabetes of youth, **15:37–38**  
 scores and glycemic control, **15:38**  
 subclinical atherosclerosis, **15:34; 18:13**
- Coronary Artery Risk Development in Young Adults (CARDIA).** See CARDIA study
- Coronary heart disease (CHD).** See Heart disease
- Coronary vascular disease.** See Cardiovascular disease (CVD); Heart disease
- Cortical (lens) opacities, 21:34**
- Corticosteroids**  
 fracture risk and, **32:12**  
 hyperglycemic hyperosmolar state precipitation by, **17:6–7**  
 inflammatory bowel disease treatment, **27:15**  
 prevention trial with azathioprine, **37:7**  
 risk of hyperglycemia with, **6:18**  
 unmasking mild diabetes with, **23:3**
- Cortisol**  
 in anxiety disorders, **33:19**  
 disturbed sleep and type 2 diabetes link, **13:15**  
 in DKA, **17:1**  
 effects on insulin sensitivity, **25:19**  
 with insulin processing defects, **7:11–12**  
 interleukin-6 levels and, **33:14**  
 with sleep deprivation, **25:10**
- Cotton-wool spots, 21:12**
- Covert brain infarcts (CBI), 19:2–3**
- Cow's milk exposure/consumption**  
 autoimmunity development, **15:11**  
 autoimmunity risk with, **11:16**  
 breastfeeding and, **37:3**  
 islet cell autoimmunity association, **11:10**
- Cox proportional-hazards models**  
 death with/without diabetes, **36:9**  
 physical activity impairment, **18:12**  
 puberty vs. prepubertal diagnosis and death risk, **35:6**  
 sRAGE levels and risk of type 2 diabetes, **19:11**
- Coxsackie virus, 11:4**
- CPAP (continuous positive airway pressure)**  
 obstructive sleep apnea treatment, **25:18**  
 treatment during pregnancy, **25:21**
- C-peptide**  
 with atorvastatin, **37:14**  
 in cord blood, **4:9**  
 in diabetes definition, **2:3**  
 diabetes surveillance with, **2:4**  
 diagnosis of type 2 diabetes in youth, **15:2–3**  
 differentiating types 1 and 2 diabetes, **1:3**  
 in Donohue syndrome, **7:12**  
 in early types 1 and 2 diabetes, **1:3**  
 endogenous insulin production measurement, **2:3**  
 fasting levels, **1:3**  
 in hyperglycemic hyperosmolar state, **17:6**  
 impaired signaling pathways, **23:7**  
 with *KCNJ11* and *ABCC8* mutations, **7:10**  
 in linomide study, **37:7**  
 in MODY diagnosis, **7:4,8**  
 in permanent neonatal diabetes, **7:10**  
 pregnancy outcome with diabetes and, **4:8–9**  
 pregnancy outcomes and cord serum levels, **4:9**  
 in prevention studies, **37:7,11,12–13**  
 response with anti-celiac disease intervention, **37:11**  
 in risk score construction, **1:28**  
 with rituximab, **37:13**  
 in signaling pathways, **17:6**  
 stimulated, in cyclosporine trials, **37:7**  
 stimulated response, **2:3; 37:7**  
 for symptom relief in peripheral neuropathy, **23:8–9**  
 with teplizumab trial, **37:12–13**  
 in type 1 diabetes diagnosis, **2:3–4,11; 3:2**  
 in type 2 diabetes, **13:17; 15:2–3**  
 in types 1 and 2 diabetes, **1:3**
- C-reactive protein (CRP)**  
 adverse pregnancy outcome risk and, **31:25**  
 biomarker for type 2 diabetes, **13:18; 18:2**  
 by diabetic status, **9:23**  
 disease associations, **18:12**  
 gingivitis and gestational diabetes effects, **31:25**  
 levels with peripheral arterial disease, **20:9**  
 liver secretion of, **13:19**  
 periodontal disease association, **31:8–9**  
 with peripheral arterial disease, **20:8**  
 prediction of cardiovascular disease, **18:12**  
 stroke predictor, **19:10**  
 synthesis and secretion of, **13:19**  
 type 2 diabetes risk association, **13:19**
- CRISPR/CAS9 editing, 14:10**
- Crohn's disease.** See Inflammatory bowel diseases
- Crown-rump length, shortened, 5:67**
- CRY2 (circadian) gene**  
 circadian rhythm, **37:6**  
 fasting glucose association with, **14:8**  
 fasting plasma glucose association with, **14:8**
- C-statistic, 13:24**
- CTLA4 gene, type 1 diabetes susceptibility, 11:16; 12:6–7**
- Cubans**  
 diagnosed diabetes prevalence, **3:7**

prediabetes prevalence, **3:14**  
 total cholesterol prevalence, **3:13**  
 type 2 diabetes prevalence, **3:6**  
 undiagnosed diabetes prevalence, **3:12**  
**Curative Health Services prognostic system**, **20:22**  
**Cushing syndrome**, **6:15**  
**Cyclooxygenase (COX) inhibitor nephrotoxicity**, **22:39**  
**CYP2C9 enzyme**, **14:9**  
**Cystatin C**, **22:1,4**  
**Cystic fibrosis-related diabetes (CFRD)**  
 complications and prognosis, **6:6–7**  
 diagnosis of, **6:5–6**  
 management, **6:6**  
 pathophysiology, **6:5**  
 screening for, **1:14**  
 screening tests for, **1:14; 6:6**  
**Cystitis**  
 presentation of, **30:9–10**  
 prevalence with type 1 diabetes, **22:56**  
 risk with type 1 diabetes, **30:9**  
**Cytokines**. See also Adipocytokines/  
 adipokines  
 in diabetic kidney disease, **22:8,31,34**  
 docosahexaenoic supplement effects on  
 inflammatory, **37:5**  
 with endocrinopathies, **6:16**  
 with immune response to gluten, **27:9**  
 in inflammatory response with sleep deprivation, **25:10**  
 in obstructive sleep apnea, **25:20,21**  
 periodontitis-diabetes association, **28:6**  
 placental production of, **5:67,69**  
 proinflammatory, **13:19; 25:10**  
 prostatic growth factor stimulation, **28:4**  
 in type 1 diabetes immune response, **37:2**  
 in type 2 diabetes, **13:18**  
**Cytomegalovirus (CMV)**  
 fetal demise with congenital, **6:4–5**  
 type 1 diabetes risk with, **11:8**

## D

**Da Qing RCT of Lifestyle Modification**  
 lifestyle treatment for impaired glucose  
 tolerance, **1:25**  
 prevention of type 2 diabetes studies, **38:5**  
 screening benefits, **1:25**  
**Daclizumab anti-CD25 study**, **37:12**  
**DAISY study**  
 alpha-linoleic acid intake/*FADS1* and  
*FADS2* interactions, **11:16**  
 cow's milk consumption, **11:16**  
 early cereal exposure, **11:9,16**  
 early solid food exposure, **11:11**  
 enteroviral infections, **11:4–5,6**  
 islet autoimmunity and gastrointestinal  
 illnesses, **11:17**  
 islet autoimmunity and progression to type  
 1 diabetes, **11:12**  
 islet autoimmunity risk with cereal expo-  
 sure, **11:10**

prevention of DKA in children, **17:4–5**  
 seroconversion and progression to type 1  
 diabetes, **37:2**  
 type 1 diabetes risk and cod liver oil, **11:16**  
**Danish studies**. See also Steno Hospital/Clinic  
 studies  
 A1c levels in first trimester, **5:10**  
 A1c pregnancy levels and offspring, **5:75**  
 cesarean delivery in diabetic women, **5:46**  
 hormonal contraceptive complications  
 with diabetes, **5:12**  
 legal blindness with retinopathy, **21:7**  
 major malformations with type 2 diabetes,  
**5:62**  
 maternal mortality ratio consecutive  
 diabetic pregnancies, **5:22**  
 microalbuminuria in nondiabetic women  
 on oral contraception, **5:13**  
 nephropathy prevalence data, **5:29**  
 perinatal mortality with type 1 vs. 2  
 diabetes, **5:43**  
 preeclampsia rates in, **5:34**  
 prevalence and progression of retinopathy  
 in pregnancy, **5:27**  
 retinopathy progression during pregnancy,  
**5:27**  
**Dapagliflozin cardiovascular benefits**, **18:15**  
**Dapagliflozin Effect on Cardiovascular  
 Events (DECLARE) trial**, **18:15**  
**Data from an Epidemiological Study of the  
 Insulin Resistance Syndrome (DESIR)**. See  
 DESIR study  
**DCCT study**  
 A1c levels and incidence of, **15:27**  
 A1c measures by, **1:7,9–10**  
 condition at birth, **5:48**  
 diabetes treatment in pregnancy, **5:3**  
 hypoglycemic episode definition, **17:9**  
 hypoglycemic episodes in pregnancy,  
**5:26–27**  
 intensive glycemic control, **18:13**  
 intensive insulin therapy and DKA inci-  
 dence, **15:17**  
 intensive treatment effects on neuropathy,  
**23:2**  
 intensive vs. conventional glucose control,  
**19:13**  
 long-term effects of pregnancy on, **5:27**  
 lower extremity amputation and glycemic  
 control, **20:25**  
 nephropathy reduction with, **15:24–25**  
 peripheral arterial disease outcomes, **20:5**  
 pregnancy effects on renal function,  
**5:29–30**  
 progression of carotid media-intima thick-  
 ness, **20:10**  
 retinopathy progression, **5:26**  
 retinopathy progression in adolescents,  
**15:18**  
 spontaneous abortion rate, **5:36–37**  
**DCCT/EDIC**. See also EDIC study  
 A1c levels for diagnosis, **1:7**  
 albuminuria effects, **22:46**

cardiac autonomic neuropathy rates,  
**23:12–13**  
 cardiac autonomic neuropathy with  
 reduced A1c levels, **15:27**  
 cardiovascular autonomic neuropathy in  
 type 1 diabetes, **23:13**  
 carotid intima media thickness improve-  
 ment, **15:37; 20:12**  
 cognitive impairment in adolescents and  
 adults with type 1 diabetes, **24:6**  
 coronary artery calcification, **15:38**  
 coronary artery disease reduction, **15:28**  
 distal symmetrical polyneuropathy inci-  
 dence, **23:9**  
 erectile dysfunction with diabetes, **28:10**  
 gene associations with kidney disease,  
**22:43**  
 glycemic control and mortality, **35:10**  
 intensive therapy effects on mortality,  
**35:9**  
 intensive vs. conventional insulin therapy,  
**15:18**  
 joint complications with diabetes,  
**32:17–18**  
 metabolic memory assessment, **18:13**  
 metabolic memory with glycemic control,  
**21:22; 23:12–13**  
 mortality classification used, **35:8**  
 musculoskeletal disorder in upper  
 extremity, **32:18**  
 nephropathy reduction with, **15:24**  
 neuropathy risk reduction, **23:11**  
 peripheral neuropathy assessment, **23:4**  
 persistent microalbuminuria in, **22:15**  
 retinopathy progression in adolescents  
 and adults, **15:18**  
 sexual dysfunction association, **28:7–8**  
 urinary tract infections, **28:6**  
 visual impairment effects, **21:8**  
**DCCT/EDIC intensive treatment/follow-up**.  
 See DCCT study; EDIC study  
**De novo mutations**  
 monogenic diabetes from, **7:2,4**  
 in permanent neonatal diabetes, **7:10**  
 with SHORT syndrome, **7:20**  
**“Dead-in-bed” syndrome**, **35:10**  
**Deafness**. See Hearing loss/deficits  
**Death certificates**, **36:3**  
**Death rates**. See Mortality and morbidity  
**Degenerative joint disease**, **32:14**  
**Delayed gastric emptying (GE)**, **27:4,7**  
**Delivery complications**  
 maternal mortality, **5:22**  
 pregnancy-related stroke and hypertensive  
 disorders, **5:22–23**  
 preterm delivery, **5:45**  
 prevalence by maternal age, **5:16**  
 for types 1 and 2 diabetes, **5:45**  
**Delta-5-desaturase encoding gene**, **11:16**  
**Delta-6-desaturase encoding gene**, **11:16**  
**Dementia**. See AD dementia  
**DEND (developmental delay, epilepsy, and  
 NDM)**, **7:10**

**Dental Atherosclerosis Risk in Communities (DARIC), 31:15****Dental care utilization, 31:39–40; 40:15****Depakote (valproic acid), 33:22****Department of Veterans Affairs, 41:2****Depressive episode or symptoms.** *See also*

Major depressive disorder

diabetes distress, **33:4,10,15**

gastrointestinal symptom association,

**27:3**

subthreshold depressive symptoms and

diabetes distress, **33:4**type 2 diabetes risk factors, **13:15;****33:10–11****DESIR study**A1c and fasting plasma glucose measures,  
**1:15**sex difference in A1c, **1:11****DETECT-2 study**A1c assay standardization, **1:9**A1c for long-term complication risk, **1:12**retinopathy prediction, **1:12****Dextran sieving profiles, 22:9****Diabetes**acute metabolic complications, **17:1–19**bone and joint complications, **32:1–22**cancer and diabetes, **29:1–21**classification and diagnosis, **1:1–39**cognitive impairment with, **24:1–19**diagnosis and screening for, **1:6–29**disability and, **34:1–15**gastrointestinal manifestations of, **27:1–22**genetics of type 1 diabetes, **12:1–16**genetics of type 2 diabetes, **14:1–25**gestational diabetes, **4:1–17**health care utilization and costs of,  
**40:1–78**health insurance and, **42:1–18**heart disease and, **18:1–30**infections associated with, **30:1–25**kidney disease in, **22:1–84**lifestyle characteristics, **10:1–42**liver and gallbladder disease in, **26:1–23**medication use and self-care practices  
with, **39:1–14**monogenic forms of, **7:1–27**mortality in type 1 diabetes, **35:1–16**

mortality trends in type 2 diabetes,

**36:1–14**ocular functions and diseases with,  
**21:1–49**in older adults, **16:1–26**oral health and, **31:1–49**other types of, **6:1–29**peripheral and autonomic neuropathy in,  
**23:1–20**peripheral arterial disease, **20:1–34**physical and metabolic characteristics,  
**9:1–55**with pregnancy, **5:1–101**prevention of type 1 diabetes, **37:1–21**prevention of type 2 diabetes, **38:1–21**psychiatric/psychosocial issues, **33:1–34**quality of care with, **41:1–19**risk factors for type 1 diabetes, **11:1–29**risk factors for type 2 diabetes, **13:1–37**sleep and circadian disturbances effects,  
**25:1–44**sociodemographic characteristics of  
persons with, **8:1–67**stroke and, **19:1–23**

trends in prevalence and incidence,

**3:17–21**type 1 diabetes in children and adults in  
U.S., **1:54–70**type 1 diabetes prevalence and incidence,  
**2:1–70**type 2 diabetes and prediabetes preva-  
lence and incidence, **3:1–32**urologic diseases and sexual dysfunction  
in, **28:1–26**in youth, **15:1–54****Diabetes and Atorvastatin (DIATOR) Trial,  
37:14****Diabetes and cancer, 29:1–21****Diabetes and disability/impairment.** *See**also* Disability and diabetesdiagnostic status and glucose classifica-  
tion, **34:5**educational level association, **34:5**prevalence in diagnosed diabetes, **34:3**scope of, **34:4–5****Diabetes Atherosclerosis Intervention Study  
(DAIS), 22:52****Diabetes Attitudes, Wishes, and Needs****Second Study (DAWN2), 33:9****Diabetes autoantibodies (DAA), 2:3–4****Diabetes Autoimmunity Study in the Young****(DAISY).** *See* DAISY study**Diabetes Awareness and Rehabilitation****Training (DART), 33:22****Diabetes Control and Complications Trial****(DCCT).** *See* DCCT study**Diabetes distress, 33:4,10,15****Diabetes Epidemiology: Collaborative****Analysis of Diagnostic Criteria in Europe****(DECODE)**diabetes and cancer mortality, **29:4**glucose tolerance and heart disease risk,  
**18:7**glycemic test comparisons, **1:15****Diabetes Epidemiology Research****International (DERI)**cohort characteristics of, **35:3**international mortality rates, **35:12**mortality classification and review, **35:3**

mortality in childhood-onset type 1

diabetes, **35:3–4,8,12**mortality in type 1 diabetes, **35:12****Diabetes in Early Pregnancy study (DIEP).***See* DIEP study**Diabetes in youth, 15:1–54**antibodies in classification of types 1 and 2  
diabetes, **15:3–4**arterial stiffness, **15:27–28,34**burden of, **15:4–10**cardiac autonomic neuropathy, **15:25–27**cardiovascular risk factors, **15:27–34**carotid intima media thickness, **15:34,37**cerebral edema risk with DKA, **17:5**complications, **22:9**criteria for screening, **1:14**current surveillance for type 1 diabetes,  
**2:5**definitions and classification of, **15:1–4**diabetes-periodontitis interactive effects,  
**31:18–21**diabetic peripheral neuropathy, **15:25**dyslipidemia, **15:33**early life diet, **15:11**early life factors, **15:12–13**elevated blood pressure, **15:29,33**future directions for research and preven-  
tion, **15:41**

genetic factors in type 2 diabetes,

**15:11–12**genetic susceptibility in type 1 diabetes,  
**15:10**glycemic control, **15:29**hypoglycemia, **15:17**impact of youth onset, **2:2**intrauterine environment effects, **15:12**life expectancy predictions for, **36:8**limitations of traditional classification for,  
**15:2–3**microvascular complications, **15:17–27**mortality studies, **15:38–41**mortality with cerebral edema with DKA,  
**17:3**nephropathy, **15:20–25**neuropathy, **15:25–27**obesity, diet, and physical activity, **15:12**obesity and insulin resistance, **15:33–34**pediatric diabetes data, **15:4**with pediatric-onset inflammatory bowel  
disease, **27:15**periodontal disease onset, **31:18–19**

peripheral neuropathy in types 1 and 2

diabetes, **15:25–27**positive autoantibodies at screening, **1:14**prevalence of types 1 and 2 diabetes,  
**5:6–7**provider/etiologic classification agreement,  
**15:4**retinopathy, **15:17–20**retinopathy treatment/intervention, **15:18**risk factors for, **15:10–13**

screening for cystic-fibrosis related

diabetes, **1:14**SEARCH study surveillance for, **2:2; 3:4–5**sleep and circadian disturbances, **25:1–44**subclinical cardiovascular disease,  
**15:34–38**tooth eruption rate with diabetes, **31:36**

type 1 diabetes

cardiac autonomic neuropathy in,  
**15:27**cardiovascular endpoint predictors,  
**15:34**

- complications of, **15:1,13–17**  
 coronary artery calcification in, **15:38**  
 glycemia and cardiovascular disease  
 in, **15:28**  
 incidence of, **2:6–7; 15:2,5–6**  
 international rate comparisons, **2:7**  
 microalbuminuria regression in  
 type 1 diabetes, **15:23–24**  
 mortality in, **15:38–39**  
 prevalence, **2:5; 15:4–5**  
 prevalence trends in, **1:14**  
 projections for, **15:6–8**  
 retinopathy in, **15:17–18**
- type 2 diabetes  
 characteristics of, **15:2**  
 diabetic nephropathy in Pima Indians,  
**15:24**  
 ESRD incidence in Pima Indians,  
**22:37**  
 fetal overnutrition effects in, **15:12**  
 kidney disease course in, **22:2**  
 microalbuminuria at diagnosis, **15:24**  
 mortality in, **15:39**  
 prevalence and incidence, **15:8–9**  
 projections, **15:10**  
 retinopathy with, **15:18**  
 risk factors, **15:11–13**  
 screening for, **1:14**  
 trends in, **15:9–10**
- in utero hyperglycemia exposure levels,  
**13:13**  
 viruses and immunizations, **15:10–11**
- Diabetes insipidus, 7:8**  
**Diabetes Insipidus, Diabetes Mellitus, Optic Atrophy, Deafness (DIDMOAD), 7:8**  
**Diabetes Prediction and Prevention (DIPP) study.** See DIPP study  
**Diabetes Prevention - Immune Tolerance study (DIAPREV-IT), 37:6**  
**Diabetes Prevention Program (DPP).** See DPP clinical trial  
**Diabetes Prevention Program Outcome Study (DPPOS).** See DPPOS study  
**Diabetes Prevention Trial-Type 1 (DPT-1) Study Group**  
 insulin trials, **37:6**  
 prevention of DKA in children, **17:4–5**
- Diabetes Reduction Assessment with Ramipril and Rosiglitazone Medication (DREAM), 38:9**
- Diabetes registries.** See also SEARCH study  
 Allegheny County Type 1 Diabetes Registry,  
**2:5; 15:6; 31:17; 35:3**  
 Chicago Childhood Diabetes Registry,  
**2:5,7**  
 childhood type 1 diabetes data, **15:4**  
 Children's Hospital of Pittsburgh, **35:3**  
 Colorado Insulin Dependent Diabetes, **2:5; 15:6**  
 EURODIAB, **2:10; 15:6**  
 European nation-specific, **2:5**  
 Finland, **2:5**  
 Kaiser Permanente Northern California,  
**5:3,71**  
 Kaiser Permanente Southern California,  
**5:15,16,18**  
 New Zealand, **2:5**  
 Philadelphia Pediatric Diabetes Registry,  
**15:4,6**  
 Pittsburgh Epidemiology of Diabetes  
 Complications, **35:3**  
 in public health surveillance, **2:4**  
 Sweden, **2:5**  
 United Kingdom, **2:5**  
 Wisconsin Epidemiologic Study of Diabetic  
 Retinopathy, **2:5**
- Diabetes risk score, 1:28; 37:3**
- Diabetes surveillance**  
 current systems for, **2:5**  
 Finland, **2:4**  
 HIT-based systems, **2:13**  
 postpubertal males, **2:13**  
 U.S. public health, **2:4**
- Diabetes-associated birth defects, 5:11**  
**DIAbetesMONDiale (DIAMOND) project.**  
 See DIAMOND project  
**Diabetes-susceptibility genes, DPP study, 38:11**
- Diabetic amyotrophy.** See Diabetic radiculoplexus neuropathy (DRPN)  
**Diabetic autonomic neuropathy (DAN).** See also Cardiovascular autonomic neuropathy  
 cardiovascular autonomic neuropathy,  
**23:3–4**  
 gastrointestinal autonomic neuropathy,  
**23:4**  
 kidney function with, **22:39–40**  
 signs and symptoms of, **15:27**  
 as stroke risk, **19:3**  
 sudomotor dysfunction, **23:4**  
 urogenital autonomic neuropathy, **23:4**
- Diabetic diarrhea.** See Diarrhea  
**Diabetic foot ulcers.** See Foot ulcers in diabetes  
**Diabetic kidney disease, 22:1–84.** See also Chronic kidney disease (CKD)  
 A1c levels with renal failure, **1:12**  
 ACEI and ARB for control of progression,  
**19:12**  
 albumin excretion normalization with treatment, **22:5–6**  
 albuminuria as marker for, **22:3**  
 albuminuria classification, **22:3**  
 albuminuria with type 2 diabetes, **22:7**  
 arteriolar hyalinosis, **22:9**  
 association with diabetes, **1:6**  
 autonomic neuropathy and risk for,  
**22:39–40**  
 biomarkers for, **22:1,3,9**  
 blood lipid control in treatment, **22:51–52**  
 blood pressure control in treatment,  
**19:12; 22:48–51**  
 cardiovascular mortality prediction by,  
**35:4**  
 classification of, **22:2**  
 clinical course of, **22:5–10**  
 comorbidity and mortality risks from,  
**22:19–24**  
 control of blood lipids, **22:51**  
 decline in incidence with type 1 diabetes,  
**22:16**  
 definition of, **22:3**  
 diagnosis of, **22:2**  
 diagnostic criteria for, **22:3**  
 dietary modification in treatment,  
**22:52–54**  
 dietary protein as risk factor for, **22:35–36**  
 in differential diagnosis of MODY, **7:8**  
 distal symmetrical polyneuropathy association, **23:2**  
 drug nephrotoxicity and, **22:38–39**  
 duration of diabetes as risk factor, **22:30**  
 elevated urinary albumin excretion,  
**22:12–19**  
*ELMO1* gene association, **22:43**  
 epigenetic changes and, **22:45**  
 epigenetic programming from in utero  
 exposure, **22:42**  
 ESRD and mortality with type 1 diabetes,  
**22:20–21**  
 ESRD incidence and prevalence with,  
**22:25–30**  
 ESRD survival, **22:27–30**  
 familial and genetic risk factors for,  
**22:42–45**  
 foot ulcer association, **20:19**  
*FRMD3* gene association, **22:43**  
 glomerular hemodynamic function, **22:6–7**  
 glomerular-tubular junction abnormalities,  
**22:9**  
 hemodynamic changes with diabetes,  
**22:6–7**  
 histologic changes with diabetes, **22:7–8**  
 hyperglycemia as risk factor, **22:30–31**  
 hypertension as risk factor, **22:31–32**  
 hypertension relation and, **35:11**  
 insulin restriction by patient, **33:20**  
 intensive glycemic control effects,  
**16:13,15; 22:46–47**  
 intensive insulin therapy, **15:24**  
 intensive treatment effects, **15:24–25**  
 interstitial expansion with, **22:9**  
 intrauterine factors in, **22:42**  
 lesions in type 2 diabetes, **22:7**  
 lipid abnormalities as risk factor, **22:32–35**  
 living tissue imaging in, **22:10**  
 maternal diabetes as risk for, **15:24–25**  
 metabolic control for treatment, **22:46–48**  
 microalbuminuria progression in youth,  
**15:20**  
 morphometry, **22:7–9**  
 as mortality risk with comorbid diseases,  
**22:19–20**  
 mortality risk with type 1 diabetes, **22:20**  
 multidisciplinary management for treatment, **22:54**  
 noncardiovascular mortality causes with,  
**22:22**

- obesity and risk for, **22:37–38**  
 obesity-related, **22:37–38**  
 at onset of pregnancy care, **5:29–30**  
 oral contraception and, **5:13**  
 periodontal disease and risk for, **22:38**  
 podocyte injury in, **22:8,10**  
 pregnancy and risk for, **22:40–41**  
 premature mortality with, **36:8**  
 prevalence with pregnancy, **5:29**  
 progression during pregnancy, **5:29**  
 progression of with diabetes in youth, **15:20**  
 protein-intake restriction, **22:52–53**  
 regression or progression in type 1 diabetes, **22:17**  
 relation to hyperglycemia, **22:54**  
 retinopathy association, **21:25**  
 retinopathy for detection of, **22:4**  
 risk factor for retinopathy, **21:25**  
 risk factors for kidney disease, **22:30–45**  
 selective glomerular permeability, **22:9–11**  
 smoking and risk for, **22:36–37**  
 socioeconomic factors, **22:30**  
 sodium intake, **22:53**  
 treatment of, **22:46–54**  
 type 2 diabetes in pregnancy, **5:29**  
 with types 1 and 2 diabetes in youth, **15:24**  
 with youth-onset diabetes, **22:3**
- Diabetic neuropathies, 23:1–20**  
 acute painful small fiber neuropathy, **23:3**  
 assessment of, **23:5–7**  
 bladder effects of, **28:14**  
 burning mouth, glossodynia, **31:37–38**  
 cardiovascular autonomic neuropathy, **23:3–4**  
 cause of foot ulcers, **20:17**  
 chronic inflammatory demyelinating polyneuropathy, **23:3**  
 classification, **23:2–5**  
 contribution to infections, **30:5**  
 corneal mechanical sensitivity with, **21:37**  
 criteria for diagnosis, **5:29**  
 definition, **23:2**  
 diabetic autonomic neuropathy, **23:3**  
 diabetic radiculoplexus neuropathy, **23:3**  
 diagnosis of sensory, **20:18**  
 in disability with diabetes, **34:11**  
 disease-modifying treatment for, **23:7–9**  
 distal symmetrical polyneuropathy, **23:2–3**  
 epidemiology, **23:9–14**  
 focal peripheral neuropathies, **23:3**  
 gastrointestinal autonomic neuropathy, **23:4**  
 nerve fiber repair assessment, **23:6**  
 pathogenesis of, **23:7**  
 in pregestational diabetes, **5:28–29**  
 during pregnancy, **5:28–29**  
 secondary complications of, **23:14–15**  
 sudomotor dysfunction, **23:4**  
 symptomatic treatment of, **23:9**  
 urogenital autonomic neuropathy, **23:4**
- Diabetic papillopathy, 21:39**  
**Diabetic peripheral neuropathy (DPN). See**  
 Distal symmetrical polyneuropathy  
**Diabetic radiculoplexus neuropathy (DRPN), 23:3; 26:20**  
**Diabetic retinopathy. See** Retinopathy  
**Diabetic RETinopathy Candesartan Trials (DIRECT), 21:24–25**  
**Diagnosed diabetes**  
 disability prevalence in, **34:3**  
 disability/impairment status, **34:7–8**  
 functional limitations reported, **34:9**  
 gallstone disease with diabetes, **26:15**  
 lipid measures in, **9:17–21**  
 lower extremity amputations in, **20:24**  
 NHIS/NHANES estimates of type 2 diabetes, **3:15**  
 physical activity, **10:12**  
 risk factor control for care in, **41:3–5**  
 2-hour plasma glucose in untreated, **9:7**  
 waist circumference measures in, **9:14**
- Diagnosed diabetes incidence**  
 incidence by NHIS data, **3:16**  
 trends in, **3:17**  
 type 2 diabetes in youth, **3:16**
- Diagnosed diabetes prevalence**  
 by age, **3:4–5**  
 Asian subgroups, **3:7–8**  
 county level, **3:8–9**  
 HCHS/SOL study, **3:7**  
 NHIS and NHANES comparison for, **3:15**  
 in nonpregnant women of childbearing age, **5:4–5**  
 in older adults, **16:2**  
 overall in U.S. populations, **3:4**  
 plateau in, **3:17**  
 race/ethnicity patterns in type 2 diabetes and prediabetes, **3:5–6**  
 by sex, **3:5**
- Diagnostic criteria for diabetes. See also**  
*specific glycemia measures*  
 A1c/FPG/2-hour plasma glucose measures, **9:2**  
 gestational diabetes, **4:1,5**  
 glucose metabolism measures for, **36:2–3**  
 impaired fasting glucose for prediabetes, **1:5–6**  
 prediabetes, **1:5–6; 9:2**  
 presymptomatic diabetes, **1:1**  
 2-hour plasma glucose, **36:1**  
 type 1 diabetes, **1:3,27–28**  
 type 1b diabetes, **1:3; 15:2**  
 type 2 diabetes, **1:3–4,6,22–23**
- Dialysis Outcomes and Practice Patterns Study (DOPPS), 22:48**  
**DIAMOND project**  
 mortality in childhood-onset type 1 diabetes, **35:12**  
 type 1 diabetes prevalence/incidence age <20 years, **15:6**  
 WHO diabetes surveillance, **2:5**
- DiaPep277 intervention studies, 37:12**
- Diarrhea**  
 acarbose and, **38:8**  
 autonomic neuropathy association, **23:9**  
 with celiac disease, **27:12**  
*Clostridium difficile* infections, **30:14**  
 diabetic, **23:4**  
 diagnosis and management, **27:7–8**  
 fecal incontinence, **27:8**  
 with metformin, **27:7**  
 nocturnal, **27:2**
- Diazoxide, 7:5**  
**DIEP study**  
 adult-onset diabetes mellitus, **5:2–3**  
 prevalence in early pregnancy, **5:26**  
 retinopathy progression, **5:27**  
 spontaneous abortion data, **5:35–36**  
 with type 1 diabetes, **5:2–3**
- Dietary Approaches to Stop Hypertension (DASH) diet, 22:54**  
**Dietary factors/exposures**  
 breastfeeding, **11:9**  
 cereal/grain exposure and type 1 diabetes, **15:11**  
 cow's milk consumption, **11:9–10**  
 diabetic kidney disease risk factors, **22:35–36**  
 early cereal exposure, **11:9,10–11,16; 27:14**  
 early life, **15:11**  
 gene interaction with, **11:16**  
 glycemic index, **11:14**  
 HLA variants and exposures, **11:16**  
 maternal diet, **11:9**  
 polyunsaturated fatty acids, **11:12–13**  
 type 2 diabetes risk factors, **13:6–10**  
 type 2 diabetes risk reduction with, **13:10; 29:6**  
 vitamin D, **11:11–12**  
 vitamin E, **11:13**  
 weight gain, insulin resistance and beta cell stress, **11:13–14**  
 whole grains and diabetes risk, **13:8**  
 zinc, **11:13**
- Digit Symbol Substitution Test (DSST), 24:2,8,12,13**  
**DiMe (Childhood Diabetes in Finland Study), 11:4,6**  
**Dipeptidyl peptidase-4 (DPP-4) inhibitors**  
 oral medication for glycemic control, **39:2**  
 recent-onset diabetes and, **37:14**  
 thyroid cancer and use of, **29:10**
- DIPP study**  
 antibodies in type 1 diabetes progression, **37:2**  
 enteroviral RNA in stool, **11:5**  
 progression to type 1 diabetes, **11:6**
- Disability, 34:1–15**  
 activity of daily living disability, **34:3**  
 with bipolar disorder, **33:21**  
 definition and measurement, **34:2–4**  
 demographic factors in, **34:4–7**  
 diabetes risk and, **34:12**  
 domains of, **34:1–2**

- excess disability with diabetes, **34:11**  
 factors in disability with diabetes, **34:11–12**  
 interventions to reduce risk of, **34:12**  
 longitudinal association with disability, **34:9**  
 national estimates trends, **34:9–11**  
 physical functioning/mobility, **34:3–4**  
 prediabetes, diabetes and morbidity status, **34:7–8**  
 risk of diabetes with, **34:12**  
 from stroke, **19:2**  
 with visual impairment, **21:1**
- Distal symmetrical polyneuropathy (DSPN)**  
 altered sensation in, **15:25**  
 assessment instruments, **23:5**  
 characteristics of, **23:2**  
 clinical signs, **23:2,5**  
 computer assisted sensory examination, **23:6**  
 constitutional risk factors, **23:12**  
 deep tendon reflexes in, **15:25**  
 with diabetes in youth, **15:25**  
 diagnostic criteria and staging of, **15:25; 23:5**  
 electrophysiology, **23:6**  
 end-state complications of, **23:14**  
 glycemic control in type 2 diabetes, **23:11**  
 hyperglycemia in risk for, **15:25–27**  
 incidence and prevalence, **15:25; 23:2,9–11**  
 incidence estimates in type 1 diabetes, **23:9**  
 late sequelae of, **23:2**  
 myelinated fiber function, **23:6**  
 natural history of, **23:11**  
 nerve fibers affected, **23:2,5–6**  
 onset and course of, **23:11**  
 prevalence in types 1 and 2 diabetes, **23:10–11**  
 quality of life assessment, **23:5**  
 quantitative sensory testing, **23:5–6**  
 race/ethnicity and prevalence, **23:10**  
 risk factors for, **23:11–12**  
 Semmes-Weinstein monofilament testing, **15:25; 23:6**  
 skin biopsy/corneal confocal microscopy, **23:6**  
 small fiber deficits in, **23:6**  
 symptoms, **23:2,5**  
 temporal trends neuropathy incidence, **23:9–10**  
 thermal and cooling threshold testing, **15:27; 23:6**  
 in type 1 diabetes in youth, **15:25–27**  
 in type 2 diabetes in youth, **15:27**  
 vibration perception testing, **15:25,27; 23:5**
- DKA (diabetic ketoacidosis), 17:1–5**  
 complications of, **17:3**  
 cost, **17:3–4**  
 DCCT study, **5:25**  
 definition as triad, **17:1–2**  
 diabetes in youth presentation with, **15:2–3**  
 diagnostic coding of, **17:1–2**  
 early mortality with type 1 diabetes, **35:9**  
 hospital discharge data, **17:2–3**  
 incidence in established diabetes, **17:2**  
 ketoacidotic episodes in pregnancy, **5:25**  
 ketoacidotic episodes in types 1 and 2 diabetes, **5:25**  
 maternal complications with diabetes, **5:25**  
 morbidity and mortality, **17:3**  
 pathogenesis, **17:1**  
 pediatric treatment recommendations, **17:5**  
 predictors and precipitating factors, **17:2**  
 in pregestational diabetes, **5:25**  
 prevalence at diagnosis, **17:2**  
 prevention, **17:4–5**  
 stillbirth comorbidities, **5:43**  
 treatment, **17:5**  
 in youth with types 1 and 2 diabetes, **15:13–17**
- Docosahexaenoic acid (DHA)**  
 sources and function of, **11:12**  
 supplementation in pregnancy, **37:5**  
 type 1 diabetes risk association, **11:12–13**
- Dominicans**  
 diagnosed diabetes prevalence, **3:7**  
 prediabetes prevalence, **3:14**  
 undiagnosed diabetes prevalence, **3:12**
- Donabedian health care model, 41:2**
- Donohue syndrome, 7:12**
- Double diabetes.** See Combined types 1 and 2 diabetes
- Down syndrome (DS)**  
 diabetes risk with, **6:16**  
 type 1 diabetes frequency with, **2:2**
- DPP clinical trial**  
 cognitive impairment with diabetes, **24:13**  
 conventional vs. intensive lifestyle treatment of IGT, **1:19**  
 cost effectiveness of screening, **1:27**  
 diabetes development after gestational diabetes, **4:12**  
 diabetes-susceptibility gene typed in, **38:11**  
 early treatment benefits, **1:22**  
 follow-up plans, **38:12**  
 genetic analysis of prevention trials, **38:11**  
 implementation activities following, **38:15**  
 lifestyle intervention, **1:22**  
 lifestyle intervention after gestational diabetes, **4:12**  
 lifestyle intervention for dysglycemia, **1:19; 38:6–8**  
 lifestyle interventions and medication evaluation, **16:12–13; 18:18**  
 microaneurysms with dysglycemia, **1:16**  
 prediction of type 2 diabetes by genetic risk score, **13:5**  
 prevention in geriatric population, **16:12–13**  
 regression to normal glucose levels, **18:18**  
 single nucleotide polymorphism interactions with metformin, **38:11**  
 urinary incontinence prevention, **28:19**
- DPPOS study**  
 benefit of treatment in asymptomatic phase, **1:22**  
 cognitive impairment follow-up, **24:13**  
 cost savings with prevention, **38:16**  
 intensive lifestyle intervention, **18:18**  
 intensive lifestyle intervention and prediabetes, **18:18**  
 metformin long-term follow-up, **38:7**  
 screening effects on mortality, **1:23**
- DPT-1 Oral Insulin Trial, 37:6**
- DPT-1 Parenteral Insulin Trial, 37:6**
- Drug nephrotoxicity, 22:38–39**
- Drug/chemical-induced diabetes**  
 atypical antipsychotics, **6:11**  
 beta blockers, **6:11–12**  
 calcineurin inhibitors, **6:11**  
 environmental toxins and pollutants, **6:13–14**  
 glucocorticoids, **6:11**  
 growth hormone, **6:13**  
 HIV antiretroviral therapy, **6:12**  
 HMG Co-A reductase inhibitors, **6:12**  
 independent hyperglycemia association, **6:10**  
 niacin, **6:12–13**  
 oral contraceptives and progestins, **6:13**  
 petamidine, **6:13**  
 thiazide, **6:12**
- Dry eye, 21:37**
- Duncan Index, 21:29**
- Duration of diabetes**  
 age at diagnosis, **8:8–9**  
 age at onset of type 2 diabetes and, **22:27**  
 albuminuria incidence, **22:14**  
 albuminuria prevalence, **22:12**  
 cardiovascular autonomic neuropathy increase with, **23:12**  
 cardiovascular disease mortality, **35:9**  
 cataracts and, **21:34**  
 diabetic kidney disease risk factor, **22:30**  
 diabetic peripheral neuropathy and, **15:25–27**  
 elevation of ACR, **22:18–19**  
 erectile dysfunction and, **28:7**  
 erectile dysfunction and duration of diabetes, **28:7–8**  
 fracture risks and, **32:14**  
 glaucoma relationship with type 2 diabetes, **21:36–37**  
 glucose control and, **39:2**  
 glycated hemoglobin levels and, **9:3–4**  
 glycemic control vascular events, **15:28**  
 health insurance coverage and, **42:4**  
 home health care needs and, **40:58**  
 hospitalization and hospital utilization, **40:40**  
 hypoglycemia events in type 2 diabetes, **17:10**

- incidence of ESRD, **22:27**  
 intensive glycemic control effects, **16:13; 19:13; 21:23**  
 Kimmelstiel-Wilson nodules, **22:7**  
 lower urinary tract symptoms in women, **28:16**  
 mean fasting insulin levels, **9:12**  
 mortality in type 1 diabetes, **15:38,39**  
 musculoskeletal disorder in upper extremity, **32:18**  
 nonproliferative diabetic retinopathy in type 2 diabetes, **21:15**  
 in older adults, **16:5**  
 prediction of complications, **16:5**  
 prevalence of cystopathy in men, **28:4**  
 prevalence of health insurance coverage, **42:4**  
 progression of kidney disease, **22:16**  
 progression to severe albuminuria, **22:15**  
 prophylactic aspirin use, **39:6**  
 proteinuria, **22:16,30**  
 retinopathy in pregnant women, **21:26**  
 retinopathy incidence in, **21:19**  
 risk factors for diabetic kidney disease, **22:30**  
 risk for diabetic retinopathy, **21:19–20**  
 risk of peripheral arterial disease, **20:5**  
 sarcopenia association, **34:11**  
 self-care practices in, **39:7**  
 tooth loss in type 1 diabetes, **31:33**  
 visual impairment and blindness, **21:3–4,8**  
 visual impairment in type 2 diabetes, **21:4–5**
- Dutch investigations**  
 A1c levels in first trimester, **5:10**  
 Apgar scores in newborns, **5:48**  
 cesarean delivery in diabetic women, **5:46**  
 famine exposure, **13:13**  
 fasting and impaired glucose tolerance predictive power, **1:20**  
 maternal mortality ratio with type 1 diabetes, **5:22**  
 pregnancy planning and, **5:9**  
 prenatal famine exposure, **13:13**  
 Rotterdam Study, **38:11**
- Dysglycemia**  
 drug/chemical-induced diabetes, **6:10**  
 hyperthyroidism, **6:15**  
 nonpregnant women of childbearing age, **5:4–5**  
 prevalence of total dysglycemia, **3:14**  
 race/ethnicity variations in, **3:14**  
 stages of type 1 diabetes, **37:3,7**
- Dyslipidemia.** See also Statin therapy in adolescents with diabetes, **1:14**  
 cardiovascular outcomes with lipid modification, **18:15–16**  
 comorbid condition in women 18–44 years, **5:6**  
 control in geriatric diabetes, **16:14**  
 in diabetes in youth, **15:33**  
 diabetic kidney disease risk factor, **22:32–35**  
 fenofibrate studies in, **18:16**  
 heart disease risk and, **18:8–9**  
 hormonal contraception with, **5:13**  
 insulin resistance association of, **19:9**  
 kidney disease association, **22:32–35**  
 lipid profiles in type 2 diabetes, **18:8**  
 lipid-lowering medication in diabetes, **9:20–21**  
 lipid-modifying trials, **18:16–17**  
 in pediatric patients with type 2 diabetes, **15:2**  
 statin therapy for macular edema, **21:25**  
 treatment in management of diabetes, **39:5**
- Dysmorphism**  
 Donohue syndrome, **7:12**  
 Rabson-Mendenhall syndrome, **7:12**  
 Williams syndrome, **6:17**
- Dysphagia**, **23:4; 27:8**
- E**
- Early Treatment Diabetic Retinopathy Study (ETDRS) protocol**  
 A1c for retinopathy, **1:9**  
 incidence of visual acuity loss, **21:7**  
 severity scale for, **21:16**  
 visual angle measurement protocol, **21:3**
- Early-life environment.** See also Dietary factors/exposure; Intrauterine diabetes exposure  
 birth weight, **13:13**  
 breastfeeding effects, **13:13–14**  
 Dutch famine exposure, **13:13**  
 gliadin exposure, **15:11**  
 intrauterine exposure, **15:13**
- Early-onset familial dementia**, **24:3**
- Eating disorders and behavior**  
 anorexia nervosa, **33:19**  
 association with treatment outcomes, **33:20–21**  
 binge eating disorder in type 2 diabetes, **33:19**  
 bulimia nervosa, **33:19**  
 causal issues and mechanisms, **33:21**  
 characteristics of, **33:19**  
 family dysfunction in prediction of, **33:21**  
 female adolescents with type 1 diabetes, **33:19**  
 insulin omission or underuse in, **33:20**  
 maladaptive eating behavior with type 1 diabetes, **33:20**  
 measurement issues, **33:20**  
 Night-Eating Syndrome, **33:20,21**  
 overview and definitions, **33:19–23**  
 prevalence in diabetes, **33:19–20**  
 treatment and intervention, **33:21**  
 type 1 diabetes mortality with, **35:4**
- Economic impact of diabetes**  
 care after stroke, **19:2**  
 cognitive impairment with, **24:2–3**  
 complications and comorbidities, **40:67**  
 data sources, **40:58**  
 diabetes vs. without diabetes, **40:64**  
 direct and indirect costs, **40:58**  
 of geriatric diabetes, **16:16**  
 geriatric population growth, **16:17**  
 indirect costs of, **40:69**  
 institutional care, **40:58–59**  
 international comparison, **40:70–71**  
 with kidney disease, **22:3**  
 osteoarthritis and arthritis, **32:14**  
 outpatient care, **40:59–61**  
 outpatient medications and supplies, **40:61–64**  
 per capita care expenditures, **40:64–66**  
 persistent postpartum diabetes treatment, **1:29**  
 preconceptional care use and, **5:8**  
 productivity loss, **34:4; 40:69**  
 race/ethnicity projections for type 1 diabetes in childhood, **2:10**  
 screening costs and benefits, **1:27**  
 trends in, **40:69–71**  
 visual impairment costs, **21:11**
- EDIC study.** See also DCCT/EDIC  
 A1c assays used, **1:7**  
 cardiovascular complications effects, **18:13–14**  
 cognitive impairment, **24:7–8,13**  
 cystitis prevalence data, **22:56**  
 insulin therapy in youth with retinopathy, **15:18**  
 patient enrollment and follow-up, **19:13; 23:12**  
 peripheral arterial disease outcomes, **20:5**  
 prevalence of albuminuria, **22:12**  
 urologic complications with type 1 diabetes, **22:56**
- Edinburgh Artery Study**, **20:8**
- Edinburgh Claudication Questionnaire**, **20:3**
- Education and Research Toward Health (EARTH) study**, **13:23**
- EGFR (estimated glomerular filtration rate).** See GFR/eGFR
- Egyptian population**  
 retinopathy data and FPG cutpoints, **1:13**  
 risk scores from clinical factors, **1:23**
- Eicosapentaenoic acid (EPA)**  
 ALA conversion to, **11:16**  
 effects on kidney function, **22:54**  
 sources and function of, **11:12**
- EIF2AK3 (eukaryotic initiation factor 2 alpha kinase 3) mutation**, **7:11**
- Eighth Joint National Committee (JNC 8)**  
 blood pressure control recommendations, **18:17**  
 hypertension management with kidney disease, **22:51**  
 stroke risk control recommendations, **19:12,14**
- Elderly adults.** See Geriatric diabetes
- Elderly Program Cooperative Research Group (SHEP) trial**, **19:12**

**ELMO1 (engulfment and cell motility 1)**

gene, 22:43

**Emerging Risk Factors Collaboration**

adiposity measurement and cardiovascular disease, 18:10–11

C-reactive protein and cardiovascular risk, 18:12

heart disease risks with dysglycemia, 18:7  
lipid and inflammatory markers in cardiovascular mortality, 18:8**Emotional distress**, 33:23–24**Empagliflozin**, 18:15**Empysematous cholecystitis (EC)**,

30:16–17

**Empysematous pyelonephritis**, 30:10**Enalapril retinopathy progression effects of**, 21:25**Encephalocele**, 5:65**Endocrinopathies associated with diabetes**,

1:4; 6:15–16

**Endophthalmitis**, 21:36**Endothelial cell dysfunction**association with insulin resistance, 19:9  
in diabetic kidney disease, 22:8  
markers of, 13:18**End-stage liver disease (cirrhosis)**. See Cirrhosis**End-stage renal disease (ESRD)**. See ESRD in diabetes**England**. See also United Kingdom (U.K.) studies

cognition and educational attainment of offspring, 5:75

diabetes classification criteria, 2:4–5  
glycemic control in pregnancy, 5:9–10  
independent diabetes association with, 5:37long-term effects of pregnancy on, 5:27  
maternal mortality ratio consecutive diabetic pregnancies, 5:22  
nephropathy prevalence data, 5:29  
neuropathy during pregnancy, 5:28  
pregnancy planning and, 5:9  
pregnancy with pregestational diabetes, 5:16  
prepregnancy glycemic control, 5:10**Enterobacteriaceae**, 30:13**Enteroviral infections**islet autoimmunity progression, 11:6  
islet autoimmunity triggering by, 11:4–5  
prospective cohort studies at type 1 diabetes diagnosis, 11:4  
serology and type 1 diabetes association, 11:4  
type 1 diabetes association, 10:42**Enterovirus infections, enterovirus RNA in blood samples**, 11:4–6**Environmental exposures**

accelerator and overload hypotheses, 15:11

bovine insulin, 37:3

genetic interaction in type 2 diabetes, 13:5

in initiation and progression of type 1 diabetes, 12:1; 37:1–2

toxins and pollutants, 6:13–14

for type 1 diabetes in childhood, 2:10

**Environmental Triggers of Type 1 Diabetes**.

See MIDIA

**EPIC Study**A1c and cardiovascular disease, 18:7  
abdominal obesity and overweight, 13:12  
coronary heart disease events and physical activity, 18:12  
early postnatal exposure, 13:13  
lipid and inflammatory markers in heart disease, 18:8  
Reykjavik and Norfolk studies, 18:8  
triglycerides and heart disease risk, 18:8**Epidemiology and Prevention of Diabetes Controlled Trial of Lisinopril in Insulin-Dependent Diabetes Mellitus (EUCLID)**, 21:24**Epidemiology of Diabetes Complications Study (EDC)**A1c levels and albuminuria, 22:19  
20-year mortality with type 1 diabetes, 22:19  
albuminuria and heart disease relationship, 35:11  
albuminuria prevalence with diabetes, 22:12  
albuminuria with type 1 diabetes, 22:12  
cardiac autonomic neuropathy with diabetes, 15:27  
coronary artery calcification progression, 15:37  
cumulative incidence of heart disease, 15:28  
diabetes-periodontitis association, 31:17  
diabetic nephropathy incidence, 22:16  
distal symmetrical polyneuropathy incidence in type 1 diabetes, 23:9–10  
long-term effects of pregnancy on, 5:27  
microalbuminuria prevalence and diabetes duration, 15:23  
microvascular complications, 15:17–18  
mortality and renal disease trends, 35:4–5  
mortality in type 1 diabetes, 35:3–4  
mortality with youth-onset diabetes, 15:38  
neuropathy in women, 31:38  
neuropathy risk after pregnancy, 5:29  
peripheral arterial disease with type 1 diabetes, 20:5  
retinopathy (diabetic), 15:18  
retinopathy and quality of life, 21:9  
retinopathy development, 21:25  
retinopathy prevalence and diabetes diagnosis, 21:12  
risk of retinopathy, 15:18  
stroke incidence and prevalence in type 1 diabetes, 19:4  
study population, 31:37  
symptomatic autonomic neuropathy incidence trend, 23:12  
type 1 diabetes mortality, 35:3–4**Epidemiology of Diabetes Interventions and Complications (EDIC)**. See EDIC study**Epigenetic programming**in disease risk for next generation, 22:42  
of famine exposure, 13:13  
with kidney disease, 22:2,45  
with maternal diabetes, 5:73  
in periodontitis and diabetes risk, 31:23  
in risk for persons with diabetic relatives, 11:2  
tissue-specific changes and mechanism, 22:45**Epsilon4 allele polymorphism**, 21:25**ERBB3 gene (12q13)**, 12:6**Erectile dysfunction**, 23:4; 28:10**Erectile dysfunction and duration of diabetes, periodontitis severity and risk of**, 31:16**Ertugliflozin**, 18:15**Erythrasma**, 30:12**Escherichia coli**, 30:9,16**ESRD in diabetes**. See also Diabetic kidney diseaseACR and GFR prediction of death rate for, 22:22  
in diabetes of youth, 15:20  
incidence and treatment of, 22:27  
increased incidence and prevalence of, 22:25  
NSAIDs and acetaminophen risks, 22:39  
prevalence of diabetes-related, 22:25  
PVT1 gene and susceptibility, 22:43  
race/ethnicity survival rates with treatment, 22:29  
risk with diabetic kidney disease, 22:19–24  
risks with and without diabetes, 22:22–23  
survival rates with treatment, 22:27–30  
trends in incidence and mortality, 22:20  
type 1 diabetes mortality with, 35:9  
type 2 diabetes in, 22:27**Ethics**early termination of randomized studies, 38:14  
limitations on randomized control trial use by, 5:74**Etiologic classification of type 1 diabetes**agreement with care provider report, 2:4  
difficulties in, 2:3  
markers for, 2:3–4**Euglycemia**. See Glycemic control**Euglycemic hyperinsulinemic clamp**, 13:17; 25:2,28; 26:17**EUROCAT registries of congenital anomalies**congenital malformations/anomalies prevalence, 5:62  
nonchromosomal anomalies, 5:65**EURODIAB (EUROpe and DIABetes) study**IDDM Complications Study, 15:25  
neuropathy risk after pregnancy, 5:29  
type 1 diabetes prevalence/incidence age <20 years, 15:6

- vitamin D supplementation in type 1 diabetes, **11:11**
- WHO diabetes surveillance, **2:5**
- European Association for the Study of Diabetes**  
individualization of care needed, **41:12**  
use of A1c for diagnosis, **1:7**
- European Cooperative Acute Stroke Study (ECASS)-II trial**, **19:9**
- European Nicotinamide Diabetes Intervention Trial (ENDIT)**, **37:5**
- European Prospective Investigations into Cancer (EPIC) Norfolk**. See EPIC Study
- European Society for Paediatric Endocrinology**, **17:1**
- European studies**. See also Meta-analyses; *specific countries*  
birth weight and type 2 diabetes risk, **13:13**  
cardiac autonomic neuropathy, **15:27**  
disability and diabetes association, **34:3**  
early induction for birth trauma prevention, **5:59**  
long-term effects of pregnancy on, **5:27**  
major malformations/anomaly rates, **5:62**  
mortality in childhood-onset type 1 diabetes, **35:12**  
neuropathy with diabetes, **15:25**  
physical activity and type 2 diabetes risk, **13:11**  
preeclampsia in types 1 vs. 2 diabetes, **5:35**  
preeclampsia rates in, **5:34**  
pregnancy effects on renal function, **5:30**  
prevalence of DKA at onset of diabetes, **15:17**  
seafood consumption and type 2 diabetes risk, **13:8**  
single nucleotide polymorphisms, **12:4–5**  
sleep apnea rates, **25:12**  
whole exome sequencing, **14:6**
- European Surveillance of Congenital Anomalies (EUROCAT) Guide**. See EUROCAT registries of congenital anomalies
- Evaluation of Lixisenatide in Acute Coronary Syndrome (ELIXA) trial**, **18:16**
- Evening chronotype (eveningness)**, **25:27**
- Executive-frontal abilities**  
definition and measurement, **24:1–2**  
impairment with dementia, **24:2**  
in type 2 diabetes, **24:8**
- Exenatide**, **18:16**; **29:12**
- Exenatide Study of Cardiovascular Event Lowering Trial (EXSCEL)**, **18:16**
- Exercise**. See Physical activity
- Exocrine pancreatic disease**, **1:4**
- Exome sequencing**  
gene association with type 2 diabetes, **14:6**  
genetic lipodystrophies, **7:13**  
multi-ethnic expansion of, **14:10**
- Expiration:inspiration ratio**, **15:27**
- Exploring Perinatal Outcomes among Children (EPOCH)**, **15:13**
- Extracranial carotid and vertebral artery disease (ECVD)**, **19:14–16**
- Exudative age-related macular edema**. See Macular edema
- Eye Diseases Prevalence Research Group**  
prevalence data sources, **21:2**  
prevalence of retinopathy, **21:12**  
racial/ethnic differences in retinopathy, **21:27**
- Ezetimibe**, **22:52**
- F**
- Factor VII, hyperglycemia effects on**, **20:1**
- FADS1 gene**, **11:16**
- FADS2 gene**, **11:16**
- Familial hypoglycemia**, **7:5**
- Familial partial lipodystrophy (FPL)**  
AKT2 mutation, **7:19–20**  
atypical progeroid syndrome, **7:20**  
CIDEA mutation, **7:17**  
differential diagnosis of, **7:20**  
Dunnigan variety, **7:18–19**  
Kobberling variety, **7:17**  
other types, **7:20**  
PLIN1 mutation, **7:19**  
PPARG mutation, **7:19**  
SHORT syndrome, **7:20**
- Family history**  
criteria for screening in youth, **1:14**  
of diabetes in youth at diagnosis, **15:2**  
epigenetic effects with, **11:2**  
with K<sub>ATP</sub> mutation, **7:10**  
in pediatric patients with type 2 diabetes, **15:2**  
with type 2 diabetes in youth, **15:11**  
type 2 diabetes risk and, **13:5**
- Family Investigation of Nephropathy and Diabetes (FIND) study**, **22:43**
- Family Investigation of Nephropathy and Diabetes-Eye study**, **21:29**
- Family-based study design**, **12:2–3,6**
- Fasting hyperglycemia**  
with cystic fibrosis-related diabetes, **6:6**  
in MODY2 presentation, **7:6**  
with obstructive sleep apnea, **25:14**
- Fasting hypoglycemia**, **7:12**
- Fasting insulin levels**  
in blacks/African Americans, **9:11**  
by diabetes status, treatment, age, **9:11–13**  
in insulin resistance, **13:18**  
sleep fragmentation effects on, **25:9**
- Fasting plasma glucose (FPG)**. See also Impaired fasting glucose (IFG)  
A1c comparisons and correlation, **1:14–15**  
ADA cutpoint revision, **1:13**  
ADCY5 gene association, **14:8**  
by age grouping, **9:4–5**  
association with vascular risk, **18:7**  
cancer risks with elevation, **29:7**
- circadian gene associations with, **14:8**
- CRY2 association with, **14:8**
- diagnostic criteria for diabetes, **1:2**; **36:1**
- fasting glucose and prostate size, **28:5**
- glycated albumin correlation, **1:15**
- H. pylori* status and levels of, **31:24**
- for high risk for diabetes, **1:6**
- MTNR1B gene and, **25:28**
- NHANES methods for, **9:2**
- normalization effects on cardiovascular risk, **18:15**
- oral health effects on, **31:8**
- with prediabetes, **9:3**
- prediabetes levels and periodontitis, **31:22**
- prediabetes prevalence trends, **3:20**
- pregnancy outcome association, **4:4**
- presymptomatic diabetes diagnosis, **1:1**
- race/ethnicity variations in, **1:12**; **9:5**
- revision of cutpoints by ADA, **1:13**
- with self-reported diabetes prevalence, **18:7**
- skin autofluorescence correlation, **1:16**
- sleep efficiency and, **25:17**
- sleep fragmentation effects on, **25:9**
- stroke risk with, **19:9**
- threshold for heart disease risk, **18:7**
- in treated diabetes, **9:3**
- type 2 diabetes and genetic elevation of, **14:8**
- with undiagnosed diabetes, **3:15**; **9:3**
- with untreated diagnosed diabetes, **9:3**
- vascular disease risk association, **18:2**
- without diabetes/age stratified, **9:5**
- Fat metabolism**  
in diabetes, **1:2**  
free fatty acid levels in diabetes, **1:6**
- “Fat neck syndrome”**, **7:18**
- Fatty Liver Index**, **26:3**
- FCRL3/1q23, IA-2A positivity association**, **12:12**
- Fecal incontinence**, **27:8–9**
- Fenofibrate Intervention and Event Lowering in Diabetes (FIELD) study**  
cardiovascular event outcomes, **18:15**  
macular edema and retinopathy, **21:25**  
new-onset albuminuria risk, **22:52**
- Fenofibrate studies**  
cardiovascular event outcomes, **18:15**  
lipid control in geriatric population, **16:14**  
macular edema and retinopathy effects, **21:25**  
new-onset albuminuria risk, **22:52**
- Ferritin concentration**, **13:6**
- Fetal abdominal circumference (AC)**  
fetal measurements, **41:11**  
gestational diabetes monitoring, **4:11**  
in shoulder dystocia, **5:58**
- Fetal complications before delivery**  
cesarean delivery, **5:46**  
distress, **5:48**  
fetal demise (stillbirth), **5:36–44**  
in gestational diabetes, **4:2**  
mortality with ketoacidosis, **5:25**

- nuchal translucency, **5:67**  
 preterm delivery, **5:45–46**  
 sex-associated malformation risks, **5:66**  
 spontaneous abortion data, **5:35–36**
- Fetal demise (stillbirth).** See also Fetal growth causes with pregestational diabetes, **5:43**  
 chronic hypertension/gestational diabetes, **5:33**  
 congenital cytomegalovirus, **6:4–5**  
 early loss rate with diabetes, **5:35**  
 frequency in type 2 diabetes, **5:43**  
 gestational age-specific rates, **5:37**  
 independent diabetes association with, **5:37**  
 intensive insulin therapy and, **5:37**  
 late fetal death and stillbirth definitions, **5:35**  
 maternal glycemic control, **5:36**  
 polyhydramnios with type 2 diabetes, **5:46**  
 with pregestational diabetes, **5:43–44**  
 pregestational diabetes rates with stillbirth, **5:37**  
 prepregnancy risk factors with, **5:37**  
 prospective rates for risk measurement, **5:37**  
 rates in North America, **5:37**  
 risk association with diabetes, **5:43**  
 risk factors for, **5:37**  
 vs. spontaneous abortion, **5:36**
- Fetal growth.** See also Macrosomia abdominal circumference, **5:58**  
 chronic hypertension/gestational diabetes risks, **5:33**  
 early growth delay and malformation prediction, **5:67**  
 gestational weight gain and, **5:49–50**  
 growth restriction, **5:49**  
 overnutrition/overfeeding, **5:73**  
 with pregestational diabetes, **5:49–56**  
 type 2 diabetes with Chinese famine, **13:13**
- Fetal overnutrition**  
 effects of, **15:12–13**  
 sources of, **5:73**
- Fibrin D-dimer, 20:8**
- Fibrinogen**  
 by diabetic status, **9:23**  
 levels with peripheral arterial disease, **20:9**  
 with peripheral arterial disease, **20:8**  
 type 2 diabetes risk association, **13:20**
- Fibrinolysis**  
 hyperglycemia effects on, **20:1**  
 plasminogen activator inhibitor-1, **13:19–20**
- Fifth International Workshop-Conference on Gestational Diabetes Mellitus, 4:12**
- Filipino populations**  
 dental visits with insurance, **31:39**  
 metabolic syndrome prevalence, **13:23**  
 type 2 diabetes prevalence in, **3:7–8**
- FINDRISC calculator, 1:23**
- Finnish Diabetes Prevention Study (DPS), 38:5–6**  
 impaired glucose tolerance treatment, **1:19**  
 prevention of type 2 diabetes studies, **38:5–6**  
 weight loss interventions, **38:13**
- Finnish Diabetic Nephropathy (FinnDiane) study**  
 all-cause mortality prediction by albuminuria, **22:20**  
 mortality rates in type 1 diabetes, **35:11**  
 prevalence of albuminuria, **22:12**
- Finnish Dietary Intervention Trial for the Prevention of Type 1 Diabetes (FINDIA), 37:3**
- Finnish studies**  
 albuminuria mortality, **22:20**  
 cardiovascular risk with metabolic syndrome traits, **18:9**  
 casein hydrolysate formula effects on autoimmunity, **37:3**  
 cow's milk consumption, **11:10**  
 diabetes registries, **2:5**  
 diabetes-chronotype association, **25:27**  
 early mortality with type 1 diabetes, **35:9**  
 enteroviral infections and type 1 diabetes, **11:4**  
 heartburn prevalence with diabetes, **27:2**  
 hyperinsulinemia mortality association, **18:11**  
 insulin in prevention of type 1 diabetes, **37:6**  
 intranasal insulin trial, **37:6**  
 maternal mortality ratio in, **5:22**  
 mortality in childhood-onset type 1 diabetes, **35:8,12**  
 penetrance of HLA genotypes, **11:3**  
 preeclampsia rates with pregestational diabetes, **5:34**  
 prevalence of DKA at diagnosis, **15:17; 17:2**  
 severe maternal complications with diabetes, **5:25**  
 type 1 diabetes and severe infection, **5:24**
- First Nation peoples, 15:2**
- First-phase insulin response.** See Acute insulin response (AIR)
- Flatbush diabetes.** See Type 1b diabetes
- Florida**  
 Hispanic/Latino population, **3:7**  
 pregestational diabetes prevalence during pregnancy, **5:18**  
 total diabetes percentages, **8:9**
- Focal peripheral neuropathies, 23:3**
- Folic acid**  
 congenital malformation association with, **5:11**  
 periconception and preconception use of, **5:10**
- Foot ulcers in diabetes (DFU), 20:16–22.** See also Distal symmetrical polyneuropathy autonomic neuropathy, **20:18**  
 BMI, weight, height, waist circumference, **20:18**  
 classification by etiology, **20:22**  
 classification by physical characteristics, **20:21**  
 definition and epidemiology of, **20:16**  
 diabetes characteristics/glycemic control, **20:19**  
 diabetic foot risk classifications, **20:21**  
 foot deformity and callus, **20:18–19; 23:5**  
 footwear precipitation of, **20:21**  
 healing of, **20:21**  
 home temperature monitoring, **20:21**  
 incidence, **20:16–17**  
 lower extremity amputation risk comparison, **20:24**  
 motor neuropathy, **20:17**  
 national survey results, **20:19–20**  
 neuropathy as risk for, **20:17**  
 osteomyelitis with, **30:12**  
 outcome prediction, **20:22**  
 peripheral arterial disease pathway to, **20:18**  
 physical impairment as contribution to, **20:19**  
 pressure measurements, **20:19**  
 prevention by education, **20:20**  
 previous foot complications as risk, **20:19**  
 prognostic systems, **20:22**  
 race/ethnicity distribution, **20:19**  
 risk factors for, **30:12**  
 secondary complications of neuropathy, **23:14–15**  
 self-care and inspection, **20:21**  
 self-reported frequency, **20:18**  
 Semmes-Weinstein monofilament testing, **23:6**  
 sensory neuropathy, **20:18**  
 sex as risk factor, **20:19**  
 smoking, **20:19**  
 treatment strategies, **20:22**  
 Vibratrip for assessing risk of, **23:5–6**
- Fournier's gangrene, 30:12–14**
- Frailty**  
 defined, **16:10,11**  
 diabetes comorbidity, **16:5**  
 incidence of, **34:11**  
 risk of falls and, **16:15**  
 tooth loss association, **31:41**  
 vertebral fracture association, **32:1**
- Framingham CVD risk score, 18:10**
- Framingham Eye Study, 21:33**
- Framingham Heart Study (FHS)**  
 C-reactive protein as stroke predictor, **19:10**  
 diabetes prediction model in, **13:24**  
 incidence rate of diabetes, **36:10–11**  
 intermittent claudication risks, **20:7**  
 metabolic syndrome prevalence, **13:21,22**  
 sex differences in stroke risk, **19:4–5**  
 stroke incidence, **19:9**  
 stroke risk with urine albumin:creatinine ratio, **19:10**  
 type 2 diabetes risk and obesity duration, **13:11**

**Framingham Offspring Study**

changes in A1c with age, **1:11**  
 effects of smoking cessation, **18:12**  
 markers for type 2 diabetes risk, **13:20**  
 metabolic syndrome prevalence, **13:24**  
 prevalence trends in, **13:18**  
 sequential oral glucose tolerance test  
 predictive value, **13:16**  
 stroke risk with diabetes and metabolic  
 syndrome, **19:10**  
 type 2 diabetes incidence and vitamin  
 D, **13:7**

**France**

maternal mortality ratio consecutive  
 diabetic pregnancies, **5:22**  
 nephropathy prevalence data, **5:29**  
 pediatric type 2 diabetes prevalence, **15:9**

**FRAX algorithm, 32:12****Free fatty acids**

in atherogenesis, **20:1**  
 effects on insulin sensitivity, **25:19**  
 fasting levels, **1:2**  
 in fetal overnutrition, **5:73**  
 in proteinuria progression, **22:35**  
 sympathetic nervous system activity  
 effects on, **25:11**

**“Free” foreign peptide, T cell recognition  
of, 12:2–3****Friedwald equation for LDL cholesterol, 9:2****FRMD3 (FERM domain-containing protein  
3) gene, 22:43****Fructosamine**

glycemic levels from, **1:12**  
 hazard ratio for diabetes, **1:21**  
 racial/ethnic variations in, **3:15**

**Fructose, 13:9****Fulminant diabetes, 1:3****Functional impairment/disability, 16:15–16;  
34:1****Fungal infections, 30:11,12,16; 31:23. See  
also *Candida albicans*****G****GAD-65. See Glutamic acid decarboxylase  
(GAD)****GAD-Alum, 37:12****Gallbladder disease, 26:13–18**

cholecystectomy with diabetes, **26:16**  
 directionality of diabetes association,  
**26:18**  
 gallstone disease association with diabetes,  
**26:18**  
 gallstone disease with diabetes, **26:13–15**  
 insulin resistance, **26:17–19**

**Gamma glutamyltransferase (GGT). See  
GGT (gamma glutamyltransferase)****Gastric parietal cell antibodies. See Parietal  
cell antibodies (PCA)****Gastrointestinal (GI) tract manifestations,  
27:1–22**

abdominal pain, **27:9**

anxiety and depression associated with,  
**27:3**

autoimmune gastritis, **27:15–16**

celiac disease, **27:9–14**

constipation/laxative use, **27:2,8**

data sources and limitations, **27:2**

diabetic diarrhea, **23:4**

diarrhea diagnosis and management,  
**27:7–8**

diarrhea in celiac disease, **27:12**

dysmotility in diabetes, **27:3**

dysphagia and heartburn, **27:8**

fecal incontinence, **27:8–9**

functional disturbances and syndromes,  
**27:2,4–7**

gastric emptying with diabetes, **27:4–5**

gastroparesis course and management,  
**23:4; 27:4–7**

heartburn, **27:2**

immune-related disorders, **27:9–16**

inflammatory bowel diseases, **27:14–15**  
 malformations with in utero diabetes expo-  
 sure, **5:62**

risk factors for functional disturbances,  
**27:2**

symptom turnover in, **27:5**

symptoms with and without diabetes,  
**27:2–3**

type 1 diabetes and celiac disease, **27:9**

**Gastroparesis**

autonomic function test for, **27:7**

course and management of, **27:4–7**

epidemiology of, **23:4,5**

iatrogenic, **23:5**

manifestation of autonomic neuropathy,  
**23:9**

morbidity and mortality association of,  
**27:6**

prevalence with diabetes, **27:2**

symptoms and pathophysiology, **23:4–5**

**Gastroschisis, 5:11****GATA4 haploinsufficiency, 7:11****GCK (glucokinase) gene mutations**

glucose sensing function of, **7:5**

insulin synthesis/secretion, **7:4,5**

MODY2 clinical presentation, **7:4**

in neonatal diabetes, **7:5,11**

**GCKR gene**

p.Pro446Leu with type 2 diabetes, **14:10**

whole grain intake and rs780094 variant,  
**13:5**

**Gemfibrozil, 22:52****Gene expression**

defect in hepatocyte nuclear factor  
 4-alpha, **1:4**

defects in MODY, **1:4**

diabetes-obesity gene interactions,  
**5:10–11**

in diabetic kidney disease, **22:45**

dietary factors/exposure interactions,  
**11:16**

environment x HLA genotype interaction,  
**11:16**

epigenetic change mechanisms in expres-  
 sion, **22:45**

functional consequences of variants, **12:8**

genetic risk in siblings, **12:1–2**

genotype association with function, **14:10**

genotype x treatment interactions, **38:11**

hepatic gene expression in MODY, **7:7**

heritable changes in, **22:45**

HLA and type 1 diabetes associations,  
**12:3–4,12; 37:1,5**

penetrance of moderate-risk genotypes,  
**11:3**

placental contribution with maternal  
 diabetes, **5:67**

regulation of *TCF7L2*, **14:10–11**

risk markers for early development of type  
 1 diabetes, **11:14**

susceptibility loci with type 1 diabetes,  
**12:7**

**Gene polymorphism evaluation, 38:9****Gene-environment interactions. See also**

Epigenetic programming; Intrauterine  
 exposure

in early life, **13:12–14**

for fetal losses and malformations,  
**5:59–60**

genetic risk score, **13:5**

hygiene hypothesis (natural protection),  
**11:7; 15:11**

infectious agents, **11:3–6**

nutrition and type 2 diabetes, **13:6–10**

polio model of type 1 diabetes, **11:6–7**

for type 1 diabetes, **11:15–17**

type 2 diabetes risk factors, **13:5**

**General Practice Research Database  
(GPRD)**

data included in, **5:36**

stillbirth rates, **5:43**

**Generalized anxiety disorder, 33:16–19****Genetic lipodystrophies**

congenital generalized lipodystrophy,  
**7:13–17**

diabetes management in, **7:20**

epidemiology, **7:13–20**

estimated prevalence of, **7:13,20**

familial partial lipodystrophy, **7:17**

mandibuloacral dysplasia associated lipo-  
 dystrophy, **7:17**

predisposition to diabetes with, **7:13–21**

**Genetic risk ratio ( $\lambda_S$ ), 12:1–2****Genetic risk score**

diabetes prediction by, **38:11**

gene-environment interaction, **13:5**

prediction of type 1 diabetes, **12:10**

**Genetic susceptibility. See also Genetics of  
type 1 diabetes; Genetics of type 2 diabetes**

to autoimmunity, **15:3**

for diabetic kidney disease development,  
**22:42–45**

genes/regions for type 1 diabetes, **12:6**

for progression to autoimmunity, **11:13**

in retinopathy development, **21:29**

in type 1 diabetes, **12:1**

**Genetics of Kidneys in Diabetes (GoKinD), 22:43****Genetics of type 1 diabetes, 12:1–16**

- autoantibody positivity, **12:11–12**
- autoimmune disease shared genetic risks, **12:6**
- candidate genes for, **11:3; 12:7–8**
- case-control study design for genetic studies, **12:2**
- chromosome 6p21.3, **12:2–3**
- family history of, **11:2**
- gene-function relationships, **12:11**
- genetic contribution to, **12:1,10**
- glucotoxicity in, **11:13**
- haplotypes associated with, **12:3**
- heterogeneity of, **1:3**
- HLA alleles associated with, **12:4**
- HLA-DQB1 alleles, **37:6**
- IFIH1* gene coding variants in, **12:6–7**
- initiation in susceptible individuals, **12:10,11–12**
- linkage mapping, **12:6**
- loci contributing to, **12:12**
- major HLA complex, **12:2**
- non-major HLA risk loci, **12:6–10**
- penetrance of HLA genotypes, **11:3**
- pregestational diabetes, **12:5**
- single nucleotide polymorphism association, **12:6,10,11**
- susceptibility loci mapping, **12:6,7–10**
- whole-genome linkage analysis in, **14:1**

**Genetics of type 2 diabetes, 14:1–25**

- amino acid sequences in, **14:1**
- disease emergence, **14:8**
- DNA sequencing technology in, **14:9**
- early-onset type 2 diabetes, **15:11**
- environmental factor interactions with, **14:10**
- future research on, **14:11**
- gene functions in, **14:10**
- genetic architecture analysis for, **14:6–7**
- genetic information vs. clinical variables in prediction, **14:8**
- genetic predisposition for type 2 diabetes, **14:1–2**
- genetic risk score and type 2 diabetes, **13:5**
- genetic variation and drug response, **14:9**
- GWAS predictive properties, **14:10**
- heritability estimates of, **14:1**
- insights gained, **14:6–9**
- lifestyle characteristics intervention with, **14:9**
- limitations of current approaches, **14:9–11**
- in prevention of type 2 diabetes, **38:11**
- TCF7L2* gene, **14:1**
- for type 2 diabetes, **14:1–3**
- type 2 diabetes gene discovery, **14:2–6**

**Genome sequencing, 14:2****Genome-wide association studies (GWAS).**

See GWAS (genome-wide association scans)

**Genome-wide linkage analysis. See also**

GWAS (genome-wide association scans)

for lipodystrophies, **7:15,18**

for type 2 diabetes, **14:2**

**Genotype risk score (GRS), 14:6****Genotype-phenotype. See also** Epigenetic programming

effects of risk variants on genes, **12:12**

genetic determinants of type 2 diabetes, **14:6; 17:10**

HLA susceptibility genotype in celiac disease, **27:13**

**Genotyping. See GWAS** (genome-wide association scans)**Geographic atrophy. See** Macular edema**Georgia**

- A1c comparison with oral glucose tolerance, **1:12**
- major malformations with type 1 diabetes, **5:60**
- malformation risk with type 1 diabetes, **5:60**
- mortality comparison to general population, **35:5**
- oral health with diabetes, **31:21**
- pregestational diabetes prevalence, **5:5**
- racial/ethnic differences in stroke in diabetes, **19:7**
- total diabetes percentages in, **8:9**

**Geriatric diabetes, 16:1–22. See also** Bone complications; Joint complications

- abdominal and general obesity in, **9:14**
- absolute number of diabetic adults, **16:2**
- activity limitations in, **34:3–11**
- age-related conditions and prevention, **16:8–11**
  - age-related macular edema, **21:38**
  - dementia, **16:15**
  - depression, **16:9–10,15**
  - falls, **16:8,15**
  - functional impairment, **16:15–16**
- cardiovascular complications, **16:6–7**
- cardiovascular risk factors, **16:5–6**
- cardiovascular/microvascular complication prevention, **16:13–15**
- cataracts with type 2 diabetes, **21:33**
- cognitive decline with diabetes, **24:8**
- cognitive impairment, **16:10**
- comorbidities with diabetes, **16:5–11**
- complication/mortality rates with, **16:5**
- costs of, **16:16–17**
- data sources and limitations, **16:1**
- duration of diabetes, **16:4**
- economic consequences, **16:17–26**
- economic impact of, **16:16,17; 40:64**
- etiology of diabetes in, **16:1**
- functional status, **16:11–13; 34:8**
- general and abdominal obesity with, **9:14**
- geriatric population demographics, **16:2**
- glucose control in prevention, **16:13**
- growth in spending, **16:17**
- hyperglycemic hyperosmolar state prevalence and risk, **17:6**
- hypoglycemia, **16:16**
- improving care and curbing cost, **16:17**

lifestyle intervention for prevention, **16:12**

lipid control effects in, **16:14**

lower extremity amputation rates in, **20:23–24**

Medicare costs, **16:16**

microalbuminuria with, **16:7**

microvascular complications, **16:7–8**

mortality rates, **16:11**

multifactorial control benefits in, **16:14–15**

overweight/obesity in, **16:5–6**

periodontitis prevalence, **31:4**

polypharmacy, **16:10–11,15**

population size and prevalence, **16:2–3**

prevalence in nursing homes, **16:4**

prevalence of persistent albuminuria, **22:12**

preventing complications of, **16:13–16**

quality of care standards, **16:16**

quality of life with, **16:11**

race/ethnicity in, **16:3**

race/ethnicity with insurance, **42:1–22**

retinopathy progression in, **21:26**

sarcopenia and frailty, **16:10**

urinary incontinence, **16:9**

visual impairment incidence, **21:3**

**German (Deutsch) Nicotinamide Diabetes Intervention Study (DENIS), 37:5,14****German studies**

- cancer risks with glargine insulin, **29:11**
- death certificate reliability for mortality, **35:7–8**
- fetuin-A association with type 2 diabetes risk, **13:20**
- lower urinary tract symptoms with diabetes, **28:5**
- pediatric type 2 diabetes prevalence, **15:9**
- prevalence of albuminuria, **22:14**
- prevalence of DKA at diagnosis, **15:17; 17:2**
- prevalence of nephropathy in youth, **15:20**

**Gestational age**

definition of, **5:35**

fetal demise (stillbirth) age-specific rates, **5:37**

preterm delivery rates by, **5:45**

**Gestational diabetes, 4:1–17. See also****Maternal diabetes**

A1c for screening, **4:5**

A1c levels in, **1:12**

association with rate in nonpregnant women, **4:8**

background/history, **4:2–3**

brachial plexus palsy risk with, **5:58**

breastfeeding after, **15:13**

cardiovascular risk factors with, **4:12**

cost-effectiveness of screening, **4:4**

cost-effectiveness of treatment, **4:11**

definition, **4:1–2**

diagnostic criteria for, **4:1,5**

effects on offspring, **4:12–13**

factors in increased prevalence, **13:12**

glucose tolerance, **4:8**

HAPO study, **4:8**

- increased risk with sleep disturbance, **25:21**  
 long-term effects on offspring, **4:12–13**  
 long-term implications of, **4:11**  
 low-risk pregnancy management, **4:11**  
 obstructive sleep apnea association with, **25:21**  
 pathophysiology of, **4:3**  
 perinatal outcomes with treatment, **4:1**  
 periodontal disease and inflammation in, **31:25**  
 periodontitis association with, **31:22**  
 physical activity levels with, **10:12**  
 prevalence, **1:4; 4:5–8**  
 prevalence trends in, **4:11**  
 prevention of type 2 diabetes after, **4:12**  
 progression to type 2 diabetes after delivery, **1:4; 4:11–12; 5:7; 13:21**  
 randomized clinical studies with treatment of, **4:10**  
 regression of, **1:29**  
 risk with periodontitis, **31:15**  
 screening criteria for, **1:4,28–29; 4:3–5**  
 skin autofluorescence discrimination in, **1:16**  
 treatment, **4:10–12**
- Gestational hypertension (GHTN).** *See also* Preeclampsia  
 diagnostic criteria, **5:30**  
 with pregestational diabetes, **5:34**  
 prevalence with pregestational diabetes, **5:34**  
 sleep-disordered breathing association, **25:21**
- Gestational weight gain**  
 childhood obesity and, **5:74**  
 effects of, **5:72–73**  
 fetal growth and birth size, **5:49–50**  
 maternal obesity and, **5:56**  
 risk for diabetes in youth, **15:1**  
 small-for-gestational age with, **5:55**  
 stillbirth rates, **5:43**
- Get With the Guidelines-Stroke program,** **19:17**
- GFR/eGFR**  
 cardiovascular disease risk association with, **22:21**  
 confounding of association with mortality, **22:20**  
 hemodynamic changes with diabetes, **22:6**  
 hyperfiltration, **22:31**  
 hyperfiltration in types 1 and 2 diabetes, **22:6–7**  
 with hypertension or cardiovascular disease with diabetes, **22:12**  
 infection rate with diabetes, **22:22**  
 methods determination of, **22:3–4**  
 obesity-associative changes in, **22:37**  
 pathophysiology and clinical course, **22:3**  
 predictive value of ACR, **22:22**  
 pregnancy effects on, **5:30**  
 prevalence in diabetic population, **22:12**  
 prevalence of low, **22:12**  
 renal insufficiency criteria, **20:9**  
 in staging of chronic kidney disease, **22:3**  
 and stroke risk, **19:3**
- GGT (gamma glutamyltransferase)**  
 association with fetuin-A, **13:20**  
 association with increased mortality, **26:6,7**  
 in Fatty Liver Index, **26:3**  
 increased diabetes risk with elevation, **26:5**  
 liver injury measurement, **26:3–4**  
 nonalcoholic steatohepatitis, **13:20**  
 type 2 diabetes risk factors, **13:19**
- Ghrelin**  
 levels with sleep restriction, **25:10–11**  
 sleep disturbance and alterations in, **13:15**  
 in sleep restriction, **25:10**
- Gila River Indian Community periodontitis study,** **31:9,15,17,20**
- Glargine insulin, cancer risks with,** **29:11–12**
- Glaucoma**  
 definitions of, **21:36**  
 in diabetic vs. nondiabetic persons, **21:36**  
 duration of diabetes, **21:36**
- Gliadin, early-life exposure,** **15:11**
- Glibenclamide (glyburide),** **7:10**
- Global Case-Control Study of Risk Factors for Acute Myocardial Infarction (INTERHEART),** **18:11**
- Glomerular filtration rate (GFR).** *See* GFR/eGFR
- Glomerular-tubular junction abnormalities,** **22:8,9**
- Glossodynia.** *See also* Burning mouth syndrome  
 neuropathy association, **31:38**
- Glucagon-like peptide-1 (GLP-1)**  
 in dementia, **24:13**  
 sitagliptin and lansoprazole effects, **37:14**  
 thyroid cancer and use of agonists, **29:10**
- Glucocorticoids**  
 bone marrow transplantation, **29:14–15**  
 Cushing syndrome with, **6:15**  
 cystic fibrosis-related diabetes risk and screening, **6:5–6**  
 diabetes induced by, **6:11**  
 glioblastoma multiforme treatment, **29:13**  
 glucose metabolism effects of, **6:11; 25:19**  
 precipitation of DKA, **17:2**  
 visceral fat accumulation with, **25:11**
- Glucose challenge test (GCT)**  
 gestational diabetes screening, **4:2,4,7**  
 pregnancy outcome association, **4:8–9**
- Glucose intolerance.** *See also* Impaired glucose tolerance  
 with disturbed sleep, **13:15**  
 with gallstone disease, **26:13–15**  
 nonpregnant women, **4:8**  
 progression to type 2 diabetes, **13:16**  
 with sleep disturbances in pregnancy, **25:21**  
 thyroid dysfunction effects on, **6:15**
- Glucose metabolism**  
 ambient hyperglycemia, **1:1**  
 in brain with sleep deprivation, **25:10**  
 circadian system and, **25:24–30**  
 effects of CPAP treatment on, **25:18**  
 effects of ZnT8, **13:5**  
 exercise effects on pathways, **13:11**  
 fasting glucose levels and sleep efficiency, **25:17**  
 gallstone disease with impairment of, **26:15**  
 hyperglycemic hyperosmolar state pathogenesis, **17:6**  
 impairment with schizophrenia, **33:22**  
*INS* gene effects on, **7:11**  
 insulin-like growth factor-1 and binding protein effects on, **19:11**  
 obstructive sleep apnea impact on, **25:13–14**  
 proinsulin in, **7:11**  
 resistin effects on, **25:20**  
 screening strategy in pregnancy, **4:3–4**  
 shallow sleep suppression effects, **25:6**  
 sleep and circadian disturbance effects, **25:1–44**  
 sleep and metabolic variables in diabetes, **25:9**  
 systemic inflammatory response and, **25:10**
- Glucose toxicity, 38:8**  
 beta cell apoptosis from, **7:19; 11:13**  
 beta cell lesion in type 2 diabetes, **1:6**  
 in ischemic stroke demonstration, **19:9**
- Glucose transporter GLUT4,** **14:5,6**
- Glucose-based diagnostic tests.** *See specific tests*
- Glucose-lowering agents.** *See also* Antihyperglycemic medications  
 in distal symmetrical polyneuropathy, **23:8**  
 in older adults, **41:7**  
 SGLT2 inhibitors, **18:15**  
 trends in use of, **39:3**
- Glucotoxicity.** *See* Glucose toxicity
- Glutamic acid decarboxylase autoantibodies (GADA)**  
 beta cell destruction, **15:2**  
 beta cell injury manifestation, **37:2**  
 development of islet autoimmunity, **11:2**  
 for diabetes in youth classification, **15:3**  
 differentiating types 1 and 2 diabetes, **1:3; 2:3**  
 high parenting stress and, **11:15**  
 with IPEX syndrome, **6:14**  
 latent autoimmune diabetes of adults, **1:5**  
 in MODY, **7:6**  
 in phenotypic type 2 diabetes, **1:6**  
 stiff man syndrome, **6:15**
- Glutamic acid decarboxylase (GAD)**  
 autoantibody positivity in initiation of type 1 diabetes, **12:11–12**  
 screening for preclinical type 1 diabetes, **1:28**  
 screening for type 1 diabetes, **1:27–28**

vaccine prevention trials with, **37:6–7,12**

**Gluten.** See also Celiac disease (CD)

autoimmunity trigger, **27:14**  
 delayed exposure, **37:5**  
 interleukin-15 response to, **27:9**  
 islet autoimmunity risk with, **11:10**  
 T lymphocyte response to, **27:9**

**Glycated albumin (GA)**

fasting plasma glucose and A1c correlation, **1:15**  
 incident diabetes hazard ratio, **1:21**  
 inflammatory cytokine production with, **31:24**  
 racial/ethnic variations in, **3:15**  
 for screening, **1:15**

**Glycated hemoglobin (A1c)**

A1c levels and retinopathy prevalence, **1:8**  
 advantages for diagnosis, **1:9; 36:1**  
 cataract association with, **21:34**  
 correlation with nephropathy, **1:7,9**  
 detection of retinopathy, **1:9**  
 diabetes diagnosis criteria, **1:2**  
 in diagnosis and screening, **1:7–11**  
 drawbacks of, **1:12–13**  
 by duration of diabetes, **9:3**  
 early fetal loss and levels of, **5:35**  
 excess vitamin B12 effects on, **1:12**  
 genetic influences on, **1:11**  
 gestational diabetes diagnosis and screening, **1:12; 4:5**  
 gluten-free diet effects, **27:14**  
 glycated albumin correlation, **1:15**  
 glycemic control in geriatric population, **16:13–14**  
 glycemic test comparisons, **1:14–15**  
 hemoglobinopathies effects on measurements, **1:12**  
 high/low glycation status, **1:12**  
 insomnia symptoms relation to, **25:9**  
 iron deficiency anemia effects on measurement, **1:12**  
 levels for screening, **1:21**  
 levels in MODY3, **7:6**  
 levels in treated diabetes, **9:3**  
 levels in undiagnosed diabetes, **9:3**  
 levels predicted by insufficient sleep, **25:3**  
 levels with obstructive sleep apnea, **25:17**  
 levels with prediabetes, **9:3**  
 levels with visual impairment, **21:1**  
 lower extremity amputation association with levels, **20:25**  
 malformation predictive value with fetal nuchal translucency, **5:67**  
 mean plasma glucose and, **1:12**  
 microaneurysms levels and, **1:16**  
 NHANES methods for, **9:2**  
 nonglycemic factors affecting, **1:11**  
 in normal pregnancy, **5:10**  
 optimal first trimester levels for, **5:10**  
 peripheral arterial disease and level of, **20:6**  
 physical activity effects, **18:18**

plasma glucose test discrepancies, **1:14–15**

postprandial hyperglycemia and, **5:72**  
 in prediabetes, **1:5–6**  
 prediction of fetal loss, **5:43**  
 predictive power of various levels, **1:20**  
 preferred test for diagnosis, **1:9**  
 racial/ethnic variations in, **1:11; 3:13,15**  
 red cell turnover effects on, **1:12**  
 relationship of other glycemia measures, **1:11–12**  
 in REM-related sleep apnea, **25:17**  
 renal failure effects on, **1:12**  
 retinopathy and levels of, **21:12**  
 retinopathy progression in adolescents and adults, **15:18**  
 retinopathy risk during pregnancy, **5:27**  
 as risk factor for diabetes, **1:20–21**  
 risk for retinopathy progression, **5:26**  
 screening cutpoint for, **1:26**  
 for screening for preventative interventions, **18:7**  
 screening for undiagnosed diabetes, **1:26; 3:3**  
 seasonal variations in, **1:12**  
 with self-reported diabetes prevalence, **18:7**  
 sensitivity of, **1:12**  
 sex differences in risk prediction, **1:20**  
 skin autofluorescence correlation, **1:16**  
 standardization of methods, **1:7**  
 undiagnosed/prediabetes detection, **3:15**  
 variations in measurement methods, **1:7**  
 vitamin B12 deficiency effects on measurement of, **1:12**

**Glycemia**

A1c and other indices of chronicity, **1:11–12**  
 acceleration of beta cell apoptosis, **11:13**  
 circadian gene effects on, **37:6**  
 direct effects on malformations, **5:11**  
 distal symmetrical polyneuropathy association with, **23:12**  
 heart disease risk and fasting glycemia, **18:7–8**  
 levels associated with visual impairment, **21:1**  
 lower extremity amputation association, **20:25**  
 measurement of, **1:2**  
 neuronal glutamate level and, **33:14**  
 progression to diabetes, **13:16**  
 relation to cognitive performance, **24:13**  
 risk factor for retinopathy, **21:20–23**  
 type 2 diabetes mortality risk with, **36:8**

**Glycemic control.** See also Metabolic memory  
 chronotype effects on, **25:27–28**  
 congenital malformations and, **5:10**  
 coronary artery calcification progression and, **15:38**  
 in diabetic persons with shift work, **25:26**  
 disability risk and, **34:5**  
 early fetal loss and, **5:35**

effects of CPAP treatment on, **25:18**

fracture risk effects of, **32:14**  
 maladaptive eating behavior with type 1 diabetes, **33:20**  
 microalbuminuria fluctuation with, **15:24**  
 nerve fiber repair with euglycemia, **23:6**  
 neuropathy treatment with, **23:7–8**  
 normalization of albuminuria with, **22:12**  
 obstructive sleep apnea impact, **25:17**  
 optimal first trimester levels for, **5:10**  
 oral health and diabetes, **31:9**  
 periodontal therapy trials for, **31:12–14**  
 periodontal treatment effects on, **31:12,40**  
 preconception planning/counseling, **5:8**  
 pregestational diabetes complications, **5:25**  
 in pregnancy with preexisting diabetes, **5:25–26**  
 preterm delivery rates and, **5:46**  
 for prevention of preeclampsia, **5:35**  
 for reduction of retinopathy progression, **15:18**  
 sleep quality and glycemic control, **25:3–6,9**  
 spontaneous abortion rate confounding, **5:36**  
 stroke incidence with diabetes, **19:1**  
 visual impairment and, **21:7–8**

**Glycemic index**

carbohydrate quality, **13:6**  
 islet autoimmunity association with, **11:14**

**Glycemic load**

and alcohol consumption, **13:9**  
 beta cell stress by, **11:14**  
 defined, **13:6**  
 diabetes risk with, **13:6**  
 type 2 diabetes risk association, **29:6**

**Glycemic risk factors for diabetes**

criteria for type 2 diabetes screening, **1:22–23**  
 fructosamine measurements, **1:21**  
 glycated hemoglobin, **1:20–21**  
 high-risk glycemic state prevalence, **1:17**  
 impaired fasting glucose, **1:19**  
 impaired glucose and fasting glucose tolerance, **1:21–22**  
 impaired glucose tolerance, **1:18**  
 levels for screening, **1:21**  
 prediction by impaired fasting and glucose tolerance, **1:16–17,19–20**  
 screening for type 2 diabetes, **1:22–27**

**Glycemic risk profile, 1:19**

**Glycemic traits.** See Quantitative glycemic traits

**Glycosuria**

in diabetic screening, **1:15**  
 with hyperglycemic hyperosmolar state, **17:6**

**Glycosylated hemoglobin.** See Glycated hemoglobin (A1c)

**Gram-negative bacterial infections, 30:8,9,16**

**Gram-positive bacterial infections, 30:13,17**

**Granulocyte colony-stimulating factor (GSCF), pegylated**, 37:14

**Graves' disease**, 6:15; 12:12

**Greater Cincinnati/Northern Kentucky Stroke Study (GCNKSS)**  
diabetes-specific ischemic stroke risks, 19:8  
epidemiology of stroke in diabetes, 19:4

**Greenlandic population**  
postprandial hyperglycemia, 14:6  
*TBC1D4* gene, 14:3–4,6  
type 2 diabetes analysis, 14:3–5

**Group B Streptococcus (GBS)**, 30:9,17

**Group Health Cooperative of Puget Sound, Washington State**, 30:10

**Growth hormone (GH)**  
diabetes after therapy with, 6:13  
in DKA, 17:1  
post-puberty retinopathy, 21:23  
with sleep debt, 25:10

**Gum disease**. See Periodontal disease

**GWAS (genome-wide association scans)**  
acarbose prevention effects, 38:11  
additive model with, 14:10  
circadian gene-fasting glucose association, 14:8  
developments in, 14:6  
for diabetes screening, 1:16  
HLA-DR, 5:105  
incidence prediction, 38:11  
meta-analysis of, 14:3  
non-HLA loci and type 1 diabetes risk, 11:3  
participants in, 12:6  
phenotyping with, 14:9  
single nucleotide polymorphism association in, 12:6  
statistical association with type 2 diabetes, 14:2  
targeted arrays for, 14:6  
for type 1 diabetes, 11:3; 12:2,4,6  
for type 2 diabetes, 14:1–3  
Wellcome Trust Case-Control Consortium, 12:6

## H

**H syndrome**, 7:8–9

**Haplotype**. See also HLA haplotypes  
linkage disequilibrium in, 12:3

**HapMap reference panels**, 14:6

**HAPO (Hyperglycemia and Adverse Pregnancy Outcome)**  
adverse outcome and maternal glucose association, 4:2–3  
intrauterine hyperglycemia exposure, obesity in offspring, 4:12  
perinatal outcome and maternal glycemia, 4:8–10  
screening recommendations, 1:28–29  
in utero hyperglycemia exposure levels, 13:12

**Hard exudates (retinal)**, 21:12,25

**Hawaii**  
age-adjusted total preexisting diabetes during pregnancy, 5:13–14  
periodontitis prevalence, 31:4  
U.S. centers for SEARCH, 15:4

**HCHS/SOL (Hispanic Community Health Study/Study of Latinos)**  
baseline data, 3:12  
diagnosed diabetes prevalence comparison with NHIS, 3:7  
prediabetes prevalence, 3:14  
sampling methods, 3:7  
tooth loss in, 31:32

**HDL (high-density lipoprotein) cholesterol**  
albuminuria progression prediction by, 22:32  
with chronic kidney disease, 22:32,52  
diabetic peripheral neuropathy association, 15:25  
in diabetic persons, 9:19–20  
evening chronotype association, 25:27  
fenofibrate studies, 18:16  
hearing loss association, 23:12  
HNF1 $\alpha$  and levels of, 7:7  
measurement in NHANES study, 9:2  
in metabolic syndrome, 13:24; 19:10; 21:26; 26:5  
niacin effects on, 6:12  
with peripheral arterial disease, 20:6  
in prediction of diabetes probability, 1:23  
type 1 diabetes mortality risk, 35:12

**Health, Aging, and Body Composition Study**, 13:20; 32:2–3,8

**Health and Retirement Study**  
disability/impairment status, 34:8  
health, social and financial studies, 5:75

**Health care quality model**, 41:2

**Health Discharge Database**, 5:25

**Health information technology (HIT) surveillance**, 2:13

**Health insurance coverage**, 42:1–22  
age and coverage, 42:2  
comorbidity and mortality with, 42:12  
data sources and limitations, 42:1–2  
diabetes control and, 42:11–12  
diabetes duration and, 42:4  
expected payment sources, 42:12–13  
family income of persons without coverage, 42:16  
glycemic medication use, 42:5–6  
healthcare utilization and, 42:11,12  
income spent on family medical care, 42:14  
length of time without coverage, 42:15  
Medicaid/public coverage with diabetes, 42:4  
Medicare and combination plans, 42:9  
Medicare coverage, 42:4–5,9  
number of sources for coverage, 42:6  
payment for medical care, 42:12  
percent distribution for care expenses, 42:12

persons without coverage, 42:15  
plans for private insurance, 42:7  
prescription and dental coverage, 42:8–9  
prevalence of private insurance, 42:16–17  
private combination plans, 42:9  
private health insurance sources, 42:6  
private insurance prevalence, 42:6  
private vs. Medicaid/public sources, 42:4–5  
proportion of income for private coverage, 42:13–14  
quality of care and, 42:10–11  
race/ethnicity coverage prevalence, 42:2–3  
reasons for lack of coverage, 42:15–16  
socioeconomic characteristics and sex with coverage, 42:3  
sources for, 42:6  
trends in type and prevalence of, 42:16–17

**Health Professionals Follow-up Study (HPFS)**  
cardiovascular disease mortality, 18:12  
depression and type 2 diabetes risk, 13:15  
erectile dysfunction and duration of diabetes, 28:7  
gene-environment interaction, 13:5  
periodontitis and glycemic control, 31:21  
peripheral arterial disease risk with diabetes, 20:5

**Health Technology Assessment (HTA), UK**, 1:23

**Healthcare Cost and Utilization Project**, 4:5–7

**Healthcare Effectiveness Data and Information Set (HEDIS)**  
oral health assessment data, 31:42  
organizational-level quality measures, 41:11  
quality improvement activities, 41:2

**Healthcare utilization and costs of diabetes**, 40:1–78  
ambulatory medical care, 40:1–25  
economic impact, 40:59–72  
health insurance coverage and, 42:11  
hospitalization and hospital utilization, 40:26–42  
long-term care, 40:43–58  
pregnancy planning and, 5:8–9

**Healthcare utilization and insurance coverage**  
adverse effects of screening on, 1:22  
economic analysis of screening, 1:26–27  
physician visits after diagnosis, 1:27

**Health-seeking behaviors**  
changing dietary intake, 10:18  
implications for health professionals, 10:20  
physical activity behavior change, 10:19  
practicing weight control, 10:19  
regular physician visits, 10:20  
smoking cessation, 10:18–19

**Hearing loss/deficits**  
congenital cytomegalovirus, 6:4

- with diabetes, **23:10**
  - malignant otitis externa, **30:16**
  - mechanism of, **7:9**
  - risk factors for, **23:12**
  - SHORT syndrome, **7:20**
  - Wolfram syndrome, **7:8**
  - Heart disease.** See **Cardiovascular disease (CVD)**
  - Heart disease and diabetes, 18:1–30.** See also Cardiovascular disease (CVD)
    - antiplatelet/aspirin management trial, **18:17–18**
    - biomarkers for prediction of, **18:12**
    - blood pressure association, **18:9**
    - blood pressure control and coronary vascular disease risk, **18:9**
    - blood pressure control trial, **18:17**
    - cardiovascular disease prevalence in, **18:2–3,19**
    - contribution to disability with diabetes, **34:11**
    - coronary artery calcification score for, **18:13**
    - C-reactive protein association with, **18:12**
    - diabetes association and, **18:1–3**
    - fibrinogen biomarker for, **18:12**
    - hyperglycemia as risk, **18:7–8**
    - hypertension as risk, **18:1,9**
    - insulin resistance as risk, **18:11–12**
    - intensive glycemia control, **18:13–16**
    - lifestyle management trial for risk factors, **18:18–19**
    - lipid or inflammatory makers in, **18:8**
    - lipid-modifying trials, **18:16–17**
    - lipids and lipoproteins as risk, **18:8–9**
    - low serum RAGE associations, **19:11**
    - macroalbuminuria and ventricular dysfunction, **22:21**
    - micro-/macrovascular association with blood pressure, **18:9**
    - new glucose-lowering agent outcomes, **18:15–16**
    - obesity and risk for, **18:2–3,6,9–11**
    - physical activity and risk, **18:12**
    - prevalence in diabetes vs. nondiabetes in U.S., **18:3–7**
    - proinsulin prediction of heart disease, **18:12**
    - risk factors with diabetes, **18:7–13**
    - risk with and without diabetes, **18:2**
    - risk with metabolic syndrome, **18:9–10**
    - smoking as covariate of risk, **18:12–13**
    - subclinical atherosclerosis, **18:13**
  - Heart Outcomes Prevention Evaluation (MICRO-HOPE) substudy, 19:12**
  - Heart Protection Study (HPS), 18:16**
  - Heart rate variability (HRV), 15:27; 23:6–7**
  - Heartburn, 27:2**
  - Helicobacter pylori (H. pylori), bidirectional periodontitis relationship, 31:24**
  - Heme-iron intake, 13:6**
  - Hemochromatosis**
    - characteristics of, **6:9**
    - secondary diabetes from, **1:3**
    - types and prevalence, **6:9**
  - Hemodialysis infection rate with diabetes, 22:22**
  - Hemoglobin Glycation Index, 1:12**
  - Hemoglobinopathies, effects of A1c measurements, 1:12; 3:15**
  - Hemolytic anemia effects on A1c measurement, 1:12**
  - Hemorrhagic stroke, 19:2–3**
  - Hepatic insulin resistance**
    - glucocorticoid effects on, **6:11**
    - in pancreatitis, **6:7**
  - Hepatic lipase gene, 38:11**
  - Hepatitis**
    - with *EIF2AK3* mutation, **7:11**
    - hepatitis B and diabetes risk, **26:10–11**
    - hepatitis C and diabetes association, **26:8–9**
    - insulin resistance and hepatitis treatment, **26:9**
    - insulin resistance in hepatitis C, **26:9**
    - post-transplant diabetes risk with infection, **26:13**
  - Hepatocellular carcinoma (HCC)**
    - with cirrhosis and nonalcoholic fatty liver, **26:2,6**
    - diabetes as risk factor for, **26:12**
    - diabetes risk for, **26:6**
    - liver transplantation for, **26:11**
    - risk factors for, **29:7**
    - risk with hepatitis B virus, **26:10**
  - Hepatocyte nuclear factors**
    - HNF1 $\alpha$  mutation, **1:4; 7:4–7; 15:3**
    - HNF1 $\beta$  mutation, **7:4,7**
    - HNF4 $\alpha$  mutation, **7:4,7; 15:3**
    - phenotype characteristics with HNF1 $\alpha$  mutation, **15:3**
  - Hereditary/genetic pancreatitis, 6:8**
  - Heterodimeric ( $\alpha\beta$ ) protein receptors, 12:4**
  - HFE gene mutation inheritance, 6:9**
  - High blood pressure.** See Hypertension
  - High glycators, 1:12**
  - High sensitivity C-reactive protein (hsCRP),**
    - risk marker for type 2 diabetes, **19:10**
    - sleep disturbances and, **25:10**
  - High-density lipoprotein cholesterol (HDL).** See HDL (high-density lipoprotein) cholesterol
  - Highly phosphorylated IGFBP-1, protective effects of, 19:11**
  - High-risk glycemic states**
    - A1c levels for, **1:20–21**
    - combination of factors, **1:21–22**
    - impaired fasting glucose, **1:19–20**
    - impaired glucose tolerance, **1:18–19**
    - NHANES definition and prevalence of, **1:17–18**
  - Hirsutism, 7:12,14,18,19**
  - Hispanic ethnicity.** See also Mexican Americans
    - A1c levels in, **3:15**
    - A1c variation in, **3:13**
  - acculturation, **13:14**
  - albuminuria odds, **22:14**
  - dental visits with insurance, **31:39**
  - diagnosed type 2 diabetes in, **3:7**
  - eye/dental visits, **40:15**
  - gallstone prevalence and cholecystectomy, **26:17–18**
  - insulin resistance indices for prediction of type 2 diabetes, **13:18**
  - ischemic stroke risk, **19:9**
  - metabolic syndrome prevalence, **13:22**
  - missing teeth in, **31:32**
  - MODY syndromes in, **7:8**
  - prevention trial after gestational diabetes, **38:8**
  - tooth loss in, **31:32**
  - type 1b diabetes in, **6:18**
  - type 2 diabetes and prediabetes prevalence, **3:6–7**
- HIV (human immunodeficiency virus)**
- diabetes induced by antiretroviral therapy, **6:12**
  - immune complex kidney disease, **22:56**
- HLA (human leukocyte antigen) genotypes**
- allelic variations in, **12:5**
  - amino acid residues effects on type 1 diabetes, **12:4–5**
  - class I alleles, **12:2–3**
  - class I and II encoding of, **12:2**
  - class II alleles, **12:2–3**
  - diabetes association with, **12:3**
  - gene x environment interactions, **11:16**
  - genetic predisposition to celiac disease, **27:9**
  - haplotype transmission, **12:3**
  - high-risk genotype in children, **37:1**
  - high-risk genotypes for type 1 diabetes, **12:1**
  - intervention in newborns, **37:6**
  - MHC and type 1 diabetes risk, **12:2–6**
  - moderate-risk penetrance of, **11:3**
  - in predisposition to type 1 diabetes, **37:1**
  - relation to age at onset, **12:12**
  - risk alleles in SEARCH study, **2:4**
  - type 1 diabetes association, **12:3**
  - type 1 diabetes protective, **12:4**
  - type 1 diabetes susceptibility, **12:4**
- HLA and Immunogenetics Workshop, 12:4**
- HLA haplotypes**
- autoimmune polyendocrine syndromes, **6:14**
  - autoimmunity after rubella, **6:4**
  - with Down syndrome, **6:16**
  - fine-mapping for, **14:10**
  - protective in type 1 diabetes, **37:1**
  - single nucleotide polymorphism and, **14:10**
  - type 1 diabetes, **12:2–5**
- HLA-DR3, -DR4.** See MHC (major histocompatibility complex)
- HMG Co-A reductase inhibitors, 6:12**
- HNF1A gene p.Glu508Lys SNP, 14:6**

**HOMA-IR (homeostasis model assessment-insulin resistance)**

A1c and oral glucose tolerance test, **1:26**  
 fasting insulin and glucose measurement, **13:18**  
 with gallstone disease, **26:17**  
 with HCV, **26:9**  
 islet autoimmunity status and, **11:13**  
 measurement of insulin, **18:11**  
 obstructive sleep apnea, **25:18**  
 with periodontal disease, **31:8**  
 risk for type 2 diabetes, **13:18–19**  
 sleep quality and, **25:9**  
 stroke risk, **19:9–10**

**Home health care**

activity of daily living limitations, **40:57**  
 duration of home care, **40:58**  
 environment of, **40:51**  
 living arrangements, **40:55**  
 medical conditions, **40:55–56**  
 patient characteristics, **40:51–54**

**Homocysteine levels, 20:8****Honolulu Heart Program, 19:8–9; 20:14****Hormone-sensitive lipase, 25:19****Hospitalization and hospital utilization**

adult hospital use, **40:38**  
 adult hospitalization  
   length of stay, **40:41–42**  
   multiple, **40:41**  
 adult hospitalization by demographics, **40:39**  
 adult hospitalization by diabetes duration, **40:40**  
 adult hospitalization by diabetes type, **40:38**  
 data sources, **40:26**  
 discharge data  
   2010 discharge data, **40:27–28**  
   listing complications, **40:33–37**  
   trends with listing of diabetes, **40:28–32**

**Human leukocyte antigen (HLA) genotypes.**

See HLA (human leukocyte antigen) genotypes

**Hungary**

major malformations with type 2 diabetes, **5:62**  
 malformations with utero diabetes exposure, **5:65**

**Hybrid diabetes, 15:3****Hydatidiform mole**

gene association, **7:10**  
 spontaneous abortion, **5:35**

**Hydrocephaly, 5:60****Hygiene hypothesis (natural protection), 11:7; 15:11****HYMAI (hydatidiform mole associated and imprinted gene), 7:10****Hyperfiltration, 22:6–7,31**

**Hyperglycemia.** See also Metabolic memory albuminuria with, **22:12**  
 with androgen-deprivation therapy, **29:13**  
 cancer steroid therapy and, **29:13–14**

contribution to disability with diabetes, **34:11**

diabetic complications with, **1:6,15**  
 effects on osteoblasts, **32:3**  
 extended follow-up of adverse health conditions, **38:12–13**  
 gastric emptying delay with, **27:4–5**  
 with glioblastoma multiforme treatment, **29:13**  
 with glucocorticoids, **6:11**  
*H. pylori* status and glucose levels, **31:24**  
 heart disease risk with, **18:7–8**  
 heart rate and hyperglycemia association, **23:13–14**  
 hypothesized in cancer cause, **29:7**  
 infections in diabetes patients, **30:5**  
 kidney disease risk factor, **22:30–31**  
 levels defining DKA, **17:1**  
 obstructive sleep apnea association, **25:14**  
 osmotic diuresis with, **1:1**  
 peripheral arterial disease association with, **20:6**  
 peripheral neuropathy risk, **15:25–27**  
 prenatal famine exposure and, **13:13**  
 proinflammatory processes with, **19:3**  
 renal dysfunction with, **19:3**  
 risk factors for heart disease, **18:7–8**  
 with steroid therapy, **29:13**  
 stroke risk and outcomes with, **19:9**  
 symptoms of, **1:2**  
 thiazide association with, **6:12**  
 transcription changes from, **22:45**  
 type 1 diabetes mortality association, **35:4**

**Hyperglycemic hyperosmolar state (HHS)**

corticosteroid precipitation, **17:6–7**  
 cost, **17:6–7**  
 diagnostic criteria, **17:6**  
 incidence and prevalence, **17:6**  
 morbidity and mortality, **17:6**  
 pathogenesis, **17:6**  
 precipitating factors in, **17:6**  
 prevention and treatment, **17:7**  
 vulnerable patients, **17:7**

**Hyperinsulinemia**

benign prostatic hyperplasia etiology, **28:5**  
 cognitive impairment with diabetes, **24:4–5**  
 dementia risks with, **24:4**  
 gallstone formation with, **26:16**  
 insulin resistance syndrome type A, **7:12**  
 insulin-cardiovascular disease association, **18:11**  
 prevalence trends in, **13:18**  
 risk factor for dementia, **24:4**  
 tumor growth and recurrence, **29:6**

**Hyperinsulinemic clamp study.** See Euglycemic hyperinsulinemic clamp studies**Hyperinsulinemic hypoglycemia**

of infancy, **7:5**  
 $K_{ATP}$  channel mutations in, **7:5**

**Hyperleptinemia, 22:38****Hyperproinsulinemia, 7:11**

**Hypertension.** See also Blood pressure control

in adolescents with diabetes, **1:14**  
 association with insulin resistance, **19:9**  
 chronic hypertension and placental abruption, **5:25**  
 comorbid condition in women, **5:6**  
 congenital malformation prediction by, **5:10**  
 epigenetic programming in next generation, **22:42**  
 geriatric diabetic population, **16:6**  
 gestational hypertension, **5:34**  
 heart disease risk factor, **18:9**  
 maternal mortality from pregnancy related, **5:22**  
 metabolic syndrome traits, **13:24**  
 nephropathy with, **5:29**  
 in pediatric patients with type 2 diabetes, **15:2**  
 preeclampsia, **5:34–35**  
 in pregestational diabetes, **5:33–34**  
 pregnancy-related myocardial infarction risk, **5:23**  
 risk factor for diabetic kidney disease, **22:31–32**  
 stillbirth comorbidities, **5:43**  
 stroke risk with, **19:3**  
 stroke with pregestational diabetes, **5:22**  
 treatment in management of diabetes, **39:4–5**  
 type 1 diabetes mortality, **35:11**

**Hypertension Optimal Treatment (HOT) trial, 18:17****Hypertensive disorders of pregnancy**

antenatal and delivery-related stroke, **5:22–23**  
 blood pressure criteria for, **5:30**  
 chronic hypertension, **5:33–34**  
 gestational hypertension, **5:30–33,34**  
 grading in U.K., **5:30**  
 preeclampsia-eclampsia, **5:30,34–35**  
 pregnancy outcomes with, **5:33**  
 prevalence in pregestational diabetes, **5:33**  
 severe hypertension criteria, **5:30**  
 treatment recommendations, **5:35**

**Hyperviscosity syndrome, secondary, 5:68****Hypoglycemia**

acute metabolic complications, **17:9–13**  
 with autonomic neuropathy, **23:4**  
 classification of, **17:9**  
 CYP2C9 and sulfonyl-related, **14:9**  
 economic impact of, **17:12**  
 familial, **7:5**  
 fractures with falls during, **32:12–14**  
 with GCK mutation, **7:5**  
 geriatric diabetes complication, **16:5**  
 glycemic control in geriatric population, **16:16**  
 guidelines for glycemic control, **18:15**  
 increased frequency with nateglinide, **38:9**  
 insulin pump and episodes of, **15:17**

from insulin secretagogues, **16:16**; **38:9,12**  
 insulin-induced in pregnancy, **5:26**  
 morbidity and mortality with, **17:11–12**  
 in older adults, **16:16**  
 pathogenesis of, **17:9**  
 pregnancy risk with severe, **5:26**  
 prevention, **17:12**  
 risk factors, **17:10–11**  
 risks with insulin, **17:12**  
 socioeconomic status and episodes of, **33:23**  
 treatment of, **17:13**  
 in types 1 and 2 diabetes, **17:10**

**Hypoglycemia-associated autonomic failure (HAAF)**, **35:10**

**Hypoplastic left heart syndrome**, **5:11**

**Hypopnea**

definition, **25:12**  
 quantification of, **25:13**

**Hyposalivation**, **31:38**

**Hypothalamic-pituitary-adrenal axis (HPA)**

anxiety in dysregulation of, **33:19**  
 depression impact on type 2 diabetes, **33:13**  
 modification by hypoxia, **25:19**  
 pathway for diabetes-depression association, **33:14**  
 sleep and circadian disturbances, **25:19**  
 stress-related cortisol secretion, **25:10**

**Hypoxic conditions**

effects on leukocytes, **25:20**  
 hypothalamic-pituitary-adrenal axis effects of, **25:19**  
 lactic acidosis precipitation, **17:8**  
 with obstructive sleep apnea, **13:14**; **25:1–2,13**  
 in retinopathy progression, **21:12**  
 with smoking, **21:27**

**IADPSG**

definitions of diabetes in pregnancy, **5:3**  
 fetal complication definitions, **5:35–36**  
 gestational diabetes diagnosis and classification, **4:9–10**  
 guidelines for diagnosis/treatment and cost, **4:11**  
 hyperbilirubinemia treatment, **5:71**  
 polycythemia definition, **5:68–69**  
 pregnancy outcome codification, **5:50**  
 screening for gestational diabetes, **1:28–29**

**Icelandic population**

cataract prevalence, **21:34**  
 Reykjavik participants, **18:8**  
 whole-genome sequences of, **14:6**

**Identity-by-descent (IBD) sharing**, **12:6**

**IIdiopathic diabetes**. See Type 1b diabetes

**IDL (intermediate-density lipoprotein) particles**, **22:32**

**IFIH1 gene**

cesarean delivery interaction with, **11:16–17**  
 response to picornaviruses, **12:6**  
 type 1 diabetes susceptibility, **12:6–7,8**

**IGF-binding protein (IGFBP)-1,-3**

breast cancer association, **29:6**  
 in glucose homeostasis, **19:11**  
 in macrovascular disease, **19:11**; **20:1**  
 possible link to diabetes, **13:20**

**IL2 gene**, **12:12**

**IL2-IL21 gene locus**, **32:15**

**IL2RA/CD25 gene**, **12:6**

**Illinois**

Hispanic/Latino population, **3:7**  
 Multi-Ethnic Study of Atherosclerosis, **31:6**  
 self-reported periodontal disease, **31:6**  
 total diabetes percentages, **8:9**

**Immortal time bias**, **29:10,12**

**Immune response**

antigen presentation in, **12:2**  
 genes involved with, **12:2–3**  
 initiation in type 1 diabetes, **37:2**  
 sympathetic nervous system activity effects on innate, **25:20**  
 in type 1 diabetes, **37:1,2**

**Immune Tolerance Network (ITN)**

alefacept, **37:13**  
 human insulin B chain, **37:13**  
 IL-2 and rapamycin, **37:13**  
 prevention of type 1 diabetes, **37:13**  
 teplizumab efficacy, **37:12**  
 thymoglobulin, **37:13**

**Immune-mediated diabetes**

anti-insulin receptor antibodies, **6:15**  
 autoimmune type 1a diabetes, **6:18**  
 B cell and T cell roles in type 1 diabetes, **1:3**  
 beta cell destruction in type 1 diabetes, **15:2**  
 classification of diabetes, **1:4**  
 early life exposures and, **15:11**  
 genetic susceptibility to autoimmunity, **15:3**  
 with immune-mediated syndromes, **6:1**  
 rare forms of, **6:15**  
 sharing of genetic risk, **12:6**  
 Stiff man syndrome, **6:15**

**ImmunoChip data**, **12:9**

**Impaired fasting glucose (IFG)**. See also *specific conditions*

ADA revision of classification, **1:14**  
 definition and predictive value of, **13:16**  
 diabetes risk indicator, **1:19–20**  
 genetic links for, **25:29**  
 heart disease risk association, **18:7**  
 metabolic syndrome criteria, **13:24**  
 in NHANES data, **15:9**  
 odds ratios for progression, **1:19**  
 in offspring with intrauterine diabetes exposure, **4:12**  
 pathophysiology of, **1:17**  
 periodontitis effects on, **31:8–9**

persistence of, **1:19**

prediabetic diagnostic criteria, **1:5–6**

predictive value of, **1:20**

prevalence of urinary incontinence, **28:16**  
 in progression to type 2 diabetes, **13:16–17**

risk factor for diabetes, **1:16**

**Impaired glucose tolerance (IGT)**, **1:16–17**.

See also *specific conditions*

after in utero diabetes exposure, **13:12,13**  
 AGEs association with, **1:16**  
 association with insulin resistance, **1:17**  
 cardiovascular autonomic neuropathy, **23:13**

circadian misalignment effects on, **25:2**  
 in cystic fibrosis-related diabetes management, **6:6**

definition and cutpoints for, **1:13,18**

definition and predictive value of, **13:16**

in diabetes prevalence with hemochromatosis, **6:9**

diagnostic criteria, **1:18–19**

in endogenous Cushing syndrome, **6:15**

fetal overnutrition effects in, **15:12–13**

gestational diabetes definition, **4:2**; **15:2**

with history of intrauterine growth retardation, **6:18**

kidney abnormality association, **22:12**

lifestyle intervention with, **23:8,13**; **38:10**

metabolic syndrome criteria, **18:9**

NAVIGATOR trial, **38:9**

neonatal effects of, **13:12**

neuropathy with, **23:2,7,11**

in offspring with intrauterine diabetes exposure, **4:12**

with oral contraceptive use, **6:13**

oral health effects on, **31:8**

in patients with tuberculosis, **30:17,18**

periodontitis effects on, **31:8–9**

post-transplant diabetes onset and, **26:13**

predictive value of, **1:20**

progression in Pima Indians, **1:3**

progression to diabetes, **1:18**

in progression to type 2 diabetes, **13:16–17**; **15:2**

regression with lifestyle treatment, **1:19**

risk factor for diabetes, **1:16**

with schizophrenia, **33:22**

in Turner syndrome, **6:17**

type 2 diabetes risk link, **13:15**

in Williams syndrome, **6:17**

**“Impaired glucose tolerance” neuropathy**.

See Distal symmetrical polyneuropathy

**In utero diabetes exposure**. See Intrauterine diabetes exposure

**InCHIANTI study**, **20:9**

**Incidence**. See *specific conditions and populations*

**Incretin-based diabetes therapy**, **29:12**

**Indapamide (thiazide diuretic)**, **19:12**; **21:25**

**India, epithelial fragility with type 2 diabetes**, **21:37**

**Indian Diabetes Prevention Programme (IDPP)**, 38:8–9

**Indian Health Service (IHS)**, 2:5

**Indiana, preconception planning/counseling**, 5:8

**Inducing Remission in New-Onset Type 1 Diabetes with Alefacept (T1DAL) trial**, 37:13

**Infant mortality and morbidity**, 5:45–71

**Infection-caused diabetes**, 1:4; 6:4–5

**Infections associated with diabetes**, 30:1–25

- asymptomatic bacteriuria, 22:55–56; 28:20; 30:9
- bacterial skin and soft tissue, 30:11–12
- cystitis and pyelonephritis, 30:9–10
- deep subcutaneous tissue, 30:13–14
- emphysematous cholecystitis, 30:16–17
- emphysematous pyelonephritis, 30:10
- foot ulcers and osteomyelitis, 30:12–13
- fungal skin and soft tissue, 30:11
- Group B *Streptococcus*, 30:17
- hospital-acquired, 30:13–15
- hyperglycemic hyperosmolar state precipitation by, 17:6
- influenza and pneumonia, 30:7–8
- malignant/invasive otitis externa, 30:16
- maternal mortality from, 5:24
- mortality and morbidity from infections, 30:1–4
- organisms in urinary tract infections, 30:9
- overview, 30:1–5
- pathogens in respiratory tract infections, 30:8
- periodontal disease, 30:14–15
- renal and perinephric abscess, 30:10
- rhinocerebral mucormycosis, 30:16
- sepsis risk with, 5:24
- sinusitis and bronchitis, 30:8
- skin and soft tissue, 30:10–14
- tuberculosis, 30:17–18
- urinary tract infections, 30:9

**Infectious agents**, 11:3–9

- natural infection protection hypothesis, 11:7
- polio model of type 1 diabetes, 11:6–7
- prenatal enterovirus infections, 11:6
- seasonality of type 1 diabetes diagnosis, 11:3
- type 1 diabetes, 11:7
- viral infections, 11:4–8

**Inflammation**. *See also* Systemic inflammatory response

- in diabetes/stroke risk, 19:10
- influence on benign prostatic hyperplasia risk, 28:2
- pancreatic effects of chronic, 6:7
- subclinical inflammation in prediabetes, 13:18–19

**Inflammatory bowel diseases (IBD)**

- management of, 27:15
- shared genetic predisposition with type 1 diabetes, 27:15

**Inflammatory markers**

- adipose tissue-derived, 23:7
- with circadian misalignment, 25:26
- dental disease and, 31:1,14
- for major cardiovascular disease, 18:8–9,12
- periodontal therapy effects on, 31:14
- in peripheral arterial disease, 20:7,8–9

**Inflammatory response**. *See also* Systemic inflammatory response

- asymptomatic bacteriuria, 28:20
- in beta cell destruction, 37:2
- against beta cells, 6:5
- from C fiber destruction, 30:5
- in celiac disease, 27:9–10
- changes in podocytes in kidney disease, 22:8
- from dental plaque, 31:1,3,19,24
- with diabetic foot ulcers, 20:21
- by diabetic status, 9:23
- during gestational diabetes, 31:25
- markers for, 9:23
- in pathogenesis of neuropathy, 23:7
- in prostatic growth, 28:4
- type 1 diabetes process for, 37:2

**Informatics in Diabetes Education and Telemedicine Study (IDEATel)**, 24:11–12

**Inpatient and Birth Registers (Sweden)**, 5:23–24

**INS (insulin) gene**

- association with type 1 diabetes, 11:3
- defects, 7:11
- insulin synthesis/secretion defects, 7:8
- in MODY, 7:4–5,7
- neonatal diabetes mellitus, 7:10–11
- NEUROD1 expression regulation by, 7:7
- recessive mutations of, 7:11
- regulation of transcription, 7:5
- twin/concordance studies, 12:1
- type 1 diabetes susceptibility/risk, 11:16; 12:6–7

**Insomnia**

- glucose metabolism with, 25:9,29
- with major depressive disorders, 33:2
- melatonin supplementation in, 25:29
- symptoms of, 25:6

**Institute of Medicine**, 5:43; 41:2

**Instrumental activities of daily living (IADL)**.

*See also* Activities of daily living (ADL)

- definition of, 34:2
- diabetes and morbidity status, 34:8
- diabetes association with, 34:3
- disability prevalence in, 34:4–5
- trends in national estimates, 34:9–11

**Insulin**

- albuminuria with treatment, 22:12
- amyloid cascade effects of, 24:3
- biomarkers for, 18:12
- bone mineral density effects of, 32:10
- cancer risk with glargine, 29:13
- cancer risks in type 2 diabetes, 29:11
- cataract surgery risk with use, 21:35
- diabetes expenditures for, 40:62

- effects on osteoblasts, 32:3
- gallstone disease relationship with, 26:17
- glaucoma incidence in type 2 diabetes with use, 21:36
- glucose intolerance progression to diabetes effects, 1:19
- heart disease predictor, 18:11–12
- insulin-like growth factor homology, 13:20
- levels in hyperglycemic hyperosmolar state, 17:6
- long-acting, 6:7; 29:11; 37:6
- measures of endogenous production, 2:3
- NPH and hypoglycemic episodes, 15:17
- omission with eating disorders, 33:20
- oral insulin early intervention, 37:5,11
- oral trials, 37:6,7,11
- parenteral injection of ultralente insulin, 37:6
- radioimmunoassays for, 18:11
- rapid-acting, 6:7
- use with pancreatitis-related diabetes, 6:7

**Insulin action and defects**

- in definition of diabetes, 2:3; 7:2
- Donohue syndrome, 7:12
- heritability of, 14:7
- insulin resistance syndrome type A, 7:12
- PCSK-2 mutation effects, 7:12
- Rabson-Mendenhall syndrome, 7:12
- resistin effects on, 25:20
- secondary diabetes types, 1:4

**Insulin autoantibodies (IAA)**

- beta cell destruction by, 15:2
- identification of, 37:2
- screening for preclinical type 1 diabetes, 1:28

**Insulin deficiency**

- in classification of diabetes, 1:6; 15:3
- diagnosis of type 1 diabetes in youth, 2:3
- DIDMOAD syndrome, 7:8
- DKA and, 15:13; 17:1
- with hemochromatosis, 6:1,10
- INS mutations in neonatal diabetes mellitus, 7:11
- in MODY, 7:2
- with pancreatitis, 6:7
- progression in MODY, 7:6–7
- in single gene defects, 7:8
- in type 1 and type 1b diabetes, 6:18; 7:2
- with type 1 diabetes in youth, 15:2
- in type 1 vs. type 2 diabetes, 1:3–4
- type 1a diabetes, 1:3
- type 1b diabetes, 6:18
- in type 2 diabetes, 7:2
- in types 1 and 2 diabetes, 1:3; 7:2
- types 1 and 2 diabetes in youth, 15:2–3

**Insulin processing defects**

- genetic defects in, 7:11–12
- hyperproinsulinemia, 7:11
- prohormone convertases in, 7:11

**Insulin receptor/postreceptor defects**

- Donohue syndrome, 7:12
- insulin resistance syndrome type A, 7:12
- in lipodystrophy, 7:20

- Rabson-Mendenhall syndrome, **7:12**
- Insulin resistance.** See also Insulin sensitivity
- acanthosis nigricans with, **7:12**
  - adiponectin level correlation with, **13:19**
  - after in utero diabetes exposure, **13:13**
  - aldosterone impairment of, **6:15**
  - androgen deprivation therapy induction of, **29:13**
  - association with smoking, **33:23**
  - in autoimmune groups, **15:3**
  - benign prostatic hyperplasia etiology, **28:5**
  - brain metabolism profile with, **24:5**
  - characteristics of, **19:9**
  - comparison of indices for, **13:18**
  - criteria for screening in youth, **1:14**
  - cytokines in pathway for, **13:19**
  - in diabetes of youth, **15:33–34**
  - Donohue syndrome, **7:12**
  - etiology in type 2 diabetes, **1:3**
  - euglycemic hyperinsulinemic clamp measurement, **13:17**
  - evening cortisol levels and, **25:10**
  - gallstone disease and, **26:16–18**
  - with hepatitis C, **26:8–9**
  - heritability of, **14:7**
  - hirsutism with, **7:12**
  - HOMA-IR model for risk prediction, **13:18**
  - impaired glucose tolerance association with, **1:17**
  - INS* gene mutations, **7:11**
  - ketoacidosis risk in pregnancy, **5:25**
  - in lipodystrophies, **7:20**
  - measurement of, **13:17; 18:11**
  - microalbuminuria association with, **15:24**
  - newly diagnosed SEARCH study participants, **2:3–4**
  - nicotine effects on, **13:15–16**
  - nonalcoholic fatty liver disease risk with, **26:4**
  - with obesity, **1:3**
  - obstructive sleep apnea association, **25:14**
  - in older adults, **16:1**
  - oral health effects on, **31:8–9**
  - pancreatic cancer association, **29:8**
  - with periodontal disease, **31:24**
  - periodontitis effects on, **31:8–9**
  - pioglitazone for, **24:13**
  - during pregnancy, **1:4; 4:3**
  - proinsulin and measures of, **18:1**
  - risk factor cardiovascular disease, **18:11–12**
  - subclinical proinflammatory condition in, **13:18**
  - in treated type 1 diabetes, **1:5**
  - type 1 diabetes mortality with, **35:12**
  - type 1 diabetes risk factors, **11:13**
  - with type 2 diabetes, **7:2; 19:9**
  - in type 2 diabetes in youth, **15:2**
  - type 2 diabetes prediction from indices, **13:18**
  - type 2 diabetes risk link, **13:15**
- Insulin Resistance Atherosclerosis Study (IRAS)**
- acute insulin response and proinsulin risk association, **13:17**
  - adiponectin and type 2 diabetes risk association, **13:19**
  - first-phase insulin response, **13:17**
  - insulin resistance estimates, **13:18**
  - insulin sensitivity and heart disease risk, **18:11**
  - insulin sensitivity as heart disease risk factor, **18:11**
  - liver enzymes and incident diabetes association, **26:5**
  - type 2 diabetes risk and adiponectin levels, **13:19**
- Insulin Resistance Intervention after Stroke (IRIS) trial, 19:13–14**
- Insulin resistance syndrome type A, 7:12**
- Insulin resistance syndrome type B, 6:15**
- Insulin response**
- acute insulin response, **13:17**
  - in bottle-fed babies, **15:13**
  - circadian effects on, **25:27**
  - first-phase, **7:5**
  - first-phase reduction, **37:6**
  - free fatty acid effects on, **25:19**
  - phases of, **7:5**
  - sleep restriction effects, **25:2,6**
- Insulin secretagogues, 16:16; 38:9,12**
- Insulin sensitivity.** See also Insulin resistance
- adiponectin level relationship, **13:18–19**
  - alcohol effects on, **17:11**
  - androgen deprivation therapy, **29:13**
  - cardiovascular disease and HOMA-IR model, **18:11**
  - classification of diabetes in youth, **15:3**
  - in congenital syndromes, **6:16**
  - cortisol effects on, **25:19**
  - diet effects on, **13:6; 29:6**
  - dietary fat effects on, **13:6**
  - effects of free fatty acids on, **25:19**
  - with endocrinopathies, **6:15**
  - euglycemic hyperinsulinemic clamp measurement, **15:3**
  - free fatty acid effects on, **25:19**
  - genetic risk score, **38:11**
  - genome-wide association scan, **14:7–10**
  - glucocorticoid effects on, **6:11**
  - heart disease association with, **18:11**
  - in hemochromatosis, **6:10**
  - insufficient sleep, **25:2–3**
  - Insulin Sensitivity Index for racial/ethnic backgrounds, **13:18**
  - leptin levels and, **25:11**
  - marker for progression to type 2 diabetes, **13:17**
  - meta-analysis for, **14:9**
  - obstructive sleep apnea links to, **25:14,18–20**
  - oral medication effects on, **29:10; 32:12; 38:6,8,11**
  - periodontitis effects on, **31:16,24**
  - progression to type 2 diabetes, **13:15–19**
  - SEARCH study classification by, **2:3–4; 15:3,34**
  - shift work and diabetes association, **25:26–27,30**
  - sleep fragmentation effects, **25:6**
  - thiazolidinedione medications for, **32:12**
  - weight loss effects, **38:10**
- Insulin Sensitivity Index (ISI), 13:18**
- Insulin signaling**
- in adipocytes with sleep restriction, **25:11**
  - aldosterone impairment of, **6:15**
  - in dementia, **24:13**
  - insulin gene mutation disruption of, **7:12**
  - in lipodystrophy, **7:20**
  - sympathetic nervous system activity, **25:19**
- Insulin synthesis/secretion**
- acute insulin response measurement for, **13:17**
  - aging effects on, **16:1**
  - association with smoking, **33:23**
  - beta cell apoptosis rates with, **6:10**
  - before clinical diagnosis, **1:22**
  - in diabetes, **7:8–9**
  - diazoxide, **7:5**
  - fasting glucose association with defects in, **1:17**
  - genome-wide association scans for, **14:9**
  - heritability of, **14:7**
  - insulinogenic index calculation, **13:17**
  - $K_{ATP}$  channel mutations in, **7:5**
  - maternally inherited diabetes, **7:9**
  - melatonin receptors and, **25:28**
  - MODY, **7:2–8**
  - phases of, **13:17**
  - pigmented hypertrichosis and insulin-dependent diabetes, **7:8–9**
  - shallow sleep suppression effects, **25:6**
  - single gene defects, **7:8**
  - sleep disturbances and, **25:2**
  - thiamine-responsive megaloblastic anemia, **7:8**
  - in type 1 diabetes, **2:3**
  - in utero hyperglycemia exposure levels, **13:13**
  - Wolfram syndrome, **7:8**
- Insulin-degrading enzyme, 24:4**
- Insulin-dependent diabetes.** See Type 1 diabetes
- Insulinemia, breastfeeding and, 15:13**
- Insulin-induced hypoglycemia, 5:26**
- Insulin-like growth factor-1 (IGF-1)**
- benign prostatic hyperplasia and, **28:4**
  - cancer risk associated with, **29:6–7**
  - effects in Donohue syndrome, **7:12**
  - function of, **13:20**
  - glucose effects of normalization, **6:15**
  - insulin binding to receptors for, **28:4**
  - menarchal status and, **21:23**
  - possible link to diabetes, **13:20**
  - retinopathy progression and, **21:23,26**
  - stroke and diabetes risk prediction, **19:11**

- Insulinogenic index calculation**, 1:26; 13:17
- Insulinoma associated-2 autoantibodies (IA-2A)**  
 autoantibody positivity, 12:11–12  
 beta cell destruction, 15:2  
 for diabetes in youth classification, 15:3  
 differentiating types 1 and 2 diabetes, 1:3  
 genome-wide association scan of autoantibody positivity, 12:12
- Insulinoma-associated protein 2 (IA-2)**  
 autoimmune vs. nonautoimmune diabetes classification, 1:6  
 in islet autoimmunity, 11:2  
 parvovirus homology with, 11:8  
 in screening for type 1 diabetes, 1:28  
 SEARCH diabetes classification by, 2:3  
 for types 1 and 2 diabetes differentiation, 1:3
- Insulinopenia**. See Insulin deficiency
- Insulin-stimulated glucose uptake**  
 and leptin release, 25:11  
 in postprandial hyperglycemia, 14:6
- Intensive glucose-lowering treatments**. See Intensive glycemic control
- Intensive glycemic control**  
 cardiovascular autonomic neuropathy, 15:27–28; 23:13  
 cardiovascular disease clinical trials, 18:14–16; 19:13  
 cataract risk with, 21:35  
 clinical trial outcomes on cardiovascular disease, 19:13  
 control of risk factors for coronary heart disease, 18:13–19  
 coronary artery scores and, 15:38  
 distal symmetrical polyneuropathy and, 23:11  
 in geriatric population, 16:13,15–16  
 hypoglycemia risks in older adults, 16:16  
 increased depression with, 33:4  
 metabolic memory from, 22:45  
 neonatal hypoglycemia with, 5:70  
 neuropathy risk reduction, 23:8  
 progression of carotid media-intima thickness, 20:10  
 for stroke, 19:16  
 type 1 diabetes mortality, 35:10  
 UKPDS, 18:13–14
- Intensive insulin therapy**  
 with acute stroke, 19:9  
 albuminuria risk reduction by, 22:46  
 carotid artery intima thickening progression effects, 20:12  
 with erectile dysfunction, 28:10  
 hypoglycemic episodes in pregnancy, 5:26  
 reduction of nephropathy by, 15:24  
 retinopathy in youth, 15:18  
 total calories consumed, 10:2  
 in type 1 diabetes, 1:5
- Intention-to-treat analysis**, 37:3; 38:5,12
- Inter 99 Eye Study**, 1:16
- Interferon-induced helicase C domain-containing protein 1 (IFIH1)**. See *IFIH1* gene
- Interferon- $\gamma$** , 30:18
- Interleukin (IL)-1**  
 levels with peripheral arterial disease, 20:9  
 in response to sleep deprivation, 25:10  
 T cell recruitment, 37:13  
 in type 1 diabetes immune response, 37:2
- Interleukin (IL)-6**  
 cell types producing, 13:19  
 cortisol exposure and levels of, 33:14  
 levels with peripheral arterial disease, 20:9  
 production of, 13:19  
 in response to sleep deprivation, 25:10  
 vitreous fluid levels with periodontitis, 31:16
- Interleukin (IL)-12, in adaptive immunity**, 30:18
- Interleukin (IL)-15, in immune response to gluten**, 27:9
- Interleukin (IL)-17, in response to sleep deprivation**, 25:10
- Interleukin-1 $\beta$  (IL-1 $\beta$ ), alpha-1 antitrypsin effects on**, 37:13
- Interleukin-(IL)-18, in proinflammatory and insulin resistance pathways**, 13:19
- Intermediate-density lipoprotein (IDL) particles**, 22:32
- Intermittent claudication**  
 in diagnosis of peripheral arterial disease, 20:3  
 hypertension association with, 20:7  
 IGF-binding protein, 19:11  
 prevalence of, 20:1  
 progression of, 20:12  
 risk factors for, 20:7
- International Agency for Research on Cancer (IARC)**, 29:6
- International Association of Diabetes and Pregnancy Study Groups (IADPSG)**. See IADPSG
- International Classification of Diseases (ICD 9/10)**  
 ambulatory care diagnosis coding, 40:2  
 categorization of diabetes and complications, 2:4; 17:1  
 celiac disease in hospital discharges, 27:10  
 coding of diabetic neuropathies, 23:9  
 coding of malformations, 5:35  
 dementia prevalence, 24:10  
 DKA and complication coding, 17:1  
 fetal complication definitions, 5:35  
 foot ulcer classification by, 20:16–17  
 hospital discharge neuropathy coding, 23:1,9  
 hyperglycemic hyperosmolar state, 17:6  
 hypoglycemic coma definition, 17:9  
 morbidity and comorbidity measures, 5:4  
 morbidity/comorbidity measures from, 5:4  
 neuropathy follow-up using, 15:27  
 SEARCH study identification by, 2:4  
 stroke codes, 19:5
- International Classification of Functioning, Disability and Health**, 34:2
- International Diabetes Federation (IDF)**  
 gestational diabetes projections, 4:8  
 metabolic syndrome criteria, 18:9  
 screening recommendation review, 1:23
- International Expert Committee (IEC)**  
 A1c diagnostic criteria for, 1:2,12  
 A1c sensitivity vs. FPG or 2-hour PG, 1:15,26  
 constitution of, 1:7  
 diagnostic criteria for diabetes, 1:2,15; 36:1  
 diagnostic cutpoints for diagnosis, 1:6,20–21,26  
 glycemic tests cutpoints for diagnosis, 1:6  
 high-risk range of A1c, 1:20–21  
 preference for A1c, 1:9  
 recommendation of A1c for diagnosis, 1:7  
 repeat of high-risk A1c test, 1:22  
 specificity with cutpoints by, 1:12  
 standardization of A1c measurements, 1:7
- International HapMap Project**, 12:6
- International Index of Erectile Function (IIEF)**, 28:6
- International Pancreatic Transplant Registry**, 39:9
- International Society for Pediatric and Adolescent Diabetes**, 17:1
- International Working Group on Diabetic Foot (IWGDF)**, 20:21
- Intestinal microbiome**  
 in autoimmunity development, 11:14  
 breastfeeding and, 5:73  
 diabetes in youth risk factors, 15:10
- Intracerebral hemorrhage classification**, 19:2
- Intra-epidermal nerve fiber density (IENFD)**, 23:6,8
- Intranasal Insulin Trial (INIT 1)**, 37:6
- Intraocular pressure**. See Glaucoma
- Intrauterine diabetes exposure**. See also Gestational diabetes; Maternal diabetes; Preexisting diabetes with pregnancy  
 anencephaly in, 5:65  
 anorectal atresia odds ratio, 5:60  
 apoptosis in nephrogenesis with, 22:42  
 cardiovascular congenital abnormalities, 5:65  
 central nervous system malformations, 5:62  
 effects on offspring, 13:12  
 encephalocele in, 5:65  
 epigenetic programming from, 22:42  
 hydrocephaly with, 5:60  
 long-term adverse effects on offspring, 4:12–13  
 metabolomic studies for assessment, 11:14  
 multiple anomalies, same infant, 5:65–66; 7:11  
 musculoskeletal malformation, 5:62  
 neonatal effects of, 13:12–13  
 nephrogenesis effects of, 22:42  
 nephropathy risk with, 15:24

obesity and, **4:12**  
 omphalocele, **5:65,66**  
 renal agenesis with, **5:60,65**  
 type 2 diabetes risk with maternal diabetes, **15:13**

**Intrauterine growth retardation**  
 diabetes risk with, **6:18**  
 Donohue syndrome, **7:12**  
 factors in, **22:42**  
 SHORT syndrome, **7:20**

**Intravenous glucose tolerance test (IVGTT)**  
 acute insulin response, **13:17**  
 insulin secretion measurement in, **13:17–18**  
 insulin sensitivity assessment, **18:11**  
 in Prader-Willi syndrome, **6:16**  
 sleep restriction effects on, **25:2**

**Inuit ancestry.** See Greenlandic population

**Inward rectifying potassium channel (Kir6.2), 7:5**

**IPEX (immunodysregulation polyendocrinopathy enteropathy X-linked)**  
 diabetes with, **6:14–15**  
 neonatal diabetes mellitus, **7:11**

**IPF1 (insulin promoter factor), 7:7**

**Irbesartan Diabetic Nephropathy Trial (IDNT), 22:49**

**Irbesartan in Patients With Type 2 Diabetes and Microalbuminuria (IRMA 2), 22:49**

**Irish studies**  
 gestational hypertension prevalence in, type 2 diabetes, **5:34**  
 major malformations with type 2 diabetes, **5:62**  
 malformations and preconception care use, **5:8**  
 nephropathy prevalence data, **5:29**  
 preconception care use by diabetes type, **5:10**  
 preeclampsia rates in, **5:34–35**  
 preeclampsia with preconception care, **5:35**  
 retinopathy progression during pregnancy, **5:27**  
 severe maternal morbidity, **5:25**  
 severe obstetric morbidity, **5:25**

**Iron deficiency anemia, 1:12**

**Iron poisoning, 6:9–10**

**Ischemic stroke**  
 carotid artery disease and, **19:17**  
 classification of, **19:2**  
 control of systolic hypertension with, **19:12**  
 diabetes as independent risk factor, **19:17**  
 glucose toxicity effects on, **19:9**

**Islet amyloid polypeptide toxicity, 1:6**

**Islet autoantibodies**  
 identification of, **37:2**  
 metabolomic studies for prediction of, **11:14**  
 seasonality, **11:3**

**Islet autoimmunity.** See also Type 1 diabetes risk factors  
 conjugated linoleic acid association, **11:10**

early cereal exposure, **11:9,10,16**  
 early respiratory infections and, **11:7**  
 enteroviral infection outcomes, **11:4**  
 enteroviral infections, **11:6**  
 gene/dietary exposure interaction, **11:16**  
 linoleic acid, **11:13**  
 milk and meat consumption association with, **11:10**  
 monounsaturated palmitoleic acid isomers association, **11:10**  
 peak incidence in high-risk children, **11:3**  
 risk factors for, **11:1**  
 risk with early cereal exposure, **27:14**  
 subclinical phase of type 1 diabetes, **11:1**  
 25-hydroxyvitamin D (25(OH)D) and, **11:11–12**

#### **Islet cell antibodies (ICA)**

identification of, **37:2**  
 marker for beta cell injury, **37:2**  
 in MIDD, **7:9**  
 MODY screening, **7:6**  
 prediction of type 1 diabetes development, **15:2**  
 screening for preclinical type 1 diabetes, **1:27–28**  
 screening for type 1 diabetes, **7:6**  
 type 1 diabetes in youth, **15:3**

#### **Islet cell transplants for diabetes treatment, 39:10**

#### **Islet cells**

aging effects on, **16:1**  
 enterovirus tropism for, **11:4**

#### **Isoniazid, 30:17**

#### **Israeli studies**

early induction for birth trauma prevention, **5:59**  
 early mortality with type 1 diabetes, **35:9**  
 mortality in childhood-onset type 1 diabetes, **35:8,12**  
 periconception glycemic control, **5:10**

#### **Italian population/studies**

cardiovascular risk with metabolic syndrome traits, **18:9**  
 gallstone association with diabetes, **26:15**  
 gestational hypertension prevalence in type 1 diabetes, **5:34**  
 hypoglycemic episodes in pregnancy, **5:26**  
 insulin-cardiovascular disease association in, **18:11**  
 ketoacidotic episodes in types 1 and 2 diabetes, **5:25**  
 major malformations with type 2 diabetes, **5:62**  
 maternal mortality ratio with type 1 diabetes, **5:22**  
 nephropathy prevalence data, **5:29**  
 new-onset diabetes with compensated cirrhosis, **26:11**  
 preeclampsia rates in, **5:34**  
 type 1 diabetes classification criteria, **2:4**  
 ultrasound-detected gallstones, **26:15**

## **J**

#### **Jadad score, 18:15**

#### **Japanese Americans**

diabetes and prevalence of dementia, **24:4–5**  
 diabetes as risk for stroke, **19:1**  
 diabetes risk in, **13:4**

#### **Japanese Diabetes and Pregnancy Study Group, 5:69**

#### **Japanese population/studies.** See also Asian/Pacific Islander

carries risk with macrosomia, **31:37**  
 childhood-onset mortality in type 1 diabetes, **35:8,12**  
 chronic hypertension with pregestational type 2 diabetes, **5:33,35**  
 in DECODE and EPIC studies, **18:7**  
 diabetes risk in Hawaii, **13:4**  
 diabetes-periodontitis interactive effects, **31:21–22**  
 early mortality with type 1 diabetes, **35:9**  
*ELMO1* gene association with kidney disease, **22:43**  
 gestational hypertension prevalence in type 1 diabetes, **5:34**  
 glucose measures and diabetes risk, **1:20,21**  
 glycosylated albumin and fasting glucose correlation, **1:15**  
 intensive and cardiovascular autonomic neuropathy, **23:13**  
 intensive insulin treatment and distal symmetrical polyneuropathy, **23:11**  
 lifestyle intervention, **38:10**  
 major malformations with type 2 diabetes, **5:62**  
 metabolic syndrome and sleep duration, **25:29–30**  
 MODY5 clinical presentation, **7:7**  
 neonatal polycythemia frequencies with diabetes, **5:69**  
 nephropathy prevalence data, **5:29**  
 with peripheral arterial disease, **20:14**  
 physical activity and type 2 diabetes risk, **13:11**  
 preeclampsia in types 1 and 2 diabetes, **5:35**  
 prevalence of type 2 diabetes, **3:8**  
 prostate-diabetes association, **29:9**  
 proteinuria prevalence in youth, **15:24**  
 short sleep duration and A1c levels, **25:3**  
 shoulder dystocia and brachial plexus palsy, **5:59**  
 stroke risk with diabetes, **19:1,8–9**  
 triglycerides as predictor of heart disease, **18:8**  
 type 1b diabetes in, **6:18**  
 type 2 diabetes prevalence in Asian subgroups, **3:8**

#### **Japanese Primary Prevention of Atherosclerosis With Aspirin for Diabetes (JPAD), 18:17**

**Joint Canada/United States Survey of Health, 10:12****Joint complications**

- Charcot joint/neuropathic arthropathy, **32:18**
- diffuse idiopathic skeletal hyperostosis, **32:18**
- Dupuytren's contractures (trigger fingers), **32:17**
- frozen shoulder/adhesive capsulitis, **32:18**
- osteoarthritis and diabetes risk factors, **32:16–17**
- osteoarthritis prevalence with type 2 diabetes, **32:15–16**
- osteoarthritis/arthritis, **32:14–15,17**
- rheumatoid arthritis prevalence, **32:17**
- stiff hand syndrome (cheiroarthropathy), **32:17**
- type 1 diabetes-rheumatoid arthritis association, **32:15**
- upper extremity musculoskeletal disorder prevalence, **32:17**

**Joslin Clinic studies**

- advanced glycation endproducts with retinopathy, **21:22**
- bovine insulin availability and mortality, **35:2**
- cardiovascular and renal mortality, **35:3**
- ESRD and mortality with type 1 diabetes, **22:20**
- glycemic control in youth, **15:28**
- life expectancy for type 1 diabetes, **35:5**
- mortality with eating disorders, **35:4**
- retinopathy incidence diabetes duration, **21:19**
- selection bias in studies from, **35:3**
- severe hypoglycemia in youth, **17:10**

**Juvenile idiopathic arthritis, 32:15****Juvenile-onset diabetes mellitus, 1:1; 5:3.**

See also Type 1 diabetes

**K****Kaiser Permanente Colorado (KPCO), 4:7****Kaiser Permanente Northern California (KPNC)**

- cancer risk with insulin glargine, **29:11**
- chronic hypertension prevalence with, **5:33**
- complication/mortality rates age  $\geq 60$  years, **16:5**
- deliveries with pregestational diabetes, **5:16–17**
- gestational diabetes prevalence trends, **4:7**
- gestational hypertension/pregestational diabetes, **5:34**
- lung cancer-diabetes association, **29:8**
- maternal mortality with diabetes, **5:22**
- preeclampsia superimposed on nephropathy, **5:35**
- pregestational diabetes prevalence during pregnancy, **5:18**

- prospectively collected data from, **5:3–4,71**
- retinopathy progression during pregnancy, **5:27**
- total preeclampsia frequency in, **5:34**
- type 2 diabetes in, **16:1**
- types 1 and 2 diabetes in pregnancy trend, **5:14**

**Kaiser Permanente Southern California (KPSC)**

- cancer risk vs. insulin glargine, **29:11**
- deliveries with pregestational diabetes, **5:15,16–17**
- gestational diabetes and type 2 diabetes risk, **13:21**
- gestational diabetes prevalence, **4:7**
- pregestational diabetes prevalence during pregnancy, **5:18**

**K<sub>ATP</sub> channel**

- function/structure of, **7:5**
- heritability of de novo mutations, **7:10**
- mutations in neonatal diabetes mellitus, **7:9**

**KCNJ11 gene**

- in MODY, **7:4–5**
- mutations in permanent neonatal diabetes, **7:10**
- neonatal diabetes mellitus, **7:10,11**
- p.Glu23Lys, **14:2,10**

**Ketones**

- in diagnosis of diabetes, **1:16**
- in DKA, **17:1**
- in hyperglycemic hyperosmolar state, **17:6**
- in lactic acidosis, **17:8**

**Ketosis**

- in classification of diabetes, **1:2,3; 6:19; 7:2; 15:2**
- resistance in congenital generalized lipodystrophy, **7:15**
- in type 2 diabetes in African Americans, **17:2**
- in types 1 and 2 diabetes, **15:2–3**

**KIDAA0350 gene, 12:6****Kidney disease associated with diabetes, 22:55–56. See also Chronic kidney disease;**

- Diabetic kidney disease; ESRD (end stage renal disease)
- HIV infection, **22:56**
- kidney cancer, **29:9**
- MODY5 clinical presentation, **7:4**
- renal papillary necrosis, **22:56**
- urinary tract infections, **22:55–56**

**Kidney Disease: Improving Global Outcomes (KDIGO), 22:4****Kidney Early Evaluation Program (KEEP), 22:36****Kidney failure. See also ESRD in diabetes**

- A1c levels with, **1:12**
- albuminuria as risk factor for, **22:3**
- albuminuria with type 2 diabetes, **22:17**
- Alstrom syndrome, **7:12**
- definition by GFR, **22:3**
- with EIF2AK3 mutation, **7:11**

- excess mortality risk with type 1 diabetes, **35:11–12**

fracture risk factor, **32:12**

metformin use with, **17:8**

proteinuria phase with diabetes, **15:20**

in relatives of MODY patients, **7:7**

risk with type 2 diabetes in youth, **15:24**

in type 1 diabetes, **22:16**

type 1 diabetes mortality, **35:11**

in types 1 and 2 diabetes, **22:25**

**Kidney injury molecule 1 (KIM-1), 22:1,9****Kidney-specific leptin resistance, 22:38****Kilham rat virus (KRV), 11:8****Kimmelstiel-Wilson nodules, 22:7****Klebsiella pneumonia, 30:8,9,16****KLF14 gene, 14:11****Korean Genome and Epidemiology Study, 25:29****Korean National Health and Nutrition Examination Survey, 25:6****Korean studies. See also Asian/Pacific****Islander**

- A1c sex differences in prediction, **1:20**
- chronic hypertension in diabetic pregnancy, **5:35**
- gallstone disease and insulin resistance, **26:17–18**
- maternal morbidity rates, **5:25**
- preeclampsia rates in, **5:34–35**
- prevalence of preexisting diabetes during pregnancy, **5:17**
- prevalence of type 2 diabetes, **3:8**
- proteinuria prevalence in youth, **15:24**
- puerperal sepsis, **5:24**
- severe obstetric morbidity and pregestational diabetes, **5:25**
- type 2 diabetes prevalence in Asian subgroups, **3:8**
- urinary tract infections with pregestational diabetes, **5:24**
- venous thromboembolism during first pregnancy with pregestational diabetes, **5:23**

**Kruppel-like factor 11 (KLF11), 7:7****Kuopio Ischemic Heart Study, cardiovascular risk with metabolic syndrome traits, 18:9****L****Labor and delivery**

- birth weight of liveborn infants, **5:55–56**
- brachial plexus palsy by duration of, **5:58**
- brachial plexus palsy with operative vaginal delivery, **5:59**
- early induction for birth trauma prevention, **5:59**
- gestational age at delivery with diabetes, **5:45**
- neonatal deaths with preexisting diabetes with pregnancy, **5:47**

**Lactic acidosis**

diagnostic criteria, **17:8**

- incidence, **17:8**  
metformin-associated in type 2 diabetes, **17:8**  
morbidity and mortality, **17:8–9**  
precipitating factors, **17:8**  
prevention and treatment, **17:9**
- Lansoprazole**, **37:14**
- Large-for-gestational age infants (LGA)**  
adverse outcomes with, **5:56**  
birth trauma with, **5:56,58–59**  
criteria for, **5:49**  
hyperbilirubinemia in, **5:71**  
insulin-treated gestational diabetes, **4:11**  
neonatal hyperbilirubinemia, **5:71**  
neonatal hypoglycemia, **5:70**  
neonatal hypoglycemia rates, **5:70**  
neonatal morbidities in, **5:56**  
odds ratio with maternal diabetes, **5:50**  
with in utero diabetes exposure, **13:12**
- Latent autoimmune diabetes of adults (LADA)**  
celiac disease autoimmunity and, **27:9**  
glutamic acid decarboxylase autoantibodies in, **1:5**
- Late-onset AD dementia**. See AD dementia
- Latinos**. See Hispanic ethnicity
- Lawson Wilkins Pediatric Endocrine Society**, **17:1**
- LDL (low-density lipoprotein) cholesterol**  
association with mortality, **35:11**  
cardiovascular event effects of reduction, **18:16; 36:10**  
characteristics in diabetic persons, **18:8**  
control in patients with health insurance, **42:11**  
density correlation with dysglycemia, **15:28**  
by diabetes status, **9:20–21**  
fenofibrate studies, **21:25**  
Friedwald equation for, **9:2**  
in geriatric diabetes, **16:6**  
with intensive glycemic control, **20:12**  
management in diabetes, **19:14**  
measurement in youth, **15:33**  
oxidized autoantibodies in apneic patients, **25:19**  
progression of kidney disease with type 1 diabetes, **22:32**  
reduction and vascular mortality, **36:10**  
screening recommendations with diabetes, **41:3**  
type 1 diabetes mortality, **35:11**
- Leber's hereditary optic neuropathy (LHON)**, **7:8,9**
- Lens opacities**, **21:33–34**
- Leprechaunism**, **7:12**
- Leptin**  
with circadian disruption, **25:26**  
congenital generalized lipodystrophy, **7:15**  
factors modulating secretion, **25:11**  
functions of, **22:37–38**  
in glucose homeostasis, **25:20**  
hypoxic condition effects on, **25:20**
- insulin-stimulated glucose uptake in regulation, **25:11**  
kidney-specific resistance to, **22:38**  
levels with obstructive sleep apnea, **25:20**  
receptor gene and weight loss, **38:11**  
role in obesity-related nephropathy, **22:37–38**  
signaling impairment in Bardet-Biedel syndrome, **6:16**  
sleep disturbance effects on, **13:15**  
in sleep restriction, **25:10–11**
- Leukoaraiosis**, **24:4**
- Life expectancy**  
improvement for type 1 diabetes, **35:5**  
persistent postpartum diabetes treatment, **1:29**  
predictions for diabetes in youth, **36:8**  
for types 1 and 2 diabetes, **35:5**
- Lifestyle characteristics with diabetes/prediabetes**, **10:1–42**  
alcohol consumption, **10:9–10**  
data sources and limitations, **10:1–2**  
health-seeking behaviors, **10:18–20**  
implications for health professionals, **10:20**  
modifiable risk factors for type 2 diabetes, **13:1**  
nutrition, **10:2–11**  
physical activity, **10:12–15; 13:11–12**  
smoking, **10:16–18**
- Lifestyle intervention**  
with antipsychotic treatment, **33:22**  
with cardiovascular autonomic neuropathy, **23:13**  
clinical trials with impaired glucose tolerance, **1:19**  
diabetes development after gestational diabetes, **4:12**  
Diabetes Prevention Program, **38:6–8**  
Diabetes Prevention Program-based, **38:15**  
with gestational diabetes, **5:7**  
for gestational diabetes progression, **4:12**  
heart disease and diabetes, **18:18–19**  
with high genetic burden of risk alleles, **14:9**  
individual-based, **38:15**  
neuropathy treatment with, **23:8**  
in sexual dysfunction with diabetes, **28:10**  
type 2 diabetes prevention, **38:11**  
urinary incontinence with type 1 diabetes, **28:19**  
Zensharen study, **38:10**
- Lifestyle Intervention in Japanese Men with IGT**, **38:8**
- Linkage analysis**. See Genome-wide linkage analysis
- Linkage disequilibrium (LD)**, **12:3–4**
- Linkage mapping**, **12:6**
- Linoleic acid, islet cell autoimmunity association**, **11:10,13**
- Linomide**, **37:7**
- Lipids and lipoproteins**  
cholesterol, **9:19–21**  
total cholesterol, **9:19**  
triglycerides, **9:21–22**  
in vascular and heart disease risk, **18:8–9**
- Lipodystrophy**  
diabetes management in, **7:20**  
genetic lipodystrophies, **7:13–20**
- Lipolysis**  
adipose triglyceride lipase in, **7:19**  
beta-hydroxybutyrate levels with, **17:1**  
diagnosis of type 2 diabetes in youth, **15:2**
- Liraglutide**, **38:10–11**
- Liraglutide Effect and Action in Diabetes: Evaluation of Cardiovascular Outcome Results (LEADER) trial**, **18:16**
- Lisinopril**, **21:24**
- Lithium**, **33:21–22**
- Liver and gallbladder disease**, **26:1–23**  
ALT estimates of injury in, **26:3,4**  
AST for injury estimation, **26:3**  
biomarkers for liver disease, **13:20**  
cirrhosis, **26:11**  
diabetes prevalence with transplantation, **26:11–12**  
fatty infiltration with insulin resistance, **13:18**  
Fatty Liver Index, **26:3**  
gallstone disease, **26:13–16**  
gallstone disease and insulin resistance, **26:16–18**  
hepatitis B and diabetes, **26:10–11**  
hepatitis C and diabetes, **26:8–10**  
liver cancer, **29:7**  
liver disease diagnosis in patients with diabetes, **26:12–13**  
liver transplantation, **26:2,11–13**  
liver transplantation donor characteristics, **26:12**  
liver transplantation indications, **26:8**  
NHANES data, **26:2**  
nonalcoholic fatty liver disease and steatohepatitis, **26:2**  
nonalcoholic steatohepatitis, **26:2**  
post-transplant diabetes risk, **26:13**  
Scientific Registry of Transplant Recipients, **26:2**
- Liver fatty acid-binding protein (L-FABP)**, **22:1,9**
- Lixisenatide**, **18:16**
- LMNA gene**  
adipocyte distribution with mutations in, **7:19**  
atypical progeroid syndrome, **7:20**  
diseases associated with mutations in, **7:19**  
familial partial lipodystrophy and type 2 diabetes, **7:18–19**  
familial partial lipodystrophy association, **7:13**  
glycemic control in lipodystrophy, **7:1**  
mandibuloacral dysplasia, **7:17**  
mutation with familial partial lipodystrophy, **7:1,18,19**

**Long-acting insulin**

insulin glargine, **29:11**  
 ultralente insulin, **37:6**  
 use with pancreatitis-related diabetes, **6:7**

**Longitudinal studies.** See also Pima Indian

studies; SEARCH for Diabetes in Youth  
 alcohol consumption and type 2 diabetes  
 risk, **13:9**  
 antidepressant use association with inci-  
 dence of diagnosed diabetes, **33:13**  
 birth cohorts identified by genetic  
 screening, **37:2**  
 BMI increases and incidence of diabetes in  
 children, **22:37**  
 cardiovascular mortality risk with diabetes,  
**16:11**  
 changes in glucose levels and periodontitis,  
**31:9**  
 data with cohort studies, **36:5**  
 depression in types 1 and 2 diabetes in  
 youth comparison, **33:4**  
 depression prediction of diabetes compli-  
 cations, **33:10**  
 depressive symptoms and glycemic  
 control association, **33:13**  
 diabetes association with disability risk,  
**34:9**  
 disability and diabetes association, **34:12**  
 duration of depressive symptoms, **33:4**  
 enteroviral infection study, **11:4–5,6**  
 epigenetic gene regulation with intra-  
 uterine diabetes exposure, **22:42**  
 factors affecting prevalence rates, **36:3**  
 fetal overnutrition, **15:2**  
 fracture data with type 1 diabetes, **32:2–3**  
 fracture incidence with and without  
 diabetes, **32:6**  
 Gila River Indian Community,  
**31:9,15,17,20**  
 Health and Retirement Study, **10:12**  
 health behaviors over time, **1:27**  
 hypertension in types 1 and 2 diabetes,  
**22:31**  
 hypoglycemic events and cognitive impair-  
 ment, **24:12**  
 incidence of type 2 diabetes in youth, **3:16**  
 incident periodontitis progression with  
 diabetes, **31:19**  
 islet autoantibodies with rotavirus infection,  
**11:8**  
 life expectancy changes with type 1  
 diabetes, **35:5**  
 maternal glucose levels effect on offspring,  
**4:13**  
 metabolic syndrome and periodontitis  
 two-way causal effects, **31:21**  
 microvascular complications and psycho-  
 motor slowing with type 1 diabetes, **24:7**  
 pathogenesis of foot ulceration in diabetes,  
**23:14**  
 periodontitis and diabetes-related medical  
 expenses, **31:40**

periodontitis/new type 2 diabetes develop-  
 ment, **31:14**

Pima Indians, **31:20–21**  
 prediabetes and periodontitis severity,  
**31:22**  
 progression of obstructive sleep apnea,  
**25:20**  
 proteinuria incidence and diabetes dura-  
 tion, **22:17**  
 psychiatric disorders with type 1 diabetes,  
**17:11**  
 REGARDS study, **19:7**  
 renal lesions with chronic kidney disease,  
**22:7**  
 reported falls with and without diabetes,  
**32:11**  
 school-aged children with diabetes, **2:2**  
 sexual dysfunction incidence in American  
 men, **28:8**  
 smoking and GFR decline in type 1  
 diabetes, **22:36**  
 Study of Osteoporotic Fractures, **16:8**  
 TEDDY study, **15:10**  
 Tohono O'okham (Papago) Indian residents,  
**31:15**  
 type 2 diabetes and periodontitis inci-  
 dence, **31:20**

**Long-term care.** See also Home health care;  
 Nursing home  
 data sources, **40:43**

**Look AHEAD**

behavioral intervention for cardiovascular  
 disease, **18:18**  
 erectile dysfunction with diabetes, **28:10**  
 lifestyle characteristics, **10:2,7,9–11,16–17**  
 lifestyle intervention for weight loss, **34:12**  
 lifestyle intervention results, **38:17**  
 sexual dysfunction in diabetes, **28:10**  
 therapeutic strategies and cognitive  
 decline, **24:12**  
 urinary incontinence prevention, **28:19**

**Los Angeles Latino Eye Study (LALES)**

association of diabetes and glaucoma,  
**21:37**  
 with diabetes, **21:2–3**  
 racial/ethnic differences in retinopathy,  
**21:28**

**Losartan**

atenolol comparison on blood pressure  
 and vascular events, **19:12**  
 effects on retinopathy progression, **21:25**  
 modification of ESRD risk with, **22:31**

**Losartan Intervention for Endpoint  
 Reduction in Hypertension (LIFE), 19:12****Louisiana**

blood pressure/heart disease association,  
**18:9**  
 insulin resistance and periodontitis, **31:15**  
 periodontitis prevalence, **31:6**  
 racial/ethnic differences in stroke in  
 diabetes, **19:7**

**Low glycaters, 1:12****Low-density lipoprotein (LDL) cholesterol.**

See LDL (low-density lipoprotein) cholesterol

**Lower extremity amputation (LEA),**

**20:23–25**  
 characteristics associated with, **20:25**  
 functional status outcome, **20:25**  
 glycemia as risk, **20:25**  
 intensive vs. conventional glycemic control,  
**20:25**  
 pathophysiology, **20:24**  
 physical activity, **10:12**  
 prevalence and incidence, **20:23–24**  
 racial/ethnic risk factors, **20:24–25**  
 reamputation, **20:25**  
 risk with diabetes type, **20:24**  
 Sickness Impact Profile for functional  
 status, **20:25**

**Lower urinary tract symptoms (LUTS) in  
 men**

benign prostatic hyperplasia and, **28:5–6**  
 bladder denervation/detrusor contractility,  
**28:2**  
 bladder outlet obstruction, **28:2**  
 data sources, **28:2–4**  
 diabetes and prostate cancer association,  
**29:4**  
 diabetic cystopathy symptoms and preva-  
 lence, **28:4**  
 intensive treatment effects, **28:6**  
 lower urinary tract symptoms associated  
 with diabetes, **28:5–6**  
 measurement and classification of, **28:2**  
 prevalence and incidence of, **28:4**  
 prostatic hyperplasia mechanisms, **28:4**

**Lower urinary tract symptoms (LUTS) in  
 women**

bladder storage symptoms, **28:10**  
 cystitis with type 1 diabetes, **22:56; 30:9**  
 cystopathy symptoms and prevalence,  
**28:4**  
 diabetes treatment and prevention of  
 incontinence, **28:19–20**  
 duration of type 2 diabetes and, **28:16**  
 glycemic control and, **28:18**  
 impaired detrusor muscle function with  
 cystopathy, **28:14**  
 incontinence with type 1 diabetes,  
**28:18–19**  
 incontinence with type 2 diabetes,  
**28:14,16**  
 involuntary detrusor muscle contractions,  
**28:14**  
 lifestyle intervention with type 2 diabetes,  
**28:19**  
 overactive bladder syndrome, **28:10**  
 pathophysiology and clinical course,  
**28:14–16**  
 pharmaceutical vs. insulin treatment,  
**28:18**  
 racial disparities in urinary incontinence,  
**28:14**  
 remission and improvement with type 2  
 diabetes, **28:16**

symptoms of, **28:10**  
 type 2 diabetes association with, **28:11**  
 urinary incontinence measurement and diagnosis, **28:10–14**  
 voiding and postmicturition symptoms, **28:10**

## M

**Macroalbuminuria.** *See also* Albuminuria; Microalbuminuria; Proteinuria  
 development in diabetes, **22:15**  
 diagnostic criteria, **5:29**  
 dyslipidemia with, **22:31**  
 excess mortality risk with type 1 diabetes, **35:11**  
 excess mortality with, **22:19–20**  
 macromolecular shunt contribution to, **22:9**  
 mortality with macroalbuminuria, **22:20**  
 prediction in type 1 diabetes, **22:15**  
 prevalence of elevated, **22:12**  
 prevalence of in EURODIAB, **15:23**  
 risk factor for cardiovascular disease, **22:19–20**

**Macronutrients.** *See* Nutrition

### Macrophages

in alveoli of diabetic persons, **30:18**  
 in celiac disease inflammatory response, **27:9**  
 infiltration of adipose tissues, **13:18**  
 infiltration of kidney interstitium, **22:9**  
 TNF $\alpha$  production, **13:19**

**Macrosomia.** *See also* Birth weight; Fetal growth

birth weight categories, **5:50**  
 excess fetal size, **5:49**  
 neonatal and long-term morbidities, **5:56**  
 neonatal hypoglycemia association, **5:56**  
 polyhydramnios association, **5:46**  
 postprandial hyperglycemia driving of, **5:72**  
 reduction with treatment, **4:3**  
 risk factors for, **4:11**  
 small-for-gestational age with, **5:55**  
 with types 1 and 2 diabetes, **5:49**

**Macrovascular complications.** *See also* Heart disease and diabetes; Peripheral arterial disease; Stroke and diabetes  
 blood pressure association, **18:9**  
 definition of, **19:11**  
 effects of lowering A1c, **1:7**  
 IGFBP-1 protective effect on, **19:11**  
 multifactorial intervention, **22:54**  
 pathophysiologic mechanisms of, **22:22–23**  
 risk with retinopathy, **21:30**  
 stroke with, **19:3**  
 in type 1 and type 2 diabetes, **1:4**

### Macular edema

age-related, **21:38**  
 association with elevated blood pressure, **21:24**

with cataract surgery, **21:35–36**  
 causes, prevalence and incidence, **21:12–30**  
 clinically significant, **21:16–18**  
 fenofibrate effects on, **21:25**  
 during gestational diabetes, **5:27**  
 during pregnancy, **21:26**  
 race/ethnicity distribution, **21:27**  
 risk factors with type 2 diabetes, **21:7–8**  
 smoking and alcohol consumption, **21:27**  
 socioeconomic status, **21:29**  
 statin treatment with dyslipidemia, **21:25–26**

### Magnesium, 13:6

**Major depressive disorder (MDD).** *See also*

Depressive episode or symptoms  
 age relationship to reported symptoms and risk for, **33:8–9**  
 antidepressant use and type 2 diabetes development, **33:13**  
 association with treatment outcomes, **33:10**  
 bidirectional relationship with type 2 diabetes, **33:10–15**  
 biologic pathways for association, **33:13–14**  
 cognitive behavioral therapy effects, **33:15**  
 definitions, **33:2**  
 depression as risk marker for type 2 diabetes, **33:13**  
 diabetes distress, **33:15**  
 diabetes of youth, **33:4**  
 in diagnosed, undiagnosed, and prediabetes, **33:6–7**  
 elevated diabetes distress with, **33:10**  
 emotional distress, **33:3,13**  
 functional limitations and, **33:7**  
 measurement issues with symptom overlap, **33:9–10**  
 patient factors in course of diabetes, **33:8–9**  
 presence of diabetes complications, **33:8**  
 presentation, **33:1**  
 prevalence and course, **33:2–4**  
 treatment and intervention, **33:15–16**  
 treatment effects on glycemic control, **33:15**  
 type 1 diabetes effects on brain structure, **33:14**  
 with types 1 and 2 diabetes, **33:2–4**  
 variation by race/ethnicity, **33:9**

### Major histocompatibility complex (MHC).

*See* MHC (major histocompatibility complex)

**Major malformations.** *See also* Congenital malformations

European rates for, **5:62**  
 fetal sex-associated risk, **5:66**  
 first trimester glycemic control, **5:10**  
 musculoskeletal, **5:62**  
 nuchal translucency prediction, **5:67**  
 preconception care in diabetic women, **5:8,10**  
 pregnancy terminations, **5:62**

prenatal detection of, **5:67**  
 shortened crown-rump length prediction, **5:67**  
 with type 2 diabetes, **5:62**  
 in utero exposure to diabetes, **5:60**

**Malignant/invasive otitis externa (MOE), 30:16**

**Malmöhus County, Sweden, study, 38:2–3,5,12**

**Malnutrition-related diabetes, 6:18**

**Mandibuloacral dysplasia (MAD) associated lipodystrophy, 7:17**

**Markov modeling framework**

estimation of youth burden, **2:10**  
 life expectancy predictions for youth, **36:8**

### Maryland

cognitive status with diabetes, **24:8**  
 Multi-Ethnic Study of Atherosclerosis, **31:6**

### Massachusetts

acute metabolic complications in youth, **15:17**

electronic health records study/data, **2:4**

incidence of blindness, **21:5**

prevalence of visual impairment, **21:3**

**Massachusetts Commission for the Blind register, 21:3**

### Massachusetts Male Aging Study

benign prostatic hyperplasia diagnosis with diabetes, **28:6**

diabetes risk with short sleep, **25:3**

incidence with diabetes, **28:8**

**MATE1 (multidrug and toxin extrusion 1 transporter protein), 38:11**

**Maternal complications before and during pregnancy**

hypertensive disorders, **5:30–35**

insulin-induced hypoglycemia, **5:26**

maternal diabetes as risk factor, **5:24**

maternal morbidity with acute myocardial infarction, **5:23**

maternal mortality, **5:21**

myocardial infarction rates, **5:23**

nephropathy, **5:29**

neuropathy prevalence in pregnancy, **5:28**

proliferative diabetic retinopathy prevalence in early pregnancy, **5:26**

sepsis association with, **5:24**

venous thromboembolism, **5:23–24**

**Maternal diabetes.** *See also* Gestational diabetes; Pregestational diabetes

association with sepsis, **5:24**

association with stroke in pregnancy, **5:22**

birth condition and sequelae, **5:48–50**

birth defects with, **5:11**

cesarean delivery, **5:46**

cognitive ability in offspring, **5:75**

comorbidities with, **5:2,67–68**

comorbidities with stillbirth, **5:43**

congenital heart defects, **5:67**

consequences for offspring, **4:12**

definition of, **5:24**

diabetes diagnosis in offspring, **4:12**

effects on brachial plexus palsy, **5:58**

- fetal demise with, **5:43**  
 fetal overnutrition in, **5:73**  
 glycemia and perinatal outcome associations, **4:9**  
 health risks in children of mothers, **5:73–74**  
 in-hospital mortality risks, **5:22**  
 hydrocephaly with, **5:60**  
 hyperbilirubinemia and jaundice in offspring, **5:71**  
 infant hypocalcemia/hypomagnesemia, **5:71**  
 large-for-gestational age infants with, **5:50,55–56**  
 late preterm deliveries with, **5:45**  
 long-term risks to offspring, **4:12,13**  
 major malformations with, **5:62,65**  
 management methods in pregnancy, **5:72–73**  
 morbidity and mortality with, **5:21,22,23,24**  
 mortality ratio with, **5:22**  
 neonatal hypertrophic cardiomyopathy, **5:68**  
 neonatal hypoglycemia with, **5:69–71**  
 neonatal polycythemia/secondary hyperviscosity syndrome, **5:68**  
 neonatal respiratory distress, **5:67–68**  
 neonatal seizures and neonatal encephalopathy, **5:49**  
 nephropathy risk with, **15:23,25**  
 perinatal mortality with, **5:48**  
 placental characteristics in, **5:67**  
 prediabetes, **4:4**  
 preterm delivery with, **5:45–46**  
 schizophrenia/autism risks in offspring, **5:76**  
 shoulder dystocia with, **5:56–59**  
 size and birth weight, **5:55–56**  
 stillbirth comorbidities in, **5:43**  
 stroke and migraine history, **5:22**  
 stroke association with, **5:22**  
 in utero exposure effects on offspring, **5:73; 13:12–13; 15:12–13**  
 vascular disease, **5:43**
- Maternal mortality and morbidity**  
 from cerebrovascular disease, **5:22**  
 chronic hypertension/gestational diabetes risks, **5:33**  
 DKA in pregnancy, **5:25**  
 from hemorrhage, **5:22**  
 hypoglycemia, **5:26**  
 late maternal death definition, **5:21**  
 maternal death ratio at delivery, **5:22**  
 preexisting diabetes and pregnancy prevalence, **5:21**  
 retinopathy during, **5:26**
- Maternal mortality ratio**, **5:21**
- Maternal-fetal hyperglycemia, prediction of fetal loss**, **5:43**
- Maternal-Fetal Medicine Units (MFMU) Network**, **4:10,11**
- Maternal/fetal outcomes of sleep disturbances**, **25:21**
- Maternally inherited diabetes and deafness (MIDD)**, **7:9**
- Maturity-onset diabetes of youth (MODY)**.  
 See MODY (maturity-onset diabetes of youth)
- Mauritian population**, **1:20**
- Mean plasma glucose (MPG)**, **1:12**
- Medical Outcomes Research for Effectiveness and Economics Registry (MORE<sup>2</sup> Registry)**, **29:11**
- Medically indicated/planned preterm delivery**, **5:45**
- Medicare coverage**  
 geriatric diabetes costs, **16:16–17**  
 health insurance coverage, **42:4–5,9**  
 for insulin and oral medications, **42:5–6**  
 nursing home payments, **40:50**  
 payment for outpatient visits, **40:20**
- Medicare Current Beneficiary Survey**, **31:39**
- Medicare Diabetes Analytics File**  
 lower extremity amputation rates in, **20:23–24**  
 race/ethnicity for lower extremity amputation, **20:25**
- Medication Exposure in Pregnancy study**, **5:6**
- Medication use and self-care practices**, **39:1–10**  
 bariatric surgery to treat diabetes, **39:10**  
 barriers to self-care, **39:8–9**  
 cholesterol treatment with diabetes, **39:5–6**  
 data sources and limitations, **39:1–2**  
 depression, **39:6**  
 hypertension treatment, **39:4–5**  
 medication adherence, **39:9**  
 oral medications use, **39:2–3**  
 pancreas and islet cell transplants, **39:9**  
 prophylactic aspirin use, **39:6–7**  
 self-care practice trends, **39:7–8**  
 trends in diabetes treatment, **39:3–4**
- Meglitinides**  
 insulin secretagogue action of, **16:16**  
 oral medications, **39:2**
- Melanocortin receptor**, **7:11**
- MELAS (mitochondrial encephalomyopathy, lactic acidosis, and stroke-like episodes)**, **6:18; 7:8,9**
- Melatonin**, **25:28–29**  
 circadian regulation and insulin secretion, **25:28–29**  
 melatonin receptors and, **25:28**  
 for sleep improvement, **25:27**
- Memory**  
 consolidation, **24:1**  
 presenting cognitive complaints, **24:1**  
 retrieval, **24:2**  
 testing methods, **24:1**
- Menarchal status**  
 retinopathy relationship to, **21:23**  
 type 2 diabetes risk association, **21:23**
- MEPS (Medical Expenditure Panel Survey)**  
 adult diabetic hospital use, **40:38,39,41**  
 ambulatory care with diabetes, **40:3**  
 dental care utilization, **40:15**  
 dental visits for persons with diabetes, **40:15**  
 diabetes-related services received, **40:19**  
 emergency department visits, **40:23**  
 expenditure for antihyperglycemics, **40:59,62,65**  
 expenditure for antihypertensive medication, **40:65**  
 health care use and payment, **42:2**  
 healthcare utilization and diabetes costs, **40:3**  
 home health care utilization, **40:51**  
 hospitalization and hospital utilization, **40:26**  
 insulin expenditures, **40:70**  
 kidney disease and diabetes cost, **22:3**  
 long-term care utilization, **40:43–44**  
 outpatient visit frequency, **40:8–9**  
 payment sources for care, **42:2,12**  
 sources of payment, **40:20**
- MESA (Multi-Ethnic Study of Atherosclerosis)**  
 coronary artery calcification prediction of disease, **18:13**  
 hypertension incidence, **18:9**  
 metabolic syndrome prevalence, **13:22**  
 microalbuminuria and peripheral arterial disease, **20:9–10**  
 periodontal disease prevalence, **31:6**  
 proinflammatory cytokines in, **13:19**  
 racial/ethnic differences in retinopathy, **21:27**  
 relative risk of hypertension with diabetes, **18:9**  
 retinopathy in Mexican Americans, **21:28**  
 retinopathy prevalence, **21:27–28**  
 retinopathy prevalence in Chinese Americans, **21:29**  
 serum creatinine and peripheral arterial disease, **20:10**  
 type 2 diabetes incidence, **13:19**
- Meta-analyses**  
 A1c levels and physical activity, **18:18**  
 adiponectin levels and type 2 diabetes risk, **13:19**  
 albuminuria and intensive blood pressure control, **22:51**  
 albuminuria reduction with intensive glycemic control, **22:2**  
 albuminuria/ESRD genetic variant associations, **22:43**  
 alcohol consumption and cancer mortality and, **29:6**  
 antiplatelet/aspirin management, **18:17**  
 anxiety and diabetes relationship, **33:16**  
 anxiety-hyperglycemia relationship, **33:18**  
 atherosclerotic cardiovascular disease and periodontitis association, **31:16**  
 bacteria with diabetes, **22:55**

- becaplermin treatment of DFU, **20:22**
- birth weight and type 1 diabetes risk, **11:13**
- bladder cancer association with TZD/pioglitazone, **29:11**
- breastfeeding vs. formula-feeding, **13:13**
- cancer risk and metformin, **29:10–11**
- cardiovascular disease mortality and diabetes, **36:8**
- cardiovascular disease/diabetes association, **18:1,2**
- cognitive impairment in adults, **24:5–6**
- cognitive impairment with childhood-onset diabetes, **24:5**
- colon cancer risk with diabetes, **29:7**
- cow's milk consumption, **11:9; 37:5**
- CRP levels and type 2 diabetes risk, **13:19**
- depression and diabetes complications, **33:10**
- depression and incident diabetes, **13:15**
- depression prevalence, **33:4**
- type 2 diabetes, **33:2**
- undiagnosed diabetes in adults, **33:6**
- depressive symptoms and treatment adherence, **33:13,15**
- diabetes and bladder cancer risk, **29:9**
- diabetes and hip fracture risks
- type 1 diabetes, **32:3**
- type 2 diabetes, **32:9**
- diabetes and prostate cancer relation, **29:9**
- diabetes mortality/specific cause mortality, **36:9**
- diabetes/fasting glycemia/CHD, **18:7**
- disability risk with diabetes, **34:11**
- DKA frequency in type 2 diabetes, **5:25**
- eGFR and stroke risk, **19:3**
- endometrial cancer risk with diabetes, **29:9**
- enterovirus in blood samples, **11:4–5**
- ESRD relative risk with diabetes, **22:22**
- fetuin-A association with type 2 diabetes, **13:20**
- gene and alcohol consumption interaction, **13:9**
- genetic risk for type 1 diabetes, **12:10**
- glucose and incident cardiovascular disease, **18:7**
- GWAS data, **14:3**
- H. pylori* infection and fasting glucose levels, **31:24**
- HCV and diabetes frequency, **26:8**
- heme-iron gene-diet interactions, **13:6**
- heritability estimate of type 2 diabetes, **14:1–2**
- HMG Co-A reductase inhibitors, **6:11**
- hyperinsulinemia/cardiovascular disease association, **18:11–12**
- hypoglycemic episodes with insulin therapy, **5:26**
- incident diabetes with thiazide, **6:11**
- intensive glucose control and cardiovascular disease mortality, **18:15**
- intensive glycemic control, **18:1; 22:47**
- life expectancy with type 2 diabetes, **36:8**
- lipids and lipoproteins in vascular risk, **18:8**
- liver cancer risk with diabetes, **29:7**
- liver enzymes and type 2 diabetes, **13:20**
- lower extremity amputations and glycemia association, **20:25**
- metabolic syndrome and incident type 2 diabetes prediction, **13:24**
- microalbuminuria and stroke risk association, **19:3**
- novel loci identification, **12:8–9**
- obstructive sleep apnea and diabetes risk, **25:15**
- obstructive sleep apnea and gestational diabetes association, **25:21**
- obstructive sleep apnea association with type 2 diabetes, **13:14**
- oral contraceptive effectiveness, **5:13**
- oral hygiene with diabetes, **30:15**
- pancreatic cancer risk with diabetes, **29:8**
- periapical lesions with diabetes, **31:23**
- periodontitis and gestational diabetes risk, **31:14**
- periodontitis with adjuvant antimicrobials, **31:14**
- physical activity trials in type 2 diabetes, **18:2**
- polycystic ovary syndrome and glycemia association, **13:21**
- postoperative mortality in cancer types, **29:13**
- post-transplant diabetes, liver, **26:13**
- preconception care of diabetic women, **5:8**
- preeclampsia with chronic hypertension, **5:33**
- preterm birth association with type 1 diabetes, **11:13**
- prognostic implications for chronic kidney disease, **22:1**
- relative breast cancer risk with diabetes, **29:8**
- retinopathy as chronic kidney disease indicator, **22:4**
- retinopathy diagnostic protocols, **21:33**
- risk of cardiovascular disease with type 1 diabetes, **18:13**
- risk of kidney cancer with diabetes, **29:9**
- risk with beta blocker treatment, **6:11**
- shift work and diabetes association, **25:26**
- sitagliptin/exenatide use and pancreatitis, **29:12**
- sleep duration and incident diabetes, **25:13**
- sleep quantity and quality, **13:14–15**
- sleep-disordered breathing and gestational hypertension, **25:21**
- smoking, **13:15; 29:6**
- socioeconomic status association with type 2 diabetes, **13:14**
- somatic symptom/cognitive-affective in undiagnosed diabetes, **33:6**
- statin therapy, **18:16; 19:12; 36:10**
- steatosis vs. steatohepatitis differentiation, **26:2**
- temperature monitoring with DFU, **20:19**
- testosterone association with type 2 diabetes, **13:20**
- trans-ethnic meta-analyses, **14:3**
- triglycerides and heart disease risk, **18:8**
- tuberculosis risk with diabetes, **30:17**
- type 1 diabetes risk loci, **12:7–8**
- type 2 diabetes risk factors, **13:1,10,11**
- vaccinations diabetes association, **11:9**
- vascular events and statin therapy, **16:14**
- vitamin D intake during pregnancy, **11:11**
- waist circumference and BMI with heart disease, **18:1**
- whole grain diet-gene interactions, **13:5,8**
- Meta-analysis Of Observational Studies in Epidemiology (MOOSE)**, **30:17**
- Metabochip custom-made array**, **14:2,3–5**
- Metabolic dysfunction**
- hypothalamic-pituitary-adrenal axis, **25:19**
- with obstructive sleep apnea, **25:13–20**
- with type 2 diabetes risk factors, **13:16–21**
- Metabolic Equivalent of Task (MET) hours**, **10:15**
- Metabolic memory**
- assessment of, **23:12**
- in cardiac autonomic neuropathy, **23:13**
- with cardiovascular disease risks, **18:13**
- distal symmetrical polyneuropathy and, **23:12**
- for glycemic control in retinopathy, **15:18; 21:22**
- prior hyperglycemic exposure in kidney disease, **22:45**
- in types 1 and 2 diabetes, **22:2**
- Metabolic syndrome**
- abdominal obesity, **18:9**
- abdominal obesity assessment with, **13:1,21**
- children with diabetic mothers, **5:74–75**
- coronary vascular disease risk factors in, **18:9**
- C-reactive protein and peripheral arterial disease, **20:8**
- cross-association with retinopathy, **21:26**
- diagnostic criteria for, **18:9**
- evening preference and, **25:27**
- with gestational diabetes, **4:12**
- glaucoma links, **21:37**
- neuropathy with, **23:7**
- nonalcoholic fatty liver disease risk with, **26:4**
- number of traits and diabetes risk, **13:24**
- obstructive sleep apnea association, **25:14**
- periodontitis risk with, **31:21**
- physical activity effects on, **18:12**
- posttraumatic stress disorder as risk factor for, **33:16**
- prevalence of, **13:21–23**
- with previous gestational diabetes, **4:12**
- risk factors for heart disease, **18:9–10**

- sleep duration with, **25:30**  
 stratification by race/ethnicity, **13:21**  
 stroke risk with, **19:1,10**  
 type 2 diabetes, **13:21–25**
- Metabolic Syndrome and Atherosclerosis in South Asians Living in America study**, **13:22**
- Metabolic studies**, **11:14**
- Metformin**  
 Canadian Normoglycemia Outcomes Evaluation, **38:9–10**  
 cost-saving of prediabetic treatment, **1:22**  
 diarrhea associated with, **27:7**  
 facilitation of weight loss, **33:22**  
 fracture rates with, **32:12**  
 glucose intolerance progression to diabetes effects, **1:19**  
 guidelines for use, **18:15**  
 GWAS for treatment with, **14:9**  
 lactic acidosis precipitation, **17:8**  
 MATE1, **38:11**  
 recommendations for use, **38:16**  
 response association of *SLC47A1* gene, **38:11**  
 retinopathy treatment/intervention in youth, **15:18**  
 single nucleotide polymorphisms interactions, **38:11**  
 stroke events with, **19:13**  
 trends in use of, **39:3–4**  
 use in geriatric population, **16:14**  
 for weight loss with antipsychotic treatment, **33:22**
- Metreleptin replacement therapy**, **7:1,20–21**
- Mexican Americans**. *See also* Hispanic ethnicity  
 apolipoprotein E gene and retinopathy, **21:25**  
 diagnosed diabetes prevalence, **3:7**  
 functional status with lower extremity amputation, **20:25**  
 genetic association with hard exudates in, **21:25**  
 glaucoma prevalence in, **21:37**  
 insulin resistance indices for prediction of type 2 diabetes, **13:18**  
 prediabetes prevalence, **3:14**  
 retinopathy prevalence and severity, **21:28–29**  
 total cholesterol, **3:12**  
 undiagnosed diabetes prevalence, **3:12**  
 whole exome sequencing of, **14:6**
- MHC (major histocompatibility complex)**  
 amino acid residues and type 1 diabetes association, **12:5**  
 high-risk genotypes for type 1 diabetes, **12:1**  
 linkage disequilibrium in, **12:3**  
 type 1 diabetes genetic risk, **12:2–5,10**
- Michigan**  
 preconception planning/counseling, **5:8**  
 total diabetes percentages, **8:9**
- Michigan Neuropathy Screening Instrument (MNSI)**, **15:27; 20:18; 23:5**
- Microalbuminuria**. *See also* Albuminuria; Macroalbuminuria  
 association with stroke risk, **19:3**  
 cardiac autonomic neuropathy association, **15:27**  
 criteria for diagnosis, **15:20**  
 with diabetes in youth, **1:14; 15:20,23–24**  
 with geriatric diabetes, **16:7**  
 glomerular filtration barrier in, **22:9**  
 in nondiabetic women on oral contraceptives, **5:13**  
 prevalence in early pregnancy with type 1 diabetes, **5:29**  
 prevalence of elevated, **22:12**  
 progression of, **22:5**  
 risk factor for retinopathy, **21:25**  
 sodium-lithium countertransport activity, **22:32**  
 stroke risk with, **19:10**
- Microaneurysms**. *See also* Retinopathy  
 as diabetes indicator, **1:16**
- Micronutrients**. *See* Nutrition
- Microvascular complications**  
 blood pressure association, **18:9**  
 chronic hypertension treatment in pregnancy, **5:33**  
 in dementia, **24:4**  
 effects of lowering A1c, **1:7**  
 with geriatric diabetes, **16:7–8**  
 microvessel retinal disease with distal symmetrical polyneuropathy, **23:2**  
 multifactorial intervention, **22:54**  
 nephropathy in diabetes in youth, **15:20–25**  
 neuropathy in diabetes in youth, **15:25–27**  
 obstructive sleep apnea impact on, **25:17**  
 pathophysiologic mechanisms of, **22:22–23**  
 perindopril and indapamide retinopathy effects, **21:25**  
 physical activity effects on, **18:18**  
 retinopathy in diabetes in youth, **15:17–20**  
 risk with retinopathy, **21:30**  
 stroke with, **19:3**  
 in type 1 and type 2 diabetes, **1:4**
- MIDD (maternally inherited diabetes and deafness)**, **7:9**
- MIDIA (Environmental Triggers of Type 1 Diabetes)**, **11:5**
- Mid-sleep time on free days (MSF)**, **25:27–28**
- Migraine history**, **5:22**
- Migration and acculturation**, **13:14**
- Mild cognitive impairment (MCI)**  
 antihyperglycemic medication trials, **24:13**  
 consolidation effects in, **24:1–2**  
 definition and classification of, **24:2**  
 hypoglycemia and, **24:12**  
 prevalence and progression of, **24:3**  
 with type 1 diabetes and, **24:5**  
 type 2 diabetes and, **24:8**
- vascular impairment as component of, **24:2**  
 white matter hyperintensities in, **24:2**
- Millennium Cohort**, **25:3**
- Mini Mental Status Examination**, **24:1**  
 cognitive status measurement, **19:17**  
 global cognitive status measure, **24:8**
- Minnesota**  
 cognitive status with diabetes, **24:8**  
 Multi-Ethnic Study of Atherosclerosis, **31:6**  
 Rochester cohort, **32:2–3**
- Miscarriages**  
 with celiac disease, **27:10**  
 criteria for defining, **5:35**  
 maternal glycemic control, **5:36**  
 with pregestational diabetes, **5:16**  
 with type 2 diabetes, **5:14**
- Mississippi**  
 cognitive status with diabetes, **24:8**  
 pregestational diabetes prevalence, **5:5**  
 racial/ethnic differences in stroke in diabetes, **19:7**
- Mitchell-Riley syndrome**, **7:11**
- Mitochondrial diabetes**, **6:18**
- Mitochondrial DNA mutations**  
 A3243G mutation and diabetes, **6:18**  
 with HIV antiretroviral therapy, **6:12**  
 maternally inherited diabetes, **7:9**  
 retinopathy association with, **21:29**  
 3243A>G mitochondrial DNA point mutation, **7:9**  
 Wolfram syndrome and, **7:8**
- Mitochondrial gene defects**, **7:9**
- Mixed diabetes**, **15:3**
- Mixed meal tolerance test (MMTT)**, **37:13**
- Model for End-Stage Liver Disease (MELD) score**, **26:11–12**
- Moderate albuminuria**. *See* Microalbuminuria
- Modification of Diet in Renal Disease (MDRD)**, **22:3**
- MODY (maturity-onset diabetes of youth)**, **7:2–8**. *See also* Monogenic forms of diabetes  
 characteristics of, **7:2–4**  
 clinical presentation, **7:4**  
 differential diagnosis of, **7:8**  
 differentiating from types 1 and 2 diabetes, **7:8**  
 epidemiology, **7:4**  
 genetic bases for, **7:2–4**  
 genetic counseling with diagnosis, **7:6**  
 linkage mapping/linkage analysis, **14:2**  
 management of, **7:4**  
 MODY1, **7:5**  
 MODY2 prevalence and presentation, **7:6–7**  
 MODY3 mutations, **7:4–5**  
 MODY4, **6–10, X, 7:7**  
 MODY5 clinical presentation, **7:7**  
 MODY10, **7:7**  
 monogenic diabetes, **7:2**  
 sulfonylurea medications in, **7:6**  
 type 1 diabetes in youth, **15:2**  
 types of diabetes, **1:4; 7:1–2**

**Molecular mimicry**, 6:5; 11:8**Monoclonal antibody studies**

- anti-CD3 intervention studies, 37:11–12
- anti-CD5 trials, 37:11
- anti-CD20 monoclonal antibody, 37:12
- anti-CD25 (daclizumab), 37:12
- anti-IL-1 $\beta$  monoclonal antibody, 37:13

**Monogenic forms of diabetes**, 7:1–27. See also MODY

- abnormal cilia function, 7:12
- classification and diagnosis of, 1:4
- defective insulin synthesis/secretion, 7:8
- differential diagnosis of, 7:8
- exome sequencing, 7:2
- linkage mapping/linkage analysis, 14:2
- maternally inherited diabetes, 7:9
- neonatal diabetes mellitus, 7:9–10
- pigmented hypertrichosis and insulin-dependent diabetes, 7:8–9
- thiamine-responsive megaloblastic anemia, 7:8
- type 1b diabetes, 7:8
- Wolfram syndrome, 7:8

**Monounsaturated palmitoleic acid isomers, islet cell autoimmunity association**, 11:10**Mood stabilizers**, 33:22**Morning chronotype**, 25:27**Mortality and morbidity**

- AHSCT trials with type 1 diabetes, 37:14
- albumin:creatinine ratio, 22:20
- with albuminuria, 22:19
- antepartum hemorrhage, 5:24–25
- ascertainment of mortality, 36:3
- cardiovascular disease, 18:7
- cause-specific mortality, 35:9
- cause-specific mortality in Norway vs. U.S., 35:10
- cerebral edema with lactic acidosis, 17:9
- death certificate limitations for determining, 36:1
- death rate with diabetic ESRD, 22:30
- depressive symptom association with, 33:10
- diabetes and cancer mortality, 29:4–7
- with diabetes before and during pregnancy, 5:21
- diabetes in youth, 15:38–41
- diabetic kidney disease as risk factor for, 22:19
- DKA-related, 17:3
- epidemiologic surveillance methods, 36:3
- geriatric diabetes, 16:11
- heart disease in type 2 diabetes, 18:1
- in-hospital, 5:33
- hypoglycemia, 17:11–12
- infant mortality in U.S., 5:66
- infant mortality with preterm delivery, 5:45
- kidney disease in persons with diabetes, 22:3
- lactic acidosis, 17:8–9
- maternal death ratio at delivery, 5:22
- methodological challenges in assessment, 36:2

neonatal, perinatal, and infant mortality, 5:47–48

nonalcoholic fatty liver disease, 26:6–7

obstetric, 5:24–25

in older patients, 16:11

predelivery fetal complications, 5:35–40

pregestational diabetes and pregnancy, 5:21–35

public resources for assessment, 36:3–5

screened vs. never-screened patients, 1:23

stratification by race/ethnicity, 36:7

stroke risk in diabetes, 19:5–6

trends in type 2 diabetes, 36:1–14

type 1 diabetes, 35:1–16

type 2 diabetes, 36:1–14

visual acuity as death predictor in type 1 diabetes, 21:11–12

in youth-onset type 1 diabetes, 15:38–39

**MRFIT study**, 18:7,12**MTNR1B gene**

abnormal glucose metabolism, 25:28

circadian genes, 14:8

**Mucoraceae family**, 30:16**Mucormycosis**, 30:16**Multiethnic Cohort Study**, 13:4**Multi-Ethnic Study of Atherosclerosis (MESA)**. See MESA (Multi-Ethnic Study of Atherosclerosis)**Multiphoton fluorescence techniques**, 22:10**Multiple congenital anomalies (same infant)**, 5:65–66; 7:11**Multiple Risk Factor Intervention Trial (MRFIT) cohort study**. See MRFIT study**Multisystem dystrophy syndrome**, 7:19**Multivitamin use, periconception**, 5:11**Mumps, type 1 diabetes risk with**, 11:8**Musculoskeletal system malformations**, 5:62**M-value**, 13:17**Mycobacterium tuberculosis**, 30:17**Myocardial infarction**

adiposity measurement association with, 18:10

blood pressure association, 18:9

dyslipidemia and hormonal contraception risks, 5:13

outcomes with intensive glucose control, 18:15

physical activity and risk for, 18:18

pregestational diabetes and, 5:23

pregnancy-related, 5:23

rosiglitazone and, 24:13

**Myonecrosis**, 30:14**Myristic acid**, 11:10**N****N-acetyl- $\beta$ -D-glucosaminidase (NAG)**, 22:2,9**NAION (nonarteritic anterior ischemic optic neuropathy)**, 21:37–38**Nateglinide**, 6:12; 38:9,12**Nateglinide and Valsartan in Impaired Glucose Tolerance Outcome Research (NAVIGATOR)**. See NAVIGATOR trial**National Academy of Clinical Biochemistry (NCAB) A1c assay certification**, 1:10**National Ambulatory Medical Care Survey (NAMCS)**

- ambulatory care with diabetes, 40:2–3
- amputation-related visits, 20:24
- demographic characteristics, 40:2
- healthcare utilization and diabetes costs, 40:2
- infections associated with diabetes, 30:7
- outpatient visits for foot ulcers, 20:17
- receipt of contraceptive counseling, 5:11

**National Birth Defects Prevention Study**

- malformations with preexisting diabetes, 5:60
- oral contraceptive use in early pregnancy, 5:11

**National Center for Health Statistics**, 5:3,37; 8:2; 26:2; 41:3**National Cholesterol Education Program (Adult Treatment Panel III) (NCEP)**, 18:9**National Committee for Quality Assurance Health Plan Employer Data and Information Set**, 21:32**National Diabetes Data Group (NDDG)**

- classification of diabetes, 1:13; 4:1
- gestational diabetes diagnosis criteria, 4:7,11,12

**National Diabetes Prevention Program**, 38:15. See also DPP clinical trial**National Diabetes Quality Improvement Project (DQIP)**, 41:2**National Diabetes Surveillance System**, 2:5**National Glycohemoglobin Standardization Program (NGSP)**

- A1c assay standardization, 1:7,9
- A1c in lifestyle intervention trials, 38:10
- assay certification, 1:10
- Zensharen study, 38:10

**National Health and Nutrition Examination Survey (NHANES)**. See NHANES data**National Health Insurance System (South Korea)**, puerperal sepsis, 5:24**National Health Interview Survey (NHIS)**. See NHIS data**National Home and Hospice Care Survey (NHHCS)**

- long-term care, 40:43–44
- long-term care utilization, 40:43–44

**National Hospital Ambulatory Medical Care Survey**

- DKA patient visits, 17:4
- receipt of contraceptive counseling, 5:11

**National Hospital Discharge Survey (NHDS)**

- with acute complications of diabetes, 17:3
- bariatric surgery to treat diabetes, 39:10
- celiac disease in hospital discharges, 27:10
- data sources and limitations, 30:7
- diabetic foot ulcers in, 23:14

- emphysematous cholecystitis, **30:16–17**  
 gestational diabetes prevalence trends, **4:5**  
 hospital utilization, **40:26**  
 hyperglycemic hyperosmolar state  
 morbidity and mortality, **17:6**  
 incidence of lactic acidosis, **17:8**  
 lactic acidosis in diabetic patients, **17:9**  
 lower extremity amputation, **16:8; 20:23,25**  
 polyneuropathy and autonomic neuropathy, **23:9**  
 prevalence of stroke, **20:25**
- National Inpatient Sample**  
 chronic hypertension/gestational diabetes risks, **5:33**  
 deliveries with pregestational diabetes, **5:16**  
 maternal death ratio at delivery, **5:22**  
 “near-miss” morbidity evaluation, **5:25**  
 pregnancy-related stroke and hypertensive disorders, **5:22**  
 risk factors for myocardial infarction, **5:23**  
 sepsis prevalence and mortality, **5:24**  
 stillbirth rates, **5:37**  
 stroke before or during delivery, **5:22**  
 types 1 and 2 diabetes in pregnancy trend, **5:14,16**
- National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)**, **2:2**
- National Institutes of Health (NIH)**  
 antibody measurement standardization, **15:2**  
 diabetes definition, **2:3**
- National Kidney Foundation (NKF)**  
 glomerular filtration rate determination, **22:3**  
 screening for diabetic kidney disease, **22:4**
- National Maternal and Infant Health Survey (NMIHS)**, **4:5; 5:3**
- National Nursing Home Survey (NNHS)**  
 diabetes prevalence in nursing homes, **16:4**  
 diabetic complications predisposing to, **30:4**  
 infections associated with diabetes, **30:7**  
 long-term care utilization, **40:43**  
 prevalence of dementia in diabetes, **24:10**  
 trends in infections, **30:4**
- National Survey for Family Growth**  
 contraceptive methods and use, **5:11–12**  
 preexisting diabetes with pregnancy, **5:7,17**  
 self-reported prevalence of diabetes, **5:6**
- National Vital Statistics Report**  
 diabetes mortality from, **36:7**  
 risks with chronic hypertension in pregnancy, **5:33**
- National Vital Statistics System (NVSS)**  
 Apgar scores in newborns, **5:48**  
 chronic hypertension with pregestational diabetes, **5:33**  
 deliveries with pregestational diabetes, **5:16**  
 diabetes mortality from, **36:5,8**  
 gestational hypertension/pregestational diabetes, **5:34**  
 hyperglycemic hyperosmolar state  
 mortality trends, **17:6**  
 infections associated with diabetes, **30:7**  
 maternal mortality statistics, **5:21**  
 mortality and morbidity with infections, **30:1**  
 pregestational diabetes data, **5:3**  
 pregestational diabetes prevalence during pregnancy, race/ethnicity, **5:17**
- Nationwide Sample of Delivery Admissions**  
 chronic hypertension with pregestational diabetes, **5:33**  
 stroke and pregestational diabetes, **5:22**
- Native Americans.** See American Indian/Alaska Native
- Nauruan population**  
 impaired glucose tolerance in, **1:18**  
 impaired glucose tolerance progression to diabetes, **1:18**  
 plasma glucose concentrations in, **1:13**
- NAVIGATOR trial**, **6:12; 38:9**
- Near-miss morbidity/mortality**, **5:25**
- Necrotizing fasciitis**, **30:13–14**
- NEI-VFQ-25 scores**, **21:9**
- Neonatal complications**  
 hyperbilirubinemia/jaundice, **5:71**  
 hypertrophic cardiomyopathy, **5:68**  
 hypocalcemia/hypomagnesemia, **5:71**  
 large-for-gestational age infants, **5:55–56**  
 major congenital malformations, **5:59–67**  
 with maternal diabetes, **5:69–71**  
 placenta characteristics, **5:67**  
 placental contribution, **5:67**  
 polycythemia, **5:68–69**  
 pregestational diabetes and, **5:47–59**  
 respiratory distress, **5:67–68**  
 seizures, **5:49**  
 shoulder dystocia, **5:55–59**  
 small-for-gestational age with, **5:55**
- Neonatal diabetes mellitus (NDM)**  
 6q24 imprinting defects with, **7:10**  
 epidemiology, **7:9–10**  
 gene defects, **7:1,9–10**  
*INS* gene mutations in, **7:10–11**  
 monogenic diabetes, **7:2**  
 other mutations, **7:11**  
 permanent, **7:10–11**  
 presentation, **7:9**  
 transient, **7:10**
- Neonatal encephalopathy (NE)**, **5:2,49**
- Neonatal hyperbilirubinemia**, **5:71**
- Neonatal hypoglycemia**  
 association with macrosomia, **5:56**  
 breastfeeding for prevention, **5:73**  
 with maternal diabetes, **5:49,69**  
 MODY3 clinical presentation, **7:4**  
 with pregestational diabetes, **5:70–71**
- Neonatal mortality and morbidity**  
 early induction for birth trauma prevention, **5:59**  
 interpregnancy interval for diabetic women, **5:7**  
 in large-for-gestational age infants, **5:56**  
 polycythemia, **5:68–69**  
 with pregestational diabetes, **5:47–71**  
 respiratory distress, **5:67–68**
- Nephropathy.** See Diabetic kidney disease
- Nervous system**  
 myelinated fibers in neuropathy, **23:5**  
 nerves susceptible to focal neuropathy, **23:3**  
 quantitative sensory testing, **23:5–6**
- Netherlands.** See Dutch investigations
- Neuroarthropathy.** See Charcot neuroarthropathy
- NEUROG3 (Neurogenin3) gene**, **7:11**
- Neurologic impairment in lactic acidosis**, **17:8**
- Neuropathic arthropathy.** See Charcot neuroarthropathy
- Neuropathic foot**, **23:5**
- Neuropathic pain**, **23:2,9; 28:18**
- Neuropathy Disability Score (NDS)**, **20:18; 23:5**
- Neuropeptides**  
 appetite regulation, **7:11; 25:20**  
 prohormone convertase cleavage of, **7:11**
- Neurotoxic effects of glucose**, **19:9**
- Neutral Protamine Hagedorn (NPH) insulin**  
 cancer risk vs. insulin glargine, **29:11**  
 hypoglycemic episodes with insulin pump, **15:17**
- Neutrophil gelatinase-associated lipocalin (NGAL)**, **22:2,9**
- Nevada, total preexisting diabetes during pregnancy**, **5:14**
- New Hampshire, periodontitis prevalence**, **31:4,6**
- New Jersey**  
 mortality by race, **35:7**  
 stillbirth rates with diabetes, **5:37**
- New Jersey 725 study**  
 hypertension predictor of mortality, **35:11**  
 macular edema-socioeconomic status association, **21:29**  
 retinopathy in African Americans, **21:27**  
 type 1 diabetes mortality and race, **35:4–5**
- New Mexico**  
 age-adjusted total preexisting diabetes during pregnancy, **5:14**  
 periodontitis prevalence, **31:4,6**  
 prevalence of diagnosed diabetes, **3:4**  
 U.S. centers for SEARCH, **15:4**  
 U.S. vs. non-U.S. countries diabetes prevalence, **2:2**  
 U.S. vs. non-U.S. Native American populations, **2:2**
- New York City.** See also Northern Manhattan Study (NOMAS)  
 Hispanic/Latino population, **3:7**  
 metabolic syndrome prevalence, **13:22–23**

**New York City Health and Nutrition****Examination Survey, 13:22–23****New York State.** See also Northern Manhattan Study (NOMAS)Multi-Ethnic Study of Atherosclerosis, **31:6**  
self-reported periodontal disease, **31:6**  
total diabetes percentages, **8:9****New Zealand**diabetes registries, **2:5**diabetic retinopathy prevalence in youth, **15:20**type 1 diabetes incidence in children, **2:10**type 1 vs. type 2 diabetes pregnancy losses, **5:43****NF-kappaB activation in pathogenesis of neuropathy, 23:7****NHANES data**A1c, fasting glucose, and 2-hour plasma glucose combination, **9:5**A1c and fasting glucose cutpoints, **1:26**A1c levels and insomnia symptoms, **25:9**A1c levels in diagnosed and undiagnosed diabetes, **20:6**A1c sensitivity and specificity vs. oral glucose tolerance, **1:12**ADA A1c vs. fasting glucose measures, **1:20**albumin:creatinine ratios and risk with diabetes, **22:19**alcohol consumption, **10:9**awareness before screening, **1:27**cardiovascular complications in older adults, **16:6–7**chronic kidney disease prevalence by type of diabetes, **22:12**data collected, **3:9**data on type of diabetes, **2:2–3**depression prevalence, **33:2**diabetes and anti-HCV antibodies, **26:8–9**diabetes burden in youth, **15:8–10**diabetes definition in, **2:4**diabetes in older adults, **16:1–3**diabetes risk factor control, **41:3**diabetes risk with short sleep, **25:3**diabetes type and level of amputation, **20:24**diabetic foot ulcers, **20:20**diagnosed/undiagnosed trends, **3:19–20; 36:3**disability/impairment status, **34:7–8**estimated prediabetes prevalence, **13:16**estimated prevalence of retinopathy and vision-threatening retinopathy, **21:12**experimental design of, **3:3–4**eye examination in persons with diabetes, **21:31**fatty liver disease prevalence in diagnosed diabetes, **26:3**foot lesions on presentation with diabetes, **20:16**fracture prevalence, **32:3–4**gallstone disease with diabetes, **26:15**gingival bleeding and retinal hemorrhage risk, **31:15**glucose tolerance in women age 20–44 years, **4:8,10**glycemic control trends, **41:3–4**HCHS/SOL study prevalence comparison, **3:12**healthcare utilization and insurance coverage, **42:11**hearing deficits with diabetes, **23:10**heart disease prevalence with/without diabetes, **18:4**heart rate and hyperglycemia association, **23:13–14**hepatitis and diabetes, **26:8,10–11**hyperinsulinemia prevalence trends, **13:18**incident fractures, **32:2**intermittent claudication risk factors, **20:7–8**liver and gallbladder disease, **26:2**lower urinary tract symptoms with diabetes, **28:5**measurement and criteria, **9:2**medication use and self-care practices, **39:1–14**metabolic syndrome and cardiovascular risk, **18:9–10**oral health and diabetes, **31:2–3**overall all-cause mortality rate, **36:5**periodontal disease and kidney disease relationship, **22:38**periodontitis prevalence, **31:6**peripheral arterial disease associations, **20:9–10**physical activity, **10:12,14–15**physical limitations associated with diabetes, **34:3**population factors in increased prevalence, **3:19**pregestational diabetes prevalence during pregnancy, **5:18**prevalence and trends in diabetic persons, **21:1,2**prevalence in women of childbearing age, **5:4–5**prevalence of cataracts with diabetes, **21:33**prevalence of diabetes, **36:3**prevalence of elevated albumin excretion, **22:12**prevalence of elevated AST and ALT, **26:3**prevalence of rheumatoid arthritis, **32:17**prevalence of type 1 diabetes, **1:12; 2:10–11**prevalence of type 1 diabetes in youth, **15:5**race/ethnicity differences in retinopathy, **21:27–29**race/ethnicity variations in A1c levels, **1:11**racial/ethnic diabetes trends, **1:12**retinopathy cross-association with metabolic syndrome, **21:26**retinopathy data and FPG cutpoints, **1:13**risk factor control trends, **41:3–10**risks factors for hearing loss, **23:12**self-care practices with diabetes, **39:1,8–9**self-reported healthy and ulcer diagnosis, **20:20**sensory impairment and A1c levels, **23:12**sociodemographic characteristics, **8:3–4**soda consumption, **10:11**stroke risk without diabetes, **19:9–10**survey characteristics and use, **41:3**surveys for diabetes surveillance, **2:5**total diabetes prevalence, **3:9**type 2 diabetes incidence and prevalence, **3:3–4**undiagnosed diabetes detection, **3:3–4,9**urinary albumin excretion, **22:12**urinary incontinence association with neuropathic pain, **28:18**U.S. adult prevalence and incidence data, **2:2–3****NHIS data**adult diabetes hospital use, **40:39**age-related macular edema, **21:38**ambulatory care services use, **42:2**cancer in adults with and without diabetes, **29:2**cataracts with type 2 diabetes, **21:33**cost of diabetes model, **40:59**data collected, **8:3**dental care utilization, **31:39**diabetes in older adults, **16:1–2,5**diabetes mortality from, **36:7**diagnosed diabetes estimates, **3:15**diagnosed diabetes prevalence, **3:4–9**diagnosed diabetes prevalence plateau in, **3:17**diagnosed diabetes prevalence trends, **3:17**disability and diabetes, **34:3**emergency department visits, **40:23**eye examination in persons with diabetes, **21:31**HCHS/SOL study prevalence comparison, **3:7**health insurance coverage, **42:11**healthcare utilization and diabetes costs, **40:2**healthcare utilization and insurance coverage, **42:11**hospital utilization, **40:26**insurance prevalence and types of coverage, **42:16–17**lower extremity amputation frequency, **20:23**lower extremity amputations, **16:8**medication and self-care practices, **39:1–14**neuropathy manifestation prevalence, **23:10**physical activity, **10:12–13**prevalence of diabetes, **36:3**prevalence of heart disease with/without diabetes, **18:4**

- prevalence of screening, **1:25**  
 self-reported glaucoma with diabetes, **21:36**  
 sociodemographic characteristics, **8:3**  
 survey for diabetes surveillance, **2:5**  
 trends in diabetes medication use, **39:3**  
 type 2 diabetes and prediabetes, **3:2–3**  
 type 2 diabetes incidence and prevalence, **3:2–3**  
 type 2 diabetes prevalence in Asian subgroups, **3:7–8**  
 type 2 diabetes prevalence/incidence diagnosed diabetes, **3:16–17**  
 visual impairment with diabetes, **21:3**
- Niacin, 6:12**
- Nicotinamide trials, 37:5,14**
- Night-Eating Syndrome**  
 characteristics of, **33:20**  
 diabetes control in, **33:21**
- NIH Consensus Development Conference Statement, gestational diabetes treatment criteria, 4:10**
- NIH-AARP Diet and Health Study**  
 diabetes risk with short sleep, **25:3**  
 kidney cancer and BMI association, **29:9**
- Nitric oxide (NO), 19:3**  
 in adaptive immunity, **30:18**  
 hemodynamic regulation of kidney, **22:35,37**  
 interleukin-18, **13:19**  
 in peripheral arterial disease, **20:1**  
 susceptibility to stroke, **19:3**
- Nitric oxide synthase (eNOS) expression**  
 in diabetic kidney disease, **22:8**  
 in podocyte injury, **22:8**  
 retinopathy, **21:29**
- Nonalcoholic fatty liver disease (NAFLD)**  
 in Alstrom syndrome, **7:12**  
 description/diagnosis, **26:2–3**  
 and diabetic medication effects, **26:4**  
 mortality with type 2 diabetes, **26:6**  
 pathophysiology and progression, **26:5–6**  
 prevalence in U.S., **26:2**
- Nonalcoholic steatohepatitis (NASH)**  
 all-cause mortality association, **26:7**  
 directionality of diabetes association, **26:6**  
 hepatocellular carcinoma risk with, **26:6–7,12**  
 liver enzymes with, **13:20; 26:4**  
 liver transplantation, **26:12**  
 necroinflammatory condition, **26:2–3**  
 nonalcoholic fatty liver progression to, **26:5**  
 progression to cirrhosis, **26:6**
- Non-amnestic cognitive impairment, 24:2**
- Nonarteritic anterior ischemic optic neuropathy (NAION), 21:37–38**
- Nondiabetic kidney disease, 22:4,55–56**
- Non-Hispanic Asians.** See Asian/Pacific Islander
- Non-Hispanic black.** See Black/African American
- Non-Hispanic white.** See White/Caucasian
- “Non-insulin-dependent” diabetes, 1:6**
- Non-major histocompatibility complex (MHC).** See Non-MHC
- Nonmedical induced abortions, 5:26**
- Non-MHC (non-major histocompatibility complex).** See also MHC  
 affected sibpair families for, **12:6**  
 gene regulation vs. protein structure alteration, **12:1**  
 ImmunoChip data, **12:9**  
 single nucleotide polymorphism in, **12:10,11**
- Nonmyeloablative autologous hematopoietic stem cell therapy (AHSCT), 37:14**
- Nonproliferative diabetic retinopathy (NPDR)**  
 A1c levels and detection of, **1:9**  
 duration of type 2 diabetes and, **21:15**  
 incident geographic atrophy with, **21:38**  
 intensive glycemic control, **21:20–21**  
 macular edema with, **21:12**  
 prevalence in early pregnancy, **5:26–27**  
 progression to proliferative, **21:29**  
 quality of life with, **21:9**  
 treatment before pregnancy, **21:26**  
 visual impairment with, **21:7**
- Non-REM sleep (NREM), 25:1**
- Nonsteroidal anti-inflammatory drugs (NSAIDs), 22:38–39**
- Non-sulfonylurea medications, 39:2**  
 use in geriatric population, **16:14**
- Non-synonymous single nucleotide polymorphism, 12:6**
- Normal weight, BMI criteria for, 13:11**
- Normoalbuminuric diabetic nephropathy, 15:20**
- Normoglycemia, rosiglitazone and reversion to, 38:9**
- Normoglycemia in Intensive Care Evaluation–Survival Using Glucose Algorithm Regulation (NICE SUGAR) Study, 18:15**
- North American studies.** See also DCCT study; Meta-analyses; SEARCH for Diabetes in Youth  
 birth weight and type 2 diabetes risk, **13:13**  
 disability and diabetes association, **34:3**  
 gestational age at delivery with diabetes, **5:45**  
 nephropathy risk with type 2 diabetes, **15:17**  
 preeclampsia risk with type 1 diabetes, **5:34**  
 prevalence of DKA at onset, **15:17**  
 prevalence of preexisting diabetes during pregnancy, **5:17**  
 proinsulin prediction of heart disease in men, **18:11**  
 seafood consumption and type 2 diabetes risk, **13:8**  
 shoulder dystocia with vaginal delivery, **5:56**
- sleep apnea rates, **25:12**  
 stillbirth rates in, **5:37**
- North Carolina**  
 cognitive status with diabetes, **24:8**  
 Multi-Ethnic Study of Atherosclerosis, **31:6**  
 pregestational diabetes prevalence, **5:5**  
 racial/ethnic differences in stroke in diabetes, **19:7**  
 total diabetes percentages, **8:9**
- North Dakota.** See also American Indian/Alaska Native  
 albuminuria with type 2 diabetes, **22:18,30**  
 metabolic syndrome in, **13:23**
- Northern Manhattan Study (NOMAS).** See also New York City; New York State  
 hyperglycemia as stroke risk, **19:9**  
 insulin resistance and stroke risk, **19:9**  
 ischemic stroke and metabolic syndrome, **19:10**  
 stroke incidence ratio racial differences, **19:7**  
 stroke subtypes in diabetes, **19:8**
- Northwestern University Diabetes and Pregnancy Center, Pima Indian study, 4:12**
- Norwegian studies**  
 fetal sex-associated risk, **5:66**  
 gestational age at stillbirth, **5:43**  
 major malformations with type 2 diabetes, **5:62**  
 maternal diabetes effects on brachial plexus palsy, **5:58**  
 maternal serum docosahexaenoic in pregnancy, **11:12**  
 predictors of brachial plexus palsy permanence, **5:59**  
 preeclampsia rates with pregestational diabetes, **5:34**  
 prevalence of albuminuria, **22:12–13**  
 type 1 diabetes cause-specific mortality, **35:10**
- Nuchal translucency, 5:67**
- Nuclear cataract, 21:34**
- Nurses’ Health Study (NHS)**  
 ALT level and risk for diabetes, **26:5**  
 breast cancer and weight loss association, **29:8**  
 categorization of diabetes for study, **19:5; 32:3**  
 C-peptide concentration in type 2 diabetes, **13:17**  
 depression and type 2 diabetes risk, **13:15**  
 diabetes risk by race/ethnicity, **13:4**  
 diabetes risk with short sleep, **25:3**  
 geriatric comorbid condition risks, **16:11**  
 hazard ratio for diabetes, **25:24**  
 nocturnal melatonin secretion and diabetes, **25:28–29**  
 weight loss and cancer association, **29:6**
- Nursing home**  
 activity of daily living limitations, **40:48**  
 chronic conditions, **40:47**

duration of stay, **40:49**  
 environment, **40:44**  
 living arrangements before admission, **40:46**  
 payment sources, **40:50**  
 resident demographics, **40:44–46**

### Nutrition

alcohol consumption, **13:9**  
 calcium, **10:10**  
 carbohydrates, **10:4–5**  
 cereal/grain exposure and type 1 diabetes, **15:11**  
 cholesterol, **10:7**  
 coffee, **13:9**  
 dairy, grains, beverages, **10:11–12**  
 dietary carbohydrate and fiber, **13:6**  
 dietary fat, **13:6**  
 dietary patterns, **13:9**  
 fetal exposure to famine and diabetes risk, **13:13**  
 fiber, **10:7–9**  
 food items and groups, **13:8–9**  
 fruits and vegetables, **10:10–11**  
 gluten-free diet effects, **27:14**  
 high-protein diet and diabetes with risk for kidney damage, **22:35–36**  
 islet cell autoimmunity and early cereal exposure, **27:14**  
 micronutrients, **13:6–7**  
 periconception and maternal, **5:11**  
 protein, **10:5**  
 restricted protein intake with kidney disease, **22:52–53**  
 saturated fat, **10:5–6**  
 seafood consumption and type 2 diabetes risk, **13:8**  
 sodium intake, **10:10**  
 sodium intake modification, **22:53–54**  
 sugar-sweetened beverages, **13:10**  
 tooth loss consequences, **31:34–36**  
 total calories, **10:2**  
 total fat, **10:2–4,7**  
 vitamins, **10:10**  
 whole-grain/fasting insulin levels, **13:5**

## O

**Obesity.** See also Abdominal obesity  
 adipocyte function, **25:11**  
 adiposity measurement for, **18:10**  
 amniotic fluid insulin concentration, **15:12–13**  
 anthropometric measures of fat distribution, **13:11–12**  
 BMI criteria for, **13:11**  
 body fat distribution, **13:11–12**  
 breastfeeding and, **15:13**  
 breastfeeding protective effect from, **13:13–14; 15:13**  
 changes in children's diets, **15:12**  
 children with diabetic mothers, **5:74–75**  
 in classification of diabetes, **2:3**

congenital heart defect association, **5:10**  
 contraceptive nonuse in, **5:11**  
 contribution to disability with diabetes, **34:11**  
 in diabetes of youth, **15:33–34**  
 duration of, **13:11**  
 early childhood breastfeeding and, **13:13**  
 with eating disorders, **33:20–21**  
 effects on gestational diabetes prevalence trends, **4:8**  
 fetal overnutrition pathway for, **15:12**  
 general and abdominal, with diabetes, **9:14**  
 in geriatric population, **16:5–6**  
 increased risk with sleep disturbance, **25:10–11**  
 insulin resistance with, **1:3**  
 insulin resistance with binge eating disorder, **33:21**  
 intrauterine exposure to diabetes, **4:12**  
 leptin modulation by, **25:10–11**  
 macrophage infiltration of adipose tissues, **13:18**  
 major malformation association with, **5:67**  
 measures for, **18:10,11**  
 metabolic syndrome prevalence with, **13:21**  
 nonpregnant women age <20 years, **5:6**  
 obesity in offspring with exposure to maternal diabetes, **5:73–74**  
 in older adults, **16:1**  
 oral contraceptive effectiveness in, **5:13**  
 pregestational diabetes prevalence in pregnancy, **5:19**  
 prevalence in youth population, **2:3**  
 pro-opiomelanocortin and, **7:11**  
 relation to diabetes prevalence, **3:17**  
 risk factor for diabetic kidney disease, **22:37–38**  
 risk factor for heart disease, **18:2–3,9–11**  
 risk factor for type 2 diabetes, **13:12; 18:10**  
 risk for type 2 diabetes with, **18:10**  
 signaling to melanocortin receptors, **7:11**  
 sleep and circadian disturbances with, **25:10–11**  
 stratification by BMI and waist measures, **13:12**  
 structural changes in kidney with, **22:37**  
 “thrifty” obesity pathway for, **15:12**  
 in treated type 1 diabetes, **1:5**  
 in type 1 diabetes in youth, **15:11**  
 in type 2 diabetes in youth, **15:2**  
 in utero exposure to maternal diabetes, **15:13**

**Observational studies, biases in, 29:10**  
**Obstetric morbidity, severe, 5:24–25**  
**Obstetric Surveillance System, 5:22**  
**Obstructive sleep apnea (OSA)**  
 adipocytokine-derived factors in, **25:20**  
 apnea-hypopnea index for severity of, **25:14**  
 continuous positive airway pressure treatment, **25:18**

definition and diagnosis, **25:12–13**  
 diabetes complications, **25:17**  
 diabetes development risk with, **13:14; 25:15–16**  
 glucose intolerance association with, **25:14**  
 hypothalamic-pituitary-adrenal axis and, **25:19**  
 metabolic dysfunction mechanism, **25:13–17,18–20**  
 prevalence in type 2 diabetes, **25:16**  
 reactive oxygen species in, **25:19–20**  
 REM-related, **25:17**  
 risk factor for stroke, **19:10**  
 risk factor for type 2 diabetes, **13:14; 25:15–16**  
 sympathetic nervous system activity, **25:19**  
 systemic inflammation, **25:20**  
 treatment in well-controlled diabetes, **25:18**

**Oculomotor palsy, 23:3**

**Odds ratio (OR) definition, 12:3**

### Ohio

diabetes in youth burden, **15:4**  
 fetal overweight, **5:56**  
 large-for-gestational age with pregestational diabetes, **5:70**  
 preconceptional care use, **5:8**  
 prevalence of diagnosed diabetes, **3:4**  
 spontaneous abortion, **5:36**  
 standardization of type 1 diabetes cohorts, **35:12**  
 subclinical cardiovascular disease, **15:34,37**  
 total diabetes prevalence, **8:9**  
 type 2 diabetes incidence trends, **15:9**  
 U.S. vs. non-U.S. countries for type 1 diabetes, **2:2**

**Ojibwa-Cree community, 15:12.** See also American Indian/Alaska Native

**Oklahoma Indians.** See also American Indian/Alaska Native  
 albuminuria with type 2 diabetes, **22:18,30**  
 metabolic syndrome in Native Americans, **13:23**  
 neuropathy prevalence, **23:10**  
 retinopathy/socioeconomic status relationship, **21:29**

**Older adults.** See Geriatric diabetes

**Omega-3 fatty acids, 11:12**

**Omphalocele, 5:65,66**

**1,5-anhydroglucitol (1,5-AG), 1:21**

**1-acylglycerol-3-phosphate-O-acyltransferase 2, 7:15**

**1-hour plasma glucose, 1:19**

**1000 Genomes Project, variants in type 2 diabetes genetics, 14:9–10**

**Ongoing Telmisartan Alone and in Combination With Ramipril Global Endpoint Trial (ONTARGET), 22:49**

**Onychomycosis, 30:11**

**Open-angle glaucoma.** See Glaucoma  
**Operative vaginal delivery.** See Vaginal delivery

#### Ophthalmoscopy

glycemia assessment on, **1:16**  
 retinopathy detection by, **21:31**

**Opportunistic screening,** **1:24**

#### Optic nerve

damage in glaucoma, **21:36**  
 diabetic papillopathy, **21:39**  
 in diabetic retinopathy, **21:12**  
 in optic neuropathy, **21:37**

**Optic neuropathy,** **21:37–38**

#### Oral contraceptive use

diabetes induced by progestins and, **6:13**  
 early pregnancy use and structural birth defects, **5:11**  
 retinopathy risk with, **21:26**

#### Oral diabetes medications

diabetes treatment, **39:2–3**  
 guidelines for use, **18:15**  
 use with pancreatitis-related diabetes, **6:7**

#### Oral glucose tolerance test (OGTT)

A1c comparisons, **1:15**  
 A1c sensitivity and specificity vs, **1:12**  
 criteria for testing in pregnancy, **4:2**  
 disadvantages for diabetes diagnosis, **1:12**  
 gestational diabetes follow-up, **4:12**  
 in gestational diabetes screening, **4:4,7**  
 glycemia cutoffs and definitions, **13:16**  
 heart disease risk association, **18:7**  
 insulin secretion indices from, **13:17**  
 NHANES methods for, **9:2**  
 presymptomatic diabetes diagnosis, **1:1**  
 in screening vs. A1c, **1:26**  
 with short sleep and insomnia, **25:29**

#### Oral health and diabetes, **31:1–49**

burning mouth/diabetic neuropathy, **31:37**  
 candidiasis, **31:38**  
 caries, **31:36**  
 dental care utilization, **31:39–40**  
 dental plaque, **31:3**  
 diabetes effects on peri-implant disease, **31:23**  
 dry mouth, **31:38**  
 geographic location disparities in, **31:6**  
 gestational diabetes risk with periodontitis, **31:14–15**  
 gingivitis, **31:3,4**  
 heart disease risks with periodontitis, **31:15**  
 insurance claims data, **31:40–41**  
 multidisciplinary treatment, **31:40–41**  
 new type 2 diabetes with periodontitis, **31:14**  
 NHANES data and critique of, **31:2–3**  
 oral health-diabetes links, **31:41–42**  
 periapical periodontitis, **31:22–23**  
 periapical periodontitis/diabetes interaction, **31:7,15,16,17**  
 peri-implant disease, **31:7,15,23**  
 race/ethnicity disparity in periodontitis, **31:3–6**

root fragments, **31:34**  
 sociodemographic disparity in periodontitis, **31:6**  
 tooth eruption rate with diabetes, **31:36**  
 tooth loss consequences, **31:34–36**  
 tooth loss risk with diabetes, **31:34**  
 tooth loss/missing teeth with diabetes, **31:27–36**

**Oral insulin trials,** **37:6–7**

**Oregon, preexisting diabetes during pregnancy,** **5:13–14**

**Orexigenic neuropeptides,** **25:20**

**Orlistat prevention trials,** **38:5**

**Orthostatic hypotension,** **23:4,6,9**

**Osmotic diuresis,** **1:1; 17:6**

**Osteoarthritis (OA),** **32:14**

misclassification of, **32:17**  
 prevalence and risk factors for, **32:14–15**

**Osteoblasts,** **32:12**

**Osteomyelitis,** **30:12–13,17**

#### Osteoporosis

definition and identification of, **32:2,9,14**  
 and fractures with diabetes, **32:14**  
 in geriatric diabetes, **16:5,8**  
 prevalence with diabetes, **32:9,10**  
 risk with thiazolidinediones and sulfonylureas, **6:13**  
 treatment for prevention, **32:14**

#### Osteoporotic Fractures in Men (MrOS) study, **32:2–3,8**

**O'Sullivan-Mahan criteria,** **4:2,3,9**

#### Otelixizumab

anti-CD3 intervention studies, **37:11**  
 RCT placebo controlled trial, **37:11,12**

#### Outcome Reduction With Initial Glargine Intervention (ORIGIN) Trial

glargine insulin and cancer risk, **29:11–12**  
 glycemic control and cardiovascular disease events, **18:15**

**Overactive bladder (OAB) syndrome,** **28:10**

**Overload hypothesis,** **15:11**

#### Overnutrition/overfeeding

type 1 diabetes in youth, **15:11**  
 in utero exposure and, **15:12**

**Overt nephropathy.** See Macroalbuminuria

#### Overweight

BMI criteria for, **13:11**  
 in childhood after in utero diabetes exposure, **13:12**  
 in development of type 2 diabetes in youth, **15:12**  
 effects on gestational diabetes prevalence trends, **4:8**  
 in geriatric population, **16:5–6**  
 high BMI and age at diagnosis in youth, **15:11**  
 macrophage infiltration of adipose tissues, **13:18**  
 maternal diabetes as risk factor for offspring, **4:12**  
 offspring of diabetic parents, **4:13**  
 pregestational diabetes in pregnancy, **5:16**  
 trends in youth, **15:12**

## P

**Pancreas.** See also Beta cell dysfunction/function

agenesis/hypoplasia, **7:11**  
 annular, **7:11**  
 enterovirus detection in, **11:4**  
 transplants for diabetes treatment, **39:9**

**Pancreas after kidney transplant (PAK),** **39:9**

**Pancreas or gut endocrine tumors,** **6:15–16**

**Pancreas transplant alone (PTA),** **39:9**

#### Pancreatic cancer

incretin-based diabetic therapy, **29:12**  
 mortality from, **29:7–8**  
 pancreatogenic diabetes, **6:8–9**  
 risk factors for, **6:7,8–9**

**Pancreatic polypeptide (PP),** **6:7**

#### Pancreatitis-related (pancreatogenic) diabetes

diagnosis and clinical characteristics, **6:7–8**  
 F cells in, **6:7**  
 hereditary/genetic pancreatitis, **6:8**  
 incretin-based therapy for, **29:12**  
 pancreatic cancer, **6:8–9**  
 pathophysiology, **6:7**

**Panic Disorder,** **33:16**

**Panretinal photocoagulation,** **21:7**

#### Parasympathetic nervous system function

in cardiac autonomic neuropathy, **15:27; 23:6–7,13**  
 cardiovascular autonomic function, **23:6**  
 detrusor muscle dysfunction, **28:4**  
 in functional gastrointestinal disorders, **27:3**

**Parietal cell antibodies (PCA),** **11:16; 12:12; 27:16**

**Parvovirus infections,** **11:8**

#### Pathophysiology/pathogenesis

cystic fibrosis-related diabetes, **6:5–7**  
 diabetic kidney disease, **22:5**  
 gastrointestinal manifestations of diabetes, **27:4,8**  
 gestational diabetes, **4:3**  
 hemochromatosis, **6:10**  
 hypoglycemia, **17:9**  
 lower extremity amputation, **20:24**  
 lower urinary tract symptoms, **28:4,14**  
 malnutrition-related diabetes, **6:18**  
 metabolic syndrome, **13:21**  
 nonalcoholic fatty liver disease progression, **26:5**  
 pancreatitis-related diabetes, **6:7**  
 peripheral arterial disease, **20:17**  
 sexual dysfunction, **28:6–10**  
 stroke in diabetes, **19:3**  
 subcategories of diabetes, **1:1**  
 transient neonatal diabetes, **7:10**  
 type 1 diabetes autoantibodies, **1:3**  
 viral-mediated mechanisms for diabetes, **6:1–5**

**PAX4 (paired homeobox 4) gene,** **7:7**

- PCSK (proprotein convertase subtilisin/kexin type)-1/3 and -2**, 7:11–12
- PDX1 (pancreatic and duodenal homeobox) gene**, 7:7,11
- Pediatric diabetes**. See Children and adolescents
- Pegylated granulocyte colony-stimulating factor (G-CSF)**, 37:14
- Penn State Cohort**, 25:29
- Pennsylvania, total diabetes percentages**, 8:9
- Pentadecanoic acid**, 11:10
- Pentamidine**, 6:13
- Pentoxifylline effects on kidney function**, 22:54
- Peptide-binding groove**, 12:5
- Peri-implant mucositis**, 31:23
- Peri-implantitis**, 31:23
- Perilipin 1**, 7:19
- Perinatal morbidity and mortality**  
fetal demise (stillbirth), 5:36–44  
gestational diabetes treatment and, 1:4; 4:10–11  
with maternal diabetes, 5:48  
with nephropathy, 5:29  
preconception care of diabetic women, 5:7  
with preexisting diabetes, 5:73  
spontaneous abortion, 5:35–36  
stillbirths in types 1 vs. 2 diabetes, 5:43  
with twin pregnancies, 5:67
- Perindopril**  
effects on retinopathy, 21:25  
micro-/macrovascular association with blood pressure, 19:12
- Periodontal disease**  
complication rates with diabetes, 30:15  
definitions of, 31:4  
infections associated with diabetes, 30:15; 31:3  
risk factors for diabetic kidney disease, 22:38
- Periodontal probing depth (PPD)**, 31:3–4,8
- Periodontitis**  
bidirectional relationship with diabetes, 31:23–26  
children and adolescents with type 1 diabetes, 31:18,21  
chronic periodontitis in U.S., 31:4–7  
diabetes complication effects on, 31:19  
diabetes complication risks with, 31:15  
diabetes-periodontitis interactive effects, 31:21  
effect on diabetes, 31:8–9,17  
epigenetic programming of risk, 28:5  
geographic location disparities, 31:6  
gestational diabetes, 31:14–15,22  
glycemic control, 31:9–14,17–18  
HOMA-IR model and, 31:8  
hyperglycemia effects on, 31:21  
indicator for undiagnosed prediabetes, 31:21  
measurement and definitions for, 31:3
- metabolic syndrome interactions with, 31:21
- overt diabetes relationship with, 31:17
- prediabetes effects on, 31:22
- prevalence in type 2 diabetes, 31:17
- prevalence in U.S., 31:4–6
- prevalence in well-controlled diabetes, 31:17
- racial/ethnic disparity in, 31:4–6
- risk factors for diabetes/hyperglycemia and, 31:23
- risk with type 2 diabetes in adults, 31:19–21
- Sea Island Gullah African Americans, 31:21
- socioeconomic status disparity, 31:6
- type 2 diabetes development in, 31:14
- U.S. state level prevalence, 31:6
- Peripheral arterial disease (PAD)**, 20:1–34.  
See also Foot ulcers in diabetes  
abdominal adiposity association, 20:11  
adiposity relation with, 20:11  
ankle-brachial index, 20:2,3  
atherosclerosis pathophysiology, 20:1–2  
blood calcium association, 20:9  
cardiovascular outcomes with, 20:14–15  
data sources and limitations, 20:3–4  
diabetes and risk factors for, 20:5–7  
diabetes treatment and disease risk, 20:12  
diagnostic criteria for, 20:6  
in disability with diabetes, 34:11  
exercise testing for diagnosis, 20:3  
frequency of insulin use, 20:12  
homocysteine levels association, 20:8  
hypercholesterolemia as risk factor for, 20:8  
hypertension as risk factor for, 20:7  
inflammatory markers, 20:7,8–9  
invasive measurement of, 20:2  
lower extremity amputation with, 20:24  
noninvasive measurement, 20:2–3  
presentation symptoms, 20:1–2  
prevalence of, 20:4  
progression and cardiovascular outcomes, 20:12–14  
renal dysfunction association, 20:9–11  
renal dysfunction with, 20:10  
revascularization with, 20:13–14  
smoking as risk factor for, 20:7  
symptom-based diagnosis, 20:3
- Peripheral Nerve Society**, 23:5
- Peripheral neuropathy**. See Diabetic neuropathies
- Perivascular nitrenergic nerves**, 19:3
- Permanent neonatal diabetes (PNDM)**, 7:9,10–11
- Pernicious anemia**, 27:15,16
- Peroxisome proliferator-activated receptor gamma (PPAR $\gamma$ )**. See PPAR- $\gamma$
- Persistent albuminuria**. See Albuminuria
- Persistent postpartum diabetes**, 1:29
- Petamidine, diabetes induced by**, 6:13
- Pharmacologic intervention, type 2 diabetes prevention**, 38:5,11
- Phenformin, lactic acidosis precipitation**, 17:8
- Phenotype**  
autoimmune type 1 diabetes and obesity, 15:3  
correlation with genotype, 12:12  
of diabetes, 6:2  
diabetes with IPEX, 6:14  
epigenetic changes and, 22:45  
factors determining diabetes, 6:4  
genotype correlations in *INS* mutations, 7:12  
for insomnia, 25:29  
linkage analysis in type 2 diabetes, 14:2,6,10  
linkage analysis with, 14:2  
with lipodystrophies, 7:13,16–18,20,21  
metabolic syndrome, 13:24; 18:9  
with mitochondrial diabetes, 6:18  
with MODY, 7:7–8  
neonatal diabetes mellitus, 7:11  
with pancreatitis-associated diabetes, 6:7  
single nucleotide polymorphism and, 14:10  
in Williams syndrome, 6:17
- Phenotypic type 2 diabetes**  
antibodies found in, 1:5–6  
disease complexity, 14:6  
insulin processing defects, 7:12
- Phentermine-topiramate combination trial**, 38:10
- Pheochromocytoma**, 6:15
- Philadelphia Pediatric Diabetes Registry**, 2:5,7; 15:4
- Physical activity**  
by age, 10:14  
covariates for heart disease risk, 18:12  
decline in children and adolescents, 15:12  
effects on A1c levels, 18:18–19  
inactivity risk factor for type 2 diabetes, 13:10–11  
leisure-time, 3:17  
MET hours, 10:15  
in older adults, 16:1  
relationship to retinopathy, 21:27  
with type 2 diabetes, 10:12
- Picornaviruses**, 12:6
- Pigmented hypertrichosis and insulin-dependent diabetes (PHID)**, 7:8–9
- Pima Indian studies**. See also American Indian/Alaska Native  
ALT level and risk for diabetes, 26:5  
breastfeeding and type 2 diabetes, 15:13  
candidate genes for ESRD in, 22:43  
diabetic ESRD in, 22:27  
epigenetic programming from in utero exposure, 22:42  
ESRD incidence and in utero diabetes exposure, 22:42  
fetal overnutrition effects in, 15:12  
gallstone prevalence in, 26:13  
GGT levels association with diabetes, 26:5  
glomerular filtration in, 22:9

- glucose intolerance to type 2 diabetes conversion, **13:16–17**
- heritability of type 2 diabetes, **21:29**
- hyperglycemia as risk for kidney disease, **22:30**
- incidence of ESRD with obesity, **22:37**
- incidence of proteinuria, **22:16**
- increasing prevalence of type 2 diabetes, **15:9**
- insulin resistance measures in, **13:17**
- longitudinal periodontitis study, **31:20–21**
- microalbuminuria prevalence in, **15:24; 22:14**
- mortality from kidney or cardiovascular disease, **22:20–21**
- mortality in diabetes of youth, **15:38**
- nephropathy with type 2 diabetes, **15:24**
- obesity trends in, **22:37**
- overweight prevalence in youth, **15:12**
- periodontitis severity, **31:17,21**
- plasma glucose concentrations in, **1:13**
- predictive power of impaired fasting glucose and glucose tolerance, **1:20**
- proteinuria in offspring, **22:43**
- proteinuria in offspring with intrauterine exposure, **15:24**
- proteinuria with type 2 diabetes in offspring, **22:32**
- retinopathy data and fasting glucose cutpoints, **1:13**
- retinopathy incidence in, **15:18; 21:29**
- survival with normal albuminuria, **22:19–20**
- type 2 diabetes development in, **1:3,13,20,22**
- type 2 diabetes prevalence in, **31:15–16**
- type 2 diabetes risk with maternal diabetes, **15:13**
- type 2 diabetes/periodontitis association, **31:15–16**
- in utero exposure to maternal diabetes, **4:12–13; 22:42**
- worsening kidney function and death rates in, **22:20–21**
- Pioglitazone**
- ACT NOW prevention study, **38:10**
- bladder cancer association with, **29:11**
- bone loss and fractures with, **32:12**
- cancer risk in preclinical studies, **29:11,13**
- diabetes risk reduction with, **38:13**
- myocardial infarction risk with, **24:13**
- safety update on, **38:13**
- type 2 diabetes and macrovascular disease, **19:13–14**
- Pittsburgh Epidemiology of Diabetes Complications Study (EDC)**. See Epidemiology of Diabetes Complication Study (EDC)
- Pittsburgh Sleep Quality Index (PSQI)**, **25:9**
- Placenta previa**, **5:24–25**
- Placental abruption**, **5:24–25,43**
- PLAGL1 (pleiomorphic adenoma gene-like 1) gene**, **7:10**
- Plasma glucose measurements**
- A1c comparisons, **1:14–15**
- criteria for diabetes diagnosis, **1:2**
- cutpoints for diagnosis, **1:13**
- in pediatric age group, **1:14**
- Plasmid-encoded proinsulin effects**, **37:14**
- Plasminogen activator inhibitor-1 (PAI-1)**, **13:19–20**
- PLIN1 gene**
- mutation in familial partial lipodystrophy, **7:1,19**
- Pneumocystis carinii**, **6:13**
- Podocytes**
- alterations induced by diabetes, **22:8**
- type 1 diabetes changes in, **22:8–9**
- type 2 diabetes changes in, **22:8–9**
- POEMS syndrome (polyneuropathy, organomegaly, endocrinopathy, monoclonal gammopathy)**, **6:16**
- Poland**
- immunotherapy trials, **37:14**
- prepregnancy glycemic control, **5:10**
- type 1 diabetes incidence, **2:7**
- Polio model of type 1 diabetes**, **11:1,6–7**
- Polycystic ovary syndrome (PCOS)**, **13:21; 33:22**
- Polycythemia, neonatal**, **5:68–69**
- Polyhydramnios**, **5:45–46**
- Polymicrobial infections**, **30:13,14**
- Polymicrobial necrotizing fasciitis**, **30:14**
- Polypharmacy risks in geriatric diabetes**
- analyzing drug effects with, **6:10**
- with comorbid diseases, **16:5**
- drug/chemical-induced diabetes, **6:10–13**
- increased risk of drug side effects, **16:10**
- quality of care for, **41:12**
- risk of fall with, **16:15**
- risk with long-acting sulfonylureas, **17:10**
- Polysomnography/polysomnogram (PSG)**
- actigraphy correlation with, **25:9**
- apnea-hypopnea index after night shift, **25:30**
- diagnosis of obstructive sleep apnea, **25:12–13**
- insomnia and short sleep, **25:29**
- shallow sleep defined by, **25:6**
- Ponderal index (PI)**, **5:56**
- Population attributable risk (PAR)**, **18:6**
- Porphyromonas endodontalis**, **31:16**
- Posterior subcapsular cataract**, **21:34**
- Postpartum hemorrhage**, **5:25**
- Postpartum wound infection**, **5:24**
- Postprandial glucose intolerance**. See Impaired glucose tolerance
- Postprandial hyperglycemia**
- insulin secretagogue effects on cardiovascular disease prevention, **38:12**
- insulin-stimulated glucose uptake with, **14:6**
- in MODY2 presentation, **7:6**
- in Rabson-Mendenhall and Donohue syndromes, **7:12**
- Postprandial insulin response**. See Insulin response
- Posttraumatic stress disorder (PTSD)**, **33:16**
- Poverty Income Ratio (PIR)**, **8:12**
- PPAR (peroxisome proliferator-activated receptor)**
- alpha gene and acarbose, **38:11**
- delta gene and acarbose, **38:11**
- gamma gene, **38:11**
- PPARG (peroxisome proliferator-activated receptor-gamma) gene**
- cod liver oil interaction type 1 diabetes risk, **11:16**
- in familial partial lipodystrophies, **7:19**
- gamma coactivator (PGC-1), **38:11**
- ligand for anti-inflammatory actions, **11:16**
- mutation in familial partial lipodystrophy, **7:1**
- single nucleotide polymorphisms of, **14:2; 38:11**
- thiazolidinedione target coding, **7:20; 14:11**
- type 2 diabetes risk factor, **7:11**
- PPAR-γ (peroxisome proliferator-activated receptor gamma)**
- bone loss with, **32:12**
- in familial partial lipodystrophies, **7:19**
- omega-3 fatty acids and, **11:16**
- risk factor for type 2 diabetes, **7:11**
- stroke incidence with diabetes, **19:1**
- in type 2 diabetes, **14:2**
- Prader-Willi syndrome (PWS)**, **6:16–17**
- Preconception diabetes**. See also Preexisting diabetes with pregnancy
- definition, **5:3**
- low utilization of care, **5:8**
- Preconception planning/counseling/care**, **5:35**
- Prediabetes**
- A1c definition of, **3:3**
- A1c detection of, **3:15**
- A1c levels and insomnia symptoms, **25:9**
- 2-hour plasma glucose, **9:6**
- cutpoints of biomarkers, **9:2**
- data sources, **3:2–4**
- detection by A1c/FPG/2-hour plasma glucose, **3:15**
- diabetes and anti-HCV antibodies, **26:8–9**
- diagnostic criteria for, **1:5–6; 9:2**
- disability/impairment status, **34:7–8**
- effects on periodontitis severity, **31:22**
- estimated rate of, **13:16**
- fetal effects in, **4:2**
- fracture incidence, **32:6**
- gallstone disease prevalence in, **26:15–16**
- glycemia cutoffs and definitions, **13:16**
- glycemic criteria for, **1:1**
- high-risk range for diabetes, **1:13**
- increased risk with short sleep duration, **25:3**
- inflammatory response, **9:23**
- insomnia and lifestyle, **25:9**
- maternal, **4:4**

- missing teeth in, **31:32**  
 in nonpregnant women of childbearing age, **5:4–5**  
 in older adults, **16:3**  
 oral health effects in, **31:8**  
 overall prevalence, **3:13**  
 periodontitis as indicator of, **31:21**  
 periodontitis prevalence, **31:17**  
 prevalence by A1c/FPG/2-hour PG, **3:15–16**  
 prevalence of, **3:13–14**  
 prevalence trends by A1c/FPG measures, **3:20**  
 prevalence trends in, **3:18–21**  
 preventive behavior in, **1:27**  
 race/ethnicity, **3:13–14**  
 screening for, **1:27**  
 sex differences in, **3:13–14**  
 subclinical proinflammatory condition in, **13:18**  
 use as classification, **1:17**
- “Prediabetic” neuropathy.** See Distal symmetrical polyneuropathy
- Prediction models for type 2 diabetes risk,** **13:24**
- Preeclampsia**  
 complications with vaginal delivery, **5:25**  
 diabetes vs. control, **5:34**  
 diagnostic criteria, **5:30**  
 gestational diabetes treatment effects, **4:11**  
 gestational diabetes with chronic hypertension, **5:33**  
 microalbuminuria predictive value of, **5:29**  
 planned preterm delivery with, **5:45**  
 preeclampsia diagnostic criteria, **5:30**  
 pregestational diabetes and with chronic hypertension, **5:34–35**  
 prophylactic aspirin treatment, **5:35**  
 rates with types 1 and 2 diabetes, **5:34**  
 reduction with treatment, **4:3**  
 retinopathy with type 2 diabetes, **21:26**  
 risk factor for venous thromboembolism, **5:23**  
 risk factors for preeclampsia, **5:35**  
 risk with sleep disturbances, **25:21**  
 stillbirth comorbidities, **5:43**  
 stroke association with maternal diabetes, **5:22**  
 type 1 vs. 2 diabetes, **5:35**
- Preexisting diabetes with pregnancy,** **5:1–106.** See also Maternal diabetes  
 birth certificate/hospital record data, **5:13**  
 birth condition and sequelae, **5:48–49**  
 breastfeeding, feeding, **5:73–74**  
 cesarean deliveries, **5:46–47**  
 chronic hypertension prevalence with, **5:33**  
 congenital heart defects, **5:67**  
 congenital malformation with, **5:59–67**  
 contraception for diabetic women, **5:10–11**  
 data sources and limitations, **5:3–4,13**  
 definition, **5:3**  
 delivery complications, **5:45–46**  
 diabetes development, **5:73**  
 disparities by race/ethnicity, **5:17–19**  
 DKA in, **5:25**  
 early terminations with, **5:16**  
 epidemiologic studies of management in, **5:72–73**  
 fetal complications before delivery, **5:35–44**  
 gestational hypertension prevalence in, **5:34**  
 historical context, **5:2–3**  
 hyperbilirubinemia and jaundice, **5:71**  
 hypertensive disorders in, **5:30–35**  
 hypocalcemia/hypomagnesemia, **5:71**  
 hypoglycemia, **5:26**  
 large-for-gestational age, **5:55–56**  
 major maternal morbidity with, **5:24**  
 management methods for, **5:72–73**  
 maternal age, **5:16**  
 maternal complications before and during pregnancy, **5:21–35**  
 maternal risks, **5:2**  
 mental and psychomotor development of children, **5:75–76**  
 metabolic control and outcomes in, **5:3**  
 micro/macroadalbuminuria prevalence with, **5:29**  
 mild/severe preeclampsia/eclampsia, **5:34**  
 neonatal, perinatal, and infant mortality, **5:47**  
 neonatal cardiomyopathy with, **5:68**  
 neonatal complications with, **5:47–71**  
 neonatal hypoglycemia and, **5:69–71**  
 nephropathy with, **5:29–30**  
 neuropathy with, **5:28–29**  
 non-Hispanic Asian/Pacific Islander, **5:17**  
 nonpregnant women age 15–19 years, **5:6–7**  
 obesity, metabolic syndrome, **5:74–75**  
 objective and historical context, **5:2–3**  
 obstetric morbidity in, **5:24–25**  
 peripartum myocardial ischemia, **5:23**  
 placental characteristics in, **5:67**  
 polycythemia, **5:68–69**  
 preconception care utilization with, **5:7–8**  
 preconception glycemic control and malformations, **5:10–11**  
 preeclampsia frequency in, **5:34–35**  
 pregnancy outcomes with diabetes, **5:37**  
 pregnancy planning, **5:4–13**  
 pregnancy planning and contraception, **5:6–7**  
 pregnancy-related myocardial infarction risk, **5:23**  
 prepregnancy neuropathy frequency, **5:28–29**  
 preterm delivery in, **5:45–46**  
 prevalence during pregnancy, **5:13–17**  
 prevalence in women of childbearing age, **5:4–7**  
 prevalence of preexisting diabetes during pregnancy, **5:13–21**  
 rates with pregnancy, **4:7–8**  
 respiratory distress, **5:67–68**  
 retinopathy, **5:26–28**  
 risk factor for thromboembolism, **5:23**  
 risk for antepartum venous thromboembolism, **5:23**  
 “at risk” prevalence at age 15–44 years, **5:4**  
 sepsis likelihood with, **5:24**  
 simulated estimates of, **5:18**  
 small-for-gestational age with, **5:55**  
 spontaneous abortion, **5:35–36**  
 stillbirth rates, **5:37,43**  
 stroke and hypertensive disorder, **5:22**  
 studies on, **5:102–106**  
 total during pregnancy, **5:13–14**  
 type 2 diabetes, **5:14–15**  
 type 2 diabetes in pregnancy trends, **5:16**  
 types 1 and 2 diabetes in pregnancy trend, **5:14**  
 undifferentiated diabetes in pregnancy trends, **5:15**  
 vaginal delivery with shoulder dystocia, **5:56–59**  
 in women of childbearing age, **5:3–4**
- Pregestational diabetes.** See Preexisting diabetes with pregnancy
- Pregnancy**  
 A1c levels in, **5:10**  
 cesarean delivery, **5:46**  
 chronic proteinuria with, **5:29**  
 complications and maternal age, **5:16**  
 consecutive diabetic pregnancy mortality, **5:22**  
 depression risks with diabetes, **33:9**  
 depressive symptoms with diabetes in, **33:9**  
 DKA with type 2 diabetes, **5:25**  
 elements of care for glycemic control, **5:72**  
 insulin-induced hypoglycemia, **5:26**  
 intensive vs. conventional insulin therapy in, **5:26**  
 interpregnancy interval for diabetic women, **5:7**  
 kidney function in diabetic vs. nondiabetic pregnancy, **22:40**  
 maternal deaths with diabetes, **5:21**  
 neuropathy prevalence in pregnancy with type 1 diabetes, **5:28–29**  
 oral glucose tolerance testing in, **4:2**  
 outcome with mild chronic hypertension, **5:33**  
 perinatal morbidity and mortality with twin, **5:67**  
 periodontal bacteria and inflammation with, **31:25**  
 planning for diabetic women, **5:7**  
 preconception care utilization, **5:7–10**  
 preconception planning/counseling, **5:8**  
 with pregestational diabetes, **5:1–76**  
 pregnancy effects on, **5:29**  
 prenatal hyperglycemic testing, **5:10**  
 preterm delivery, **5:46**

- prevalence of complication by diabetes status, **5:3**
- prevalence of preexisting diabetes during pregnancy, **5:13–21**
- retinopathy development or progression with, **21:26–27**
- retinopathy progression time course in, **5:26–27**
- risk factors for diabetic kidney disease, **22:40–41**
- sleep changes during, **25:21**
- sleep disturbances during, **25:21**
- slow wave sleep during, **25:21**
- spontaneous abortions with type 1 diabetes, **5:35–36**
- terminations for malformations, **5:43,62**
- with type 1 diabetes, **5:2**
- unintentional with diabetes, **5:8**
- unplanned, **5:11**
- Pregnancy Risk Assessment Monitoring System (PRAMS)**
- 2009 postpregnancy survey, **5:17**
- limitations of data, **5:5**
- pregestational diabetes prevalence during pregnancy, **5:18**
- prevalence in women of childbearing age, **5:4**
- prevalence of preconception diabetes, **5:15–16**
- unintended pregnancies, **5:8**
- Pregnancy-induced hypertension (PIH).** See Hypertensive disorders of pregnancy
- Premature placental separation, 5:25**
- Presymptomatic diabetes.** See Prediabetes
- Preterax and Diamicon MR Controlled Evaluation.** See ADVANCE trial
- Preterm delivery, 5:45–46**
- chronic hypertension/gestational diabetes risks, **5:33**
- preconception care of diabetic women, **5:7**
- sleep disturbance relation to, **25:21**
- spontaneous, **5:45**
- Preterm premature rupture of membranes, 5:46**
- Prevalence of total diabetes.** See also other specific conditions and populations
- NHANES and NHIS data on, **3:4**
- prevalence, **3:9**
- prevalence age <20 years, **3:19**
- prevalence estimation, **3:3**
- state ranking for, **8:9**
- Prevention of Progression of Arterial Disease and Diabetes (POPADAD), 18:17**
- Prevention of type 1 diabetes, 37:1–21**
- alefacept trial, **37:13**
- alpha-1 antitrypsin, **37:13–14**
- anti-CD3 and anti-CD5 monoclonal antibody studies, **37:11–12**
- azathioprine early intervention, **37:7**
- bacille Calmette-Guerin vaccine early intervention, **37:7–11**
- cow's milk consumption meta-analysis, **37:3**
- cyclosporine early intervention, **37:7**
- docosahexaenoic acid supplement, **37:5**
- etiology of type 1 diabetes, **37:1–3**
- glutamic acid decarboxylase intervention studies, **37:12**
- gluten exposure, **37:5**
- immunologic interventions, **37:3,13–14**
- interleukin-2 and rapamycin, **37:13**
- intranasal insulin trial safety trial, **37:6**
- nicotinamide trials, **37:5,14**
- oral insulin trials, **37:5,11**
- parenteral insulin trial, **37:6,7**
- primary prevention trials and enrollment criteria, **37:3–5**
- secondary prevention trials and enrollment criteria, **37:5,6,7**
- staging criteria, **37:2–3**
- tertiary prevention trials, **37:7**
- tertiary prevention trials and enrollment criteria, **37:7,11–12**
- thymoglobulin (antithymocyte globulin) trial, **37:13**
- 25-hydroxyvitamin D (25(OH)D) and, **11:11–12**
- vitamin D effects, **37:5**
- Prevention of type 2 diabetes, 38:1–21.** See also Genetics of type 2 diabetes
- acarbose in prevention study, **38:8,10**
- Bedford study, **38:2**
- Canadian Normoglycemia Outcomes Evaluation, **38:9–10**
- Da Qing study, **38:5**
- Diabetes Prevention Program, **38:6–8**
- early U.K. and Swedish studies, **38:2–5**
- extended follow-up of outcomes, **38:12–13**
- Finnish prevention study, **38:5–6**
- genetic contribution to, **38:11–13**
- glutamic acid decarboxylase vaccine trials in, **37:6–7**
- Indian Diabetes Prevention Programme, **38:8**
- intention-to-treat analysis, **37:3; 38:5–6,9,12**
- lifestyle intervention with Japanese men, **38:8,10**
- liraglutide weight management study, **38:10–11**
- ramipril and rosiglitazone trial, **38:9**
- randomized controlled trials discussion, **38:13–16**
- SEQUEL secondary analysis/CONQUER, **38:10**
- Troglitazone in Prevention of Diabetes, **38:8**
- vitamin D effects, **13:7**
- voglibose study, **38:9**
- Primary hyperaldosteronism, 6:15**
- Primary Oral Insulin Therapy Study (Pre-POINT), 37:5**
- Primary Prevention Project (PPP), 18:17**
- Proinflammatory cytokines**
- in adipose tissue dysregulation, **13:18**
- cortisol exposure and levels of, **33:14**
- with docosahexaenoic acid supplements, **37:5**
- pathway for diabetes-depression association, **33:14**
- with periodontal disease, **31:24**
- in response to sleep deprivation, **25:10**
- type 2 diabetes risk and adiponectin levels, **13:19**
- Proinflammatory processes**
- association with insulin resistance, **19:9**
- in atherosclerosis, **20:1**
- gut microbiome effects on, **11:8,14**
- hyperglycemia promotion of, **19:3**
- in kidney disease, **22:34,38**
- periodontal disease, **31:24**
- in prediabetes and insulin resistance, **13:18–19**
- with sleep and circadian disturbance, **25:10,21**
- Proinsulin**
- beta cell dysfunction assessment by, **13:17**
- effects of plasmid-encoded, **37:14**
- heart disease prediction by, **18:11**
- insulin processing defects, **7:11**
- meta-analysis for, **14:9**
- in metformin-treated patients, **38:6**
- plasmid-encoded proinsulin effects, **37:14**
- processing to insulin, **7:11**
- risk factor for cardiovascular disease, **18:11–12**
- SGSM2 gene and, **14:6**
- Proinsulin peptide effects, 37:14**
- Proinsulin-to-insulin ratios, 13:17**
- Proliferative diabetic retinopathy (PDR)**
- prevalence in early pregnancy, **5:26**
- risk factors, **21:7**
- risk for vision loss, **21:7**
- Pro-opiomelanocortin (POMC), 7:11**
- PROspective pioglitAZone Clinical Trial In macroVascular Events (PROactive), 19:13**
- Prostaglandin synthesis, 22:39**
- Prostate hyperplasia (benign), 28:4**
- Protein metabolism**
- amino acid tissue uptake in diabetes, **1:6**
- in diabetes, **1:2**
- Proteinuria.** See also Albuminuria
- definition of, **5:30**
- effects on serum creatinine in type 1 diabetes, **22:48–49**
- glucose intolerance prediction of, **1:18**
- incidence of proteinuria in type 2 diabetes, **22:16–17**
- preeclampsia diagnostic criteria, **5:30**
- in pregnancy, **22:40**
- in renal disease with diabetes of youth, **15:20**
- risk factor for retinopathy, **21:25**
- role of free fatty acids in, **22:35**
- visual impairment association, **21:7–8**
- Proximal motor neuropathy.** See Diabetic radiculoplexus neuropathy (DRPN)

**Proyecto Vision Evaluation and Research (VER)**

racial/ethnic differences in retinopathy, **21:28**  
 retinopathy/socioeconomic status relationship in Mexican Americans, **21:29**

**PRRS1 (cationic trypsinogen) gene, 6:8**

**Pseudomonas aeruginosa** infections, **30:13,15,16; 37:14**

**Psychiatric/psychosocial issues, 33:1–34**

Bipolar Disorder prevalence with type 2 diabetes, **33:21**  
 depressive disorder and diabetes-related distress, **33:4–16**  
 diabetes care with, **41:12**  
 diabetes-related emotional distress, **33:3**  
 dysthymia prevalence, **33:2**  
 emotional distress, **33:4**  
 public health implications, **33:23–24**  
 schizophrenia, **33:21–22**  
 schizophrenia/autism risks in offspring, **33:21**  
 socio-cultural context/psychosocial issues, **33:23**  
 substance use and related disorders, **33:23**  
 subthreshold depressive symptoms and diabetes distress, **33:4**  
 treatment with comorbid Schizophrenia, **33:22**  
 type 1 diabetes risk and psychological stress, **11:15**

**Psychosomatic symptom checklist, 27:2****Psychotropic medications**

for addressing diabetes risks, **33:22**  
 mood stabilization with, **33:21–22**  
 type 2 diabetes risks with, **33:24**

**PTF1A (pancreas transcription factor 1A) gene, 7:11****PTPN22 gene**

dietary exposure interactions, **11:16**  
 mode of delivery interaction, **11:17**  
 single nucleotide polymorphism variant, **12:11**  
 type 1 diabetes association with, **11:3; 12:1; 32:15**  
 type 1 diabetes risk, **11:16; 12:6**

**PTRF gene**

caveolin-1 and -3 regulation, **7:16**  
 in congenital generalized lipodystrophy, **7:15,16**  
 mutations with congenital generalized lipodystrophy, **7:1**

**Puberty**

retinopathy relationship to, **21:23**  
 type 1 diabetes mortality onset at, **35:6**

**Public health surveillance/implications**

of childhood/adolescent diabetes, **2:4**  
 classification for pediatric surveillance in, **15:4**  
 definition, **2:5**  
 oral health-diabetes links, **31:41**  
 surveillance of type 1 diabetes, **2:4**

**Puerperal sepsis, 5:24****Puerto Ricans**

diagnosed diabetes prevalence, **3:7**  
 prediabetes prevalence, **3:14**  
 total cholesterol prevalence, **3:12**  
 undiagnosed diabetes prevalence, **3:12**

**Pulmonary embolism (PE)**

chronic hypertension/gestational diabetes risks, **5:33**  
 maternal mortality from, **5:22**  
 prevalence of, **5:24**

**Pulse-wave velocity (PWV), 15:34****PVT1 (plasmocytoma variant 1) gene, 22:43****Pyelonephritis**

acute renal failure with, **30:10**  
 emphysematous, **30:10**  
 with pregestational diabetes, **5:24**  
 in pregnancy, **5:24**  
 presentation of, **30:9–10**  
 prevalence of histologic, **22:55**  
 renal papillary necrosis with, **22:56**  
 risk with asymptomatic bacteriuria, **30:9**  
 urologic complications with type 1 diabetes, **22:56**  
 in women with diabetes, **28:20**

**Pyorrhea. See Periodontal disease****Q****Quality of care, 41:1–19**

age-related differences in risk factor control, **41:6–7,9,12**  
 appropriate measurements for, **41:11–12**  
 blood pressure, **41:6**  
 blood pressure control, **41:4–5**  
 clinical practice guidelines, **41:2–3**  
 defining quality care, **41:1–2**  
 evidence base for definition, **41:2–3**  
 foot and eye care with diabetes, **41:7**  
 geriatric diabetes care standards, **16:16**  
 glycemic control, **41:3–4,5–6**  
 high-quality care definitions, **41:2**  
 improvements needed, **41:13**  
 measurement tool for, **41:10,11**  
 monitoring groups for, **41:2**  
 performance measures and improvement initiatives, **41:10–11**  
 psychiatric/psychosocial issues in, **41:12**  
 racial/ethnic differences in risk factor control, **41:5–6,8,12**  
 regional variations in, **41:12**  
 retinopathy care, **41:5**  
 risk factor control trends, **41:2–10**  
 risk factor management for, **41:3,6–7**  
 for special populations, **41:12**  
 trends in children and adolescents, **41:12**

**Quality of life**

bone and joint complications, **32:1,14**  
 with diabetes in youth, **33:4**  
 disability effects on, **34:1–2**  
 with distal symmetrical polyneuropathy, **23:5**  
 for ethnic minorities with diabetes, **33:23**

with gastrointestinal disorders, **27:5,9,14**  
 with geriatric diabetes, **16:11**  
 oral health-related, **31:34,38,39,41**  
 with osteoarthritis, **32:14**  
 psychiatric/psychosocial issues, **33:15,16,18–19**  
 sexual dysfunction effects, **28:7**  
 urinary incontinence treatment, **28:14**  
 visual impairment and blindness, **21:9**

**Quality-adjusted life year (QALY)**

persistent postpartum diabetes treatment, **1:29**  
 screening costs and benefits, **1:27**

**Quantitative glycemic traits**

genetic determinants of, **14:2**  
 meta-analysis of, **14:3**  
*TBC1D4* gene, **14:3–4**  
 in type 2 diabetes, **14:1**

**Quantitative sensory testing (QST), 23:5–6****Quinoline-3-carboxamide, 37:7****R****Rabson-Mendenhall syndrome, 7:12****Race/ethnicity. See also specific racial/ethnic groups**

A1c variations independent of glycemia, **1:11–12; 3:13,15**  
 with dementia, **24:3**  
 depressive episode likelihood, **33:9**  
 diabetes by age distribution, **8:7**  
 diabetes in older adults, **16:3**  
 differences in stroke in diabetes, **19:7**  
 ESRD variations, **22:29,58**  
 high-risk groups for, **15:9–10**  
 metabolic syndrome stratification by, **13:21**  
 MODY epidemiology, **7:4**  
 overweight in diabetes in youth, **15:12**  
 pediatric screening recommendations, **1:14**  
 prediabetes prevalence, **3:13**  
 preexisting diabetes with pregnancy, **5:17–19**  
 projections for type 1 diabetes, **2:10**  
 “stroke belt” region, **19:7**  
 “stroke buckle” region, **19:7**  
 trends in diabetes in youth, **15:6**  
 type 1 diabetes prevalence and incidence, **2:5,6**  
 type 2 diabetes  
 prevalence and incidence, **3:8,12–13**  
 risk factors, **13:3–4**  
 variants in specific populations, **14:6**  
 type 2 diabetes prevalence and incidence, **3:5**  
 types 1 and 2 diabetes in youth, **15:2**

**Raloxifene, 32:14****Ramipril (ACEI), 19:12; 22:49; 38:9****Rancho Bernardo Study**

A1c levels and FPG comparisons, **1:15**  
 cognitive decline with diabetes, **24:8**

- coronary artery calcification and subclinical heart disease, **18:10**  
stroke risk with diabetes, **19:6**  
type 2 diabetes/testosterone level association, **13:20**  
weight loss/mortality association with diabetes, **16:10**
- Random plasma glucose**  
confirmation of diagnosis, **1:16**  
for high risk for diabetes, **1:6**
- Randomized controlled trials (RCTs).** See also *specific studies and trials*  
ACE trial, **38:11**  
ACT NOW study, **38:10**  
Canadian Normoglycemia Outcomes Evaluation, **38:9–10**  
challenges of implementation, **38:1–2**  
control of risk factors for heart disease, **18:18–19**  
CPAP treatment for obstructive sleep apnea, **25:18**  
critique of, **38:13–17**  
Da Qing Lifestyle Modification, **38:5,17**  
Diabetes and Atorvastatin (DIATOR) Trial, **37:14**  
Diabetes Control and Complications Trial (DCCT). See DCCT study.  
in diabetes prevention, **38:1–14**  
diabetic foot ulcer treatment outcomes, **20:22**  
Diabetic Retinopathy Candesartan Trials, **21:24–25**  
discussion of prevention trials, **38:13–16**  
DREAM study, **38:9**  
extended follow-up beyond hyperglycemia, **38:12–13**  
Finnish Diabetes Prevention Study, **38:5–6**  
gestational diabetes treatment effects, **4:10–11**  
IDPP study, **38:8**  
intensive glycemic control, **18:13–14**  
Lifestyle Intervention in Japanese Men with IGT, **38:8,10–11**  
mild gestational diabetes treatment, **4:10**  
NAVIGATOR trial, **38:9**  
Orlistat, **38:5**  
periodontal therapy and glycemic control, **31:12–14**  
REPAIR T1D, **37:14**  
SEQUEL/CONQUER studies, **38:10**  
STOP-NIDDM trial, **38:8**  
TODAY study, **15:18**  
Trogliatzone in Prevention of Diabetes, **4:12; 38:8**  
type 2 diabetes prevention, **38:1–11**  
voglibose trial, **38:9**  
Zensharen study, **38:10**
- Rapid-acting insulin, 6:7**
- Rapid-eye movement sleep.** See REM (rapid-eye movement) sleep
- Reactive oxygen species (ROS)**  
formation of, **25:20**  
in neuropathy pathogenesis, **23:7**  
with obstructive sleep apnea, **25:19–20**  
sleep and circadian disturbances, **25:19–20**  
in stroke etiology and diabetes, **19:3**
- Reasons for Geographic and Racial Differences in Stroke (REGARDS) study, 19:7–8**
- Receiver Operator Characteristic (ROC), 1:9; 12:10; 13:24**
- Receptor for AGEs (RAGE)**  
diabetes development, **19:10**  
links to glycemia, **24:4**  
serum soluble RAGE and heart disease, **19:11**
- Reduced kidney function, 22:3**
- Reduction of Endpoints in Non-insulin dependent diabetes with the Angiotensin II Antagonist Losartan (RENAAL) study, 22:32,49**
- Relative insulin deficiency**  
etiology of, **1:3**  
type 2 diabetes in youth, **15:2**
- REM (rapid-eye movement) sleep**  
in normal sleep, **25:1**  
during pregnancy, **25:21**  
prevalence of sleep apnea with, **25:17**
- Renal agenesis, 5:60,65**
- Renal failure.** See Kidney failure
- Renal hypoplasia, 5:60**
- Renal insufficiency/dysfunction.** See also Diabetic kidney disease  
effects on glycated hemoglobin, **1:12**  
metformin-associated lactic acidosis, **17:8**  
peripheral arterial disease association, **20:9**  
pregnancy effects on, **5:29**  
type 1 diabetes mortality, **35:11**
- Renal papillary necrosis**  
infections with type 1 diabetes, **28:20**  
prevalence with diabetes, **22:56**
- Renalase, 12:8**
- Renin-Angiotensin System Study (RASS), 21:25**
- Renin-angiotensin-aldosterone system (RAAS)**  
cardiovascular event reduction with, **38:12**  
combined hormonal contraception effects, **5:13**  
early treatment benefits, **22:16**  
kidney injury with dual therapy, **22:49**  
renoprotective effect in type 2 diabetes, **22:49**  
stimulation by oral contraceptives vs. transdermal patch, **5:13**
- REPAIR T1D, 37:14**
- Reproductive Risks of Incontinence Study at Kaiser (RRISK)**  
sexual dysfunction in women, **28:20**  
urinary incontinence remission, **28:16**  
urinary tract symptoms in minorities, **28:11**
- Resistin, 25:20**
- Respiratory distress, 5:67–68**
- Respiratory tract infections**  
influenza and pneumonia, **30:7–8**  
sinusitis and bronchitis, **30:8**  
tuberculosis, **30:17–18**
- Restriction fragment length polymorphisms in type 2 diabetes, 14:2**
- Retinal arteriolar emboli, 21:38**
- Retinal microaneurysm, 21:12**
- Retinal vein occlusion, 21:38**
- Retinopathy.** See also Visual impairment  
A1c association with, **1:12**  
age and duration of diabetes, **21:8–9**  
APOE epsilon4 allele polymorphism, **21:25**  
BMI association with, **21:25–26**  
care of persons with retinopathy, **21:30–32**  
cataract surgery with, **21:35**  
characteristics of, **21:12**  
comorbidity and mortality, **21:29–30**  
cost-effectiveness of detection, **21:30–31**  
diabetic management effects on, **21:12–13**  
epsilon4 allele polymorphism, **21:25**  
examinations in high-risk populations, **21:33**  
geographic atrophy with non-proliferative retinopathy, **21:38**  
glycemia level assessment, **1:16**  
glycemic measures for, **1:13–14**  
incidence in type 1 vs. type 2 diabetes, **21:16–18**  
ischemic hypoxic nonproliferative phase, **21:12**  
Kimmelstiel-Wilson nodules and, **22:7**  
long-term effects of pregnancy on, **5:27**  
macular edema with, **21:16–18**  
medical interventions for, **21:30**  
microaneurysms in, **1:16**  
with nephropathy, **5:29**  
new interventions for treatment, **21:29–30**  
pathogenesis, **21:25**  
photocoagulation treatment of, **21:7**  
pregestational diabetes, **5:26–28**  
in presymptomatic diabetes diagnosis, **1:1**  
prevalence, **1:9; 21:12–16**  
prevalence in early pregnancy, **5:26**  
progression risk during pregnancy, **5:26**  
public health applications of data on, **21:30–33**  
quality of care with, **41:5**  
risk factors for, **21:7,19–30**  
self-reported prevalence of, **41:5**  
three-step progression of, **15:18; 21:21**
- RFX6 (regulatory factor X, 6) gene mutations, 7:11**
- Rheumatoid arthritis**  
frequency in diabetic persons, **32:1**  
genetic associations with type 1 diabetes and, **32:15**  
intestinal microbiota association, **11:8**  
parvovirus association with, **11:8**  
prevalence in with diabetes, **32:17**  
with Turner syndrome, **6:17**

**Rhinocerebral mucormycosis**, 17:3; 30:16

**Rhizopus species**, 30:5

**Ricin A-chain**, 37:11

**Rifampicin**, 30:17

**Risk factor clustering**. See Metabolic syndrome

**Risk factors for diabetes**

bidirectional periodontitis relationship, 31:24

congenital syndromes, 6:16

enteroviral infections and type 1 diabetes, 11:6

glycemic, 1:16

hypoglycemia, 17:10–11

intrauterine growth retardation, 6:18

malnutrition, 6:18

mitochondrial diabetes, 6:18

periodontitis-diabetes common risks, 31:23

for retinopathy (diabetic), 21:19–30  
transplant recipients, 6:17–18

type 1 diabetes, 11:1–29

type 2 diabetes, 13:1–37

unique populations at risk, 6:17–18

**Risk score for autoantibody-positive relatives**, 1:28

**Risk scores from clinical factors**

for autoantibody-positive relatives of persons with type 1 diabetes, 1:28  
predictive value of, 1:23

**Rituximab**, 37:13

**RNLS gene**

age at onset of type 1 diabetes, 12:12

type 1 diabetes risk, 12:8

**Rochester, Minnesota cohort**, 32:2–3

**Rogers syndrome**, 7:8

**Rose questionnaire for peripheral arterial disease**, 20:3

**Rosiglitazone**

bone loss and fractures with, 32:12

Canadian Normoglycemia Outcomes Evaluation, 38:9–10

cancer risk in preclinical studies, 29:11

cognitive decline prevention, 24:13

combination with metformin, 15:18; 38:9,13

for diabetes prevention, 38:9

diabetes risk reduction with, 38:13

myocardial infarction risk with, 24:13

reduction of diabetes risk, 38:9,14

safety update, 38:13

use as insulin sensitizer, 24:4

**Rotavirus infections**, 11:8

**Rotterdam Study**, 38:11

**R-R interval measures**, 23:7

**RRISK 2**, 28:20–21

**Rubella virus**

congenital infection and diabetes, 11:8

type 2 diabetes risk factors, 11:15

**Russia, mortality in childhood-onset type 1 diabetes**, 35:12

## S

**San Antonio Heart Study (SAHS)**

insulinogenic index and type 2 diabetes risk, 13:17–18

metabolic syndrome prevalence, 13:22

metabolic syndrome traits and diabetes risk, 13:24

risk for type 2 diabetes, 13:17

**San Luis Valley Study**, 23:9–10

**Sarcopenia**

diabetes-related disability, 34:1,11

in geriatric population, 16:1,5,10

in older adults, 16:1

risk of falls and, 16:15

**Sardinia, type 1 diabetes risk in**, 12:4

**Saudi Arabian screening in dental clinics**, 1:24

**Scandinavian countries**

susceptibility haplotypes in, 12:4

type 1 diabetes incidence in children, 2:10

**Schizophrenia**

atypical antipsychotic medications in, 6:11

common risk factors for diabetes, 33:24

impaired glucose metabolism with, 33:22

psychiatric/psychosocial issues, 33:22

schizophrenia/autism risks with maternal diabetes, 5:76; 33:21

type 2 diabetes risk factors, 6:11;

33:21–22

**Schizophrenia Patient Outcomes Research Team (PORT)**, 33:22

**Scientific Registry of Transplant Recipients (SRTR)**, 26:2,11

**Scottland antenatal centers, long-term effects of intrauterine hyperglycemia**,

4:12–13

**Scottish Intercollegiate Guidelines Network (SIGN)**

prognostic system for foot ulcers, 20:22

risk classification for diabetes, 20:21

**Screening for diabetes**, 1:6–29

awareness before screening, 1:27

cost-effectiveness of screening, 1:27

cutpoints for, 1:25–26

early screening benefits, 1:24–25

economic analysis of screening, 1:27

genetic testing for, 1:16

for gestational diabetes, 1:28–29; 4:2

glycated albumin, 1:15

glycated hemoglobin, 1:7

glycemic tests for, 1:15

high risk groups, 1:24

lack of standardized classification, 2:12

microaneurysms at diagnosis, 1:16

patients with neuropathy, 1:16

in patients with serious mental illness,

33:21

in pediatric age group, 1:14

plasma glucose measurements, 1:13–14

positive A1c vs. oral glucose tolerance

test, 1:26

postpartum after gestational diabetes, 13:21

prevalence of screening, 1:25

retinopathy and, 1:16

screening cutpoints for type 2 diabetes, 1:25–26

screening for type 2 diabetes, 1:22–27

screening results with type 1 diabetes, 1:26–28

skin autofluorescence, 1:15–16

type 1 diabetes diagnostic criteria,

1:3,27–28

type 2 diabetes diagnostic criteria,

1:3–4,22–23

type 2 diabetes prevalence in youth, 1:14

venues for, 1:23–24

**Screening for Impaired Glucose Tolerance study**, 1:11

**Sea Island Gullah African Americans**, 31:21.

See also Black/African American

**SEARCH for Diabetes in Youth**

by age in U.S. populations, 3:4–5

birth-month pattern/seasonal variation, 2:7

cardiac autonomic neuropathy, 15:27;

23:13

carotid intima media thickness, 15:34–37

childhood diabetes and viral infections,

6:4–5

classification with autoantibodies/insulin

sensitivity, 2:3–4; 15:3–4

composition of population for, 15:5

depression and quality-of-life measures,

33:4

by diabetes autoantibodies, 2:3

diabetes in offspring after gestational

diabetes, 4:12

diabetes prevalence/incidence, 15:9

women of childbearing age, 5:4,6

in youth, 15:4

distal symmetric polyneuropathy preva-

lence, 23:10

DKA prevalence/incidence at onset/diag-

nosis, 15:17; 17:2

dyslipidemia, 15:33

elevated albumin:creatinine ratio, 15:20

elevated blood pressure, 15:33

etiologic classification for, 2:3–4

geographical regions used, 15:4

by glutamic acid decarboxylase autoanti-

bodies, 2:3

glycemic control data, 15:28

lifestyle characteristics

diabetes/prediabetes, 10:2,7,10–11

smoking, 10:16–17

metformin treatment for type 2 diabetes,

15:18

minority/ethnic projections from, 2:10

MODY epidemiology, 7:4

obesity and insulin resistance, 15:34

peripheral neuropathy with type 1 and

type 2 diabetes, 15:27

populations monitored, 2:2

- race/ethnicity patterns in type 2 diabetes and prediabetes, **3:5**
- retinopathy prevalence/incidence in minority youth, **15:18**
- risk for chronic complications, **5:7**
- type 1 diabetes
- complications and insulin use, **15:17**
  - prevalence/incidence age <20 years, **2:5**
  - racial/ethnic variation, **2:6–7**; **15:6**
  - risk factors, **15:11**
  - trends in adolescents, **1:14**
  - in youth, **2:9**
- type 2 diabetes prevalence/incidence
- data collection, **3:4**
  - diagnosed diabetes incidence, **3:16–17**
  - ever vs. never breastfeeding, **5:74**
  - pediatric diabetes data, **15:10**
  - sex differences in, **3:5**
  - trends in adolescents, **3:17**
  - in utero diabetes exposure, **4:12**; **13:13**
  - in youth, **3:16**
  - U.S. centers for, **15:4**
- Seasonality**
- birth of children with type 1 diabetes, **11:11**
  - diagnosis of type 1 diabetes, **11:3**
  - onset of type 1 diabetes at age <20 years, **2:7–9**
- Seattle risk score for diabetic foot ulcer**, **20:21**
- Second International Workshop-Conference on Gestational Diabetes Mellitus**
- glucose measures for screening, **4:2**
  - screening time recommendations, **4:4**
- Secondary diabetes**, **1:4**
- Second-generation antipsychotics**. See Atypical antipsychotic medications
- Seipin**, **7:15–16**
- Selective IgA deficiency in celiac disease**, **27:9**
- Self and non-self**, **12:2**
- Semmes-Weinstein monofilament (SWM)**, **20:18**; **23:5**
- Senile lens changes**. See Cataracts
- Sepsis**. See also Infections associated with diabetes
- with chronic kidney disease, **22:22**
  - with diabetes-associated infections, **30:14–15**
  - diagnosis with foot ulcers, **30:13**
  - maternal mortality from, **5:24**
  - precipitation by lactic acidosis, **17:8**
- SEQUEL secondary analysis on weight loss**, **38:10**
- Sequence tag sites in type 2 diabetes**, **14:1**
- Seroconversion**
- antibodies in type 1 diabetes progression, **37:2**
  - beta cell injury manifestation, **37:2**
- Serum soluble RAGE (sRAGE), heart disease association**, **19:10–11**
- Severe albuminuria**. See Macroalbuminuria
- Severe insulin deficiency**
- monogenic diabetes, **7:2**
  - type 1 diabetes, **1:3–4**
- Sex differences**
- A1c and cancer risk, **29:4**
  - A1c in prediction of incident diabetes, **1:20**
  - in A1c levels, **1:11**
  - adiposity of offspring from gestational diabetes, **4:12**
  - age distribution by sex, **8:7**
  - alcohol consumption, **10:9–10**
  - cardiovascular mortality risk with diabetes, **36:8**
  - with cataracts in type 2 diabetes, **21:33**
  - chronic kidney disease risk factors, **22:12**
  - constipation/laxative used in diabetes, **27:2**
  - coronary artery calcification scores, **15:37–38**
  - depression risks for, **33:9**
  - diagnosed, undiagnosed, and total type 2 diabetes prevalence, **3:10–11**
  - diagnosed diabetes, **3:16**
  - diagnosed diabetes prevalence, **3:5–6**; **16:2**
  - in disability with diabetes, **34:11**
  - dysglycemia prevalence in men, **3:14**
  - eating disorders in females age <20 years, **33:19**
  - fractures with type 2 diabetes, **32:4–5**
  - gallstone disease, **26:13–15**
  - hand osteoarthritis, **32:12**
  - in hyperglycemic hyperosmolar state, **17:6**
  - hyperinsulinemia/heart disease association in, **18:11**
  - idiopathic skeletal hyperostosis, **32:17**
  - increased prevalence of diabetes, **3:19**
  - late neonatal deaths, **5:48**
  - lifestyle intervention, **38:17**
  - lung cancer mortality rates, **29:8**
  - macroalbuminuria prevalence, **22:12**
  - metabolic syndrome prevalence, **13:21,23–24**
  - microalbuminuria prevalence, **22:12**
  - mortality in childhood-onset type 1 diabetes, **35:12**
  - mortality rates with hematologic cancers, **29:10**
  - mortality trends in type 2 diabetes, **36:11**
  - musculoskeletal disorder in upper extremity, **32:18**
  - obesity, diabetes, and heart disease, **18:6**
  - peripheral arterial disease prevalence, **20:5**
  - prediabetes prevalence, **3:13**
  - prediabetes/type 2 diabetes, **3:10–12**
  - prevalence of type 2 diabetes, **3:19–20**
  - in retinopathy and visual impairment, **21:9**
  - sex distribution with diabetes, **8:4**
  - sex-specific differences in mortality, **36:5–7**
  - stroke risk with diabetes, **19:5–7**
  - in thyroid cancer occurrence, **29:10**
  - total calories consumed, **10:2**
  - type 1 diabetes mortality by sex, **35:6–7**
  - type 1b diabetes, **6:18**
  - in type 2 diabetes and alcohol consumption, **13:9**
  - type 2 diabetes incidence in girls vs. boys, **3:16**
  - type 2 diabetes/prediabetes prevalence, **3:5**
  - visual impairment, **21:3,9**
- Sexual dysfunction with diabetes (female)**
- definition of, **28:20**
  - insulin-treated type 2 diabetes, **28:20–21**
  - mechanisms of, **28:21**
  - symptoms of, **23:4**
  - type 1 diabetes, **28:21**
- Sexual dysfunction with diabetes (male)**
- See also Urologic disease in diabetes
- data sources and limitations, **28:6**
  - diabetes association in, **28:9–10**
  - erectile dysfunction defined, **28:6**
  - measurement and classification, **28:6**
  - pathophysiology and comorbid conditions, **28:6–7**
  - prevalence, **28:7–8**
  - prevalence and incidence with diabetes, **28:8**
  - treatment recommendations, **28:9–10**
- SGLT2 (sodium glucose transporter-2) inhibitor**, **18:15**
- SGSM2 gene**, **14:6**
- SH2B3 gene**, **12:6**
- Shift work**
- sleep and circadian disturbances, **25:24–30**
  - type 2 diabetes risk with, **13:15**
- SHORT (Short Stature, Hyperextensibility of Joints and/or Inguinal Hernia, Ocular Depression, Reiger Anomaly, and Teething Delay) Syndrome**, **9:26**
- Shortened crown-rump length**, **5:67**
- Shoulder dystocia**
- cerebral palsy and, **5:49**
  - with gestational diabetes treatment, **4:3,10**
  - macrosomia and, **5:56**
  - reduced risk with gestational diabetes treatment, **4:3**
  - in small-for-gestational age, **5:33**
  - with vaginal delivery, **5:56–59**
- Sickness Impact Profile**, **20:25**
- Signaling pathways**
- cascade initiated by insulin receptor, **7:12**
  - hormone-sensitive lipase activation, **25:19**
  - impaired C-peptide-related, **23:7**
  - inflammatory response in kidney disease, **22:8**
  - to melanocortin receptors in obesity, **7:11**
  - melatonin, **25:19**

- nuclear factor (NF)-kappa B, **22:42**  
 placental contribution with cytokines, **5:67**
- Sildenafil**, **28:10**
- Simultaneous pancreas-kidney transplant**, **39:9**
- Single gene defects**. See Monogenic forms of diabetes
- Single nucleotide polymorphism genotype**, **12:7**
- Single nucleotide polymorphism (SNP)**  
 association with retinopathy, **21:29**  
 diabetic kidney disease association, **22:43**  
 effect of acarbose on prevention, **38:11**  
 GWAS identification correlated, **14:10**  
 importance of, **14:2–3**  
 linkage mapping, **12:6**  
 metformin treatment interaction, **38:11**  
 relation to age at onset, **12:12**  
 in type 1 diabetes, **12:4–5**  
 type 1 diabetes risk association, **12:6**  
 type 2 diabetes, **38:11**  
 in type 2 diabetes mortality, **14:1**
- Sitagliptin**  
 lansoprazole combination use, **37:14**  
 pancreatic cancer/pancreatitis risks with, **29:12**  
 trends in use of, **39:3–4**
- Skeletal muscle**  
 AGPAT2 isoform expression in, **7:15**  
 exercise effects on, **13:11**; **17:10**  
 impaired insulin signaling in, **6:15**  
 insulin resistance in, **15:2**  
 LMNA gene mutations, **7:19**  
 postprandial hyperglycemia, **14:6**  
 sympathetic activation effects on, **25:19**  
 TBC1D4 level in, **14:6**  
 wasting with neuropathy, **23:5**
- Skin autofluorescence**, **1:15–16**
- SLC19A2 (thiamine transporter) gene**, **7:8**
- SLC29A3 gene mutation**, **7:8–9**
- SLC30A8 gene**  
 type 2 diabetes association, **14:10**  
 zinc transporter variant, **13:5**
- SLC47A1 gene, metformin response association**, **38:11**
- Sleep and circadian disturbances**  
 adipocyte function, **25:11**  
 appetite-regulating hormones, **25:10–11**  
 brain glucose utilization, **25:10**  
 circadian system and glucose metabolism, **25:24–30**  
 gestational diabetes risk with, **25:21**  
 growth hormone changes, **25:10**  
 hypothalamic-pituitary-adrenal axis and, **25:10**  
 insomnia and diabetes risk, **25:6–9**  
 insufficient sleep, **25:2–6**  
 long sleep duration impact, **25:11**  
 metabolic pathways involved, **25:10**  
 obstructive sleep apnea, **25:12–20**  
 during pregnancy and gestational diabetes, **25:21–24**  
 sleep fragmentation and shallow sleep, **25:6–9**  
 sympathetic nervous system activity, **25:10**  
 systemic inflammatory response, **25:10**  
 type 2 diabetes risk factors, **13:14–15**; **25:1–44**  
 type 2 diabetes sleep breathing disorders, **25:20–21**
- Sleep Heart Health Study**, **25:14,20**
- Slow wave sleep (SWS)**, **25:1,21**
- Small area estimation (SAE) method**, **31:6**
- Small fiber neuropathies (SFN)**, **23:3**
- Small-for-gestational age (SGA)**  
 chronic hypertension/gestational diabetes, **5:33**  
 growth restriction definition, **5:49**  
 intellectual performance and, **5:75**  
 with macrosomia trend effects on, **5:55**  
 with maternal diabetes, **5:55**  
 planned preterm delivery with, **5:45**  
 shoulder dystocia risk, **5:33**
- Smoking**  
 after diagnosis of diabetes, **1:27**  
 arterial disease and amputation associations, **20:25**  
 association with chronic kidney damage, **22:36–37**  
 cessation and type 2 diabetes risks, **33:22**  
 congenital malformation prediction by, **5:10**  
 covariates for cardiovascular risk, **18:12–13**  
 with diabetes, **10:16–17**  
 dose-response relation to type 2 diabetes risk, **13:15**  
 geriatric diabetic population, **16:6**  
 incidence of intermittent claudication, **20:6**  
 incidence or progression of retinopathy with, **21:27**  
 with mood disorders, **33:23**  
 pregnancy-related myocardial infarction risk, **5:23**  
 risk factor for periodontitis, **31:23**  
 risk factors for diabetic kidney disease, **22:36–37**  
 type 1 diabetes mortality, **35:11**
- Smooth muscle**  
 in bladder outlet obstruction, **28:6**  
 hyperglycemia effects on, **20:1**  
 proinflammatory process in, **19:3**  
 in prostate, **28:2,4**
- Social phobia**, **33:16**
- Sociodemographic characteristics**, **8:1–67**  
 age distribution with diabetes, **8:4**  
 communication characteristics  
 household telephone access, **8:14**  
 main interview language, **8:14**  
 data sources and limitations, **8:2–3**  
 demographic characteristics  
 age distribution, **8:4**  
 age distribution by sex, **8:7**  
 sex distribution, **8:4**  
 diabetes characteristics  
 age at diagnosis, **8:8**  
 duration, **8:8–9**  
 employment characteristics  
 current occupations of workers, **8:18–19**  
 hours worked when employed, **8:18**  
 past 12 months, **8:15**  
 prior week, **8:15**  
 reason for not working in prior week, **8:15**  
 type of employer, **8:15–18**  
 veteran status, **8:18**  
 NHANES data, **8:3**  
 NHIS data, **8:3**  
 place of residence  
 metropolitan/nonmetropolitan county, **8:9**  
 state of U.S., **8:9**  
 time in U.S. for immigrants, **8:10**  
 race/ethnicity distributions, **8:4,6–7**  
 reported health insurance benefits, **8:19**  
 sex distribution, **8:4**  
 social and health benefits, **8:19**  
 socioeconomic characteristics  
 cohabitation type, **8:11**  
 education, **8:12**  
 family income, **8:12**  
 family size, **8:12**  
 marital status, **8:11**  
 poverty income ratio, **8:12–13**  
 type 2 diabetes risk factors, **13:15**  
 undiagnosed diabetes and prediabetes, **8:20**  
 U.S. region of residence, **8:9–10**  
 world region of residence, **8:10**
- Socioeconomic status (SES)**  
 association with depression symptoms with diabetes, **33:9**  
 association with retinopathy, **21:29–30**  
 diabetic kidney disease risk factor, **22:30**  
 likelihood of psychiatric disorders with, **33:23**  
 mortality risk for type 1 diabetes, **35:10**  
 risk factors for diabetic kidney disease, **22:30**  
 type 1 diabetes mortality, **35:10**  
 type 2 diabetes association, **13:14**  
 type 2 diabetes risk factors, **13:13–14**
- Sodium-lithium countertransport activity**, **22:32**
- Soluble CTLA4Ig**. See Abatacept
- South Americans**. See Central/South Americans
- South Carolina**  
 cesarean delivery in diabetic women, **5:46**  
 dyslipidemia and glycemic control in youth, **15:33**  
 oral health with diabetes, **31:21**  
 pediatric diabetes trends, **15:4**  
 pregestational diabetes prevalence during pregnancy, **5:18**

- prevalence of diagnosed diabetes, **3:4**  
 racial/ethnic differences in stroke in diabetes, **19:7**  
 U.S. vs. non-U.S. countries diabetes prevalence, **2:2**
- South Dakota.** See also American Indian/Alaska Native  
 albuminuria with type 2 diabetes, **22:18,30**  
 metabolic syndrome in, **13:23**
- Spondyloepiphyseal dysplasia, 7:11**
- Spontaneous abortion**  
 early fetal loss rate, **5:35–36**  
 maternal mortality ratio in, **5:22**
- Stage 1 type 1 diabetes criteria, 37:2**
- Stage 2 type 1 diabetes criteria, 37:3**
- Stage 3 type 1 diabetes criteria, 37:3**
- Staphylococcus aureus, 30:8,12–13,14,16**
- Staphylococcus epidermidis, 30:16**
- Staphylococcus pyogenes, 30:14**
- Staphylococcus saprophyticus, 30:9**
- State Inpatient Databases, 5:18**
- Statin therapy.** See also Dyslipidemia  
 combined with ezetimibe, **22:52**  
 diabetic patient expenditures for, **40:63**  
 dyslipidemia management, **18:16**  
 expenditures for, **40:66**  
 genetic association with hard exudates in, **21:25**  
 in geriatric population, **16:14**  
 modification of ESRD risk with, **22:32**  
 pre-conception use of, **5:36**  
 pregnancy loss with exposure to, **5:36**  
 use in early pregnancy, **5:11**
- Steno Hospital/Clinic studies**  
 cardiovascular autonomic neuropathy intervention, **23:13**  
 cause-specific mortality, **35:9**  
 intensive treatment of cardiovascular risk factors, **16:14**  
 legal blindness with retinopathy, **21:7**  
 life expectancy improvement with type 1 diabetes, **35:5**  
 life expectancy trend, **35:5**  
 multifactorial intervention, **18:18; 22:2,16**  
 multifactorial intervention for kidney disease, **22:54**  
 specific-cause mortality with type 1 diabetes, **35:9**  
 visual impairment incidence, **21:7**
- Stiff man syndrome, 6:15**
- Stillbirth (fetal death).** See Fetal demise
- Stillbirth Collaborative Research Group**  
 population-based, case-controlled, **5:37**  
 risk of stillbirth with diabetes, **5:43**
- Stimulated C-peptide response**  
 defining type 1 diabetes, **2:3**  
 evaluation of beta cell function, **37:7**  
 in “remission” in cyclosporine trials, **37:7**
- STOP-NIDDM (Study to Prevent Non-Insulin-Dependent Diabetes Mellitus), 38:8**  
 acarbose in prevention study, **38:8,12**  
 gene polymorphism evaluation in, **38:11**
- “Stress” hyperglycemia, 19:9**
- Stroke and diabetes, 19:1–23**  
 age and sex difference in stroke risk, **19:5–7**  
 albuminuria risk prediction for, **19:10**  
 antiplatelet use, **19:14**  
 atrial fibrillation, **19:17**  
 autonomic neuropathy risk prediction for, **19:11**  
 blood pressure management, **19:12**  
 carotid and vertebral artery disease treatment, **19:14–17**  
 carotid revascularization in, **19:16–17**  
 classification of, **19:2,3**  
 clinical definition, **19:1**  
 clinical presentation and topography of, **19:3**  
 coronary artery disease, **19:17**  
 definition of, **19:1,2**  
 before or during delivery, **5:22**  
 dementia risks with, **24:3**  
 diabetes as independent risk factor, **19:17**  
 disability association with, **34:8**  
 disease course and prognosis, **19:17**  
 dyslipidemia management, **19:12–13**  
 epidemiology in diabetes, **19:4**  
 extracranial carotid and vertebral artery disease treatment, **19:14–16**  
 glycemic control, **19:13–14**  
 hypercoagulability risk prediction for, **19:11**  
 hyperglycemia risk prediction for, **19:9**  
 hypertension/blood pressure control, **19:11–12**  
 hypertension/systolic blood pressure management, **19:11–12**  
 incidence and prevalence in types 1 and 2 diabetes, **19:4–5**  
 inflammation/CRP risk prediction for, **19:10**  
 insulin resistance risk prediction for, **19:9–10**  
 insulin-like growth factor 1 in risk prediction, **19:11**  
 ischemic and hemorrhagic, **19:2**  
 lifestyle interventions, **19:11**  
 lipid assessment for vascular disease, **18:8**  
 magnitude of diabetes/heart disease risk, **18:7–8**  
 metabolic syndrome, **19:10**  
 metabolic syndrome risk prediction for, **19:10**  
 migraine history and, **5:22**  
 obstructive sleep apnea risk prediction for, **19:10**  
 pathophysiology in diabetes, **19:3**  
 peripheral vascular disease, **19:17**  
 pregestational diabetes and, **5:22–23**  
 race/ethnicity differences in, **19:7–8**  
 receptor for AGEs risk prediction, **19:10–11**  
 risk predictors for, **19:9–11**  
 risk with peripheral arterial disease, **20:14**  
 stroke risk factors in type 2 diabetes, **19:1**
- stroke subtypes, **19:8–9**  
 transient ischemic attack, **19:2**  
 UKPDS Risk Engine, **19:11**  
 in young persons, **19:8**
- “Stroke belt” region, 19:7**
- “Stroke buckle” region, 19:7**
- Strong Heart Study**  
 albumin:creatinine ratio as cardiovascular disease predictor, **22:19,21**  
 albuminuria with type 2 diabetes, **22:18**  
 lipoprotein concentration and elevated albuminuria risk, **22:32**  
 metabolic syndrome prevalence, **13:23**  
 neuropathy prevalence, **23:10**  
 stroke occurrence in, **19:8**
- Study of Health in Pomerania (SHIP), 31:21,33,34**
- Study of Heart and Renal Protection (SHARP), 22:52**
- Study of Osteoporotic Fractures (SOF), 32:2–3,8,16; 34:11**
- Study of Thymoglobulin to ARrest Type 1 diabetes (START), 37:13**
- Study of Women’s Health Across the Nation (SWAN), 28:14,16**
- Study to Help Improve Early Evaluation and Management of Risk Factors Leading to Diabetes (SHIELD), 10:12**
- Sulfonylurea medications**  
 acute metabolic complications with, **17:10**  
 CYP2C9, **14:9**  
 fracture rates with, **32:12**  
 glucose intolerance progression to diabetes effects, **1:19**  
 insulin secretagogue action of, **16:16**  
*KCNJ11/ABCC8* target encoding for, **14:11**  
 in MODY, **7:6**  
 in treatment of neonatal diabetes mellitus, **7:10**  
 trends in use of, **39:2**  
 use in geriatric population, **16:14**
- Sulfonylurea receptor (SUR1)**  
 encoding for, **7:5**  
 in  $K_{ATP}$  channel, **7:5**  
 neonatal diabetes mellitus and, **7:10**
- Suprachiasmatic nuclei (SCN), 25:24**
- Surrogate markers**  
 for Alzheimer’s disease, **24:4**  
 for nonalcoholic fatty liver disease, **26:3**
- Surveillance, Epidemiology, and End Results Program (SEER), 29:7**
- Surveillance, HIT-based systems, 2:12**
- Susceptibility genes and loci**  
*APOE-ε4* for late-onset dementia, **24:3**  
*CTLA4* gene, **11:16; 12:6–7**  
 for ESRD, **22:43**  
*IL2RA/CD25* gene for type 1 diabetes, **12:6**  
*KIAA0350* gene for autoimmune disease, **12:6**  
*SH2B3* (12q24), **12:6**  
 type 1 diabetes, **12:6**  
 for type 1 diabetes, **12:6–8**

type 1 diabetes, **12:8**  
 type 1 diabetes risk factors, **12:6**

**Swedish Childhood Diabetes Registry**, **2:10**

**Swedish Medical Birth Registry**  
 brachial plexus palsy, **5:58–59**  
 mothers with type 1 diabetes, **5:70**  
 ponderal index use, **5:56**

**Swedish National Registry**, **22:12–14**

**Swedish Obese Subjects (SOS)**, **29:6**

**Swedish studies**  
 Apgar scores in macrosomia, **5:56**  
 blood pressure and heart disease association, **18:9**  
 cancer risks with glargine insulin, **29:11**  
 cardiovascular risk with metabolic syndrome traits, **18:9**  
 cesarean delivery in diabetic women, **5:46**  
 change in type 1 diabetes genotype, **11:3**  
 diabetes association with prostate size, **28:4–5**  
 diabetes registries, **2:5**  
 fetal sex-associated risk, **5:66**  
 Malmöhus County, Sweden, **38:2–3**  
 mild/severe preeclampsia/eclampsia, **5:34**  
 prevalence of albuminuria, **22:12–14**  
 prevalence of DKA at onset, **15:17**  
 proinsulin prediction of heart disease, **18:11**  
 pulmonary embolism risk factors, **5:23–24**  
 residual brachial plexus palsy effects, **5:59**  
 school performance of offspring of diabetic women, **5:75**  
 sex differences in fetal demise, **5:43**  
 stroke association with maternal diabetes, **5:22**  
 Swedish Childhood Diabetes Registry, **2:10**  
 weight loss and cancer association, **29:6**

**Sympathetic nervous system activity**  
 autonomic dysfunction with distal symmetrical polyneuropathy, **23:5**  
 effects on skeletal muscle, **25:19**  
 lipolytic effects of, **25:11,19**  
 in obstructive sleep apnea, **25:20**  
 on prostate smooth muscle, **28:4**  
 during REM-related sleep apnea, **25:17**  
 sleep and circadian disturbances, **25:19**  
 with sleep disturbances, **25:10**

**Sympathomimetic agents, hyperglycemic hyperosmolar state precipitation**, **17:6–7**

**Symptom turnover**, **27:5**

**Systemic inflammatory response.** *See also* Inflammatory response  
 abdominal obesity enhancement of, **25:20**  
 adipocytokines/adipokines and, **25:10**  
 C-reactive protein association with, **13:18–19**  
 gingivitis effect on, **31:25**  
 glucose metabolism and, **25:10**  
 gut microbiome effects on, **11:8**  
 with obstructive sleep apnea, **25:10,20**  
 periodontal treatment and, **31:14,16**  
 risk factor for stroke, **19:10**

## T

**T lymphocytes/cells.** *See also* Immune Tolerance Network  
 autoimmune destruction of beta cells, **15:2**  
 autoimmune gastritis, **27:15**  
 in autoimmunity development, **12:11**  
 in diabetes immune response, **37:2**  
 effects of vitamin D on response by, **11:11**  
 foreign peptide recognition, **12:2–3**  
 immune response to gluten, **27:9**  
 immune tolerance intervention studies, **37:13**  
 infiltration of kidney interstitium, **22:9**  
 MHC role in type 1 diabetes risk, **12:2**  
 peptide antigen presentation for activation, **12:2–3**  
 response to infection with diabetes, **30:11**  
 in type 1 diabetes, **12:2–3**  
 in type 1 diabetes immune response, **37:2**

**T1D Exchange Clinic Registry**, **15:17,20**

**Taiwan National Health Insurance Database**, **29:8**

**Taiwanese studies.** *See* Chinese/Taiwanese studies

**Targeted genotyping arrays**, **14:6**

**TBC1D4 gene**  
 Greenlandic population, **14:6**  
 trans-ethnic meta-analyses, **14:3–6**

**TCF7L2 gene**, **14:1**  
 incidence prediction, **38:11**  
 noncoding variant in, **14:2**  
 risk factor for type 2 diabetes, **1:16; 7:11**  
 rs7903146 SNP relationship, **14:1,10–11**  
 in type 2 diabetes, **14:1,6**

**TEDDY study**  
 DKA prevalence at onset, **15:17**  
 islet autoimmunity data, **11:2; 12:12**  
 islet autoimmunity triggers, **15:10; 37:2**  
 longitudinal studies, **15:10**  
 viruses in causation of type 1 diabetes, **11:8; 12:12**

**Temporal trends**  
 American Indian population youth, **3:17**  
 cardiovascular mortality trends, **36:10–11**  
 change in type 1 diabetes genotype, **11:3**  
 changes in age at onset of diabetes, **15:1**  
 childhood diabetes data for type 1 diabetes, **15:6**  
 childhood diabetes data for type 2 diabetes, **15:9–10**  
 chronic hypertension with pregestational diabetes and age, **5:33**  
 diabetes in geriatric population, **16:3**  
 in diabetes in U.S. youth, **1:14,54**  
 diabetes medication use, **39:3**  
 in diagnosed diabetes, **3:17–19**  
 diagnosed/undiagnosed diabetes prevalence, **3:19–20**  
 in economic impact of diabetes, **40:69–71**  
 in Framingham Offspring Study, **13:18**

functional limitations with diagnosed diabetes, **34:9**  
 geriatric diabetes cost projections, **16:17**  
 gestational diabetes prevalence, **4:7,11**  
 hospitalization/hospital utilization with diabetes, **40:28–32**  
 in hyperinsulinemia prevalence, **13:18**  
 lower extremity amputation frequency, **20:23**  
 maternal death from sepsis, **5:24**  
 medication use and self-care practices, **39:3–4**  
 mortality from hyperglycemic hyperosmolar state, **17:6**  
 national estimates of disability and causes, **34:9**  
 national trends in type 2 diabetes mortality, **36:10**  
 obesity in Pima Indians, **22:37**  
 physical activity levels, **10:12**  
 population factors in increased prevalence, **3:19**  
 prediabetes prevalence, **3:20**  
 preexisting diabetes with pregnancy, **4:7–8**  
 pregestational type 1 diabetes in pregnancy, **5:16**  
 prevalence of low filtration rate with diabetes, **22:12**  
 prevalence of persistent albuminuria with diabetes, **22:12**  
 retinopathy in youth-onset, **15:18**  
 smoking prevalence with diabetes, **10:17–18**  
 total diabetes prevalence, **3:19**  
 type 1 diabetes  
 incidence in youth, **2:9–10; 11:1**  
 mortality, **35:5**  
 prevalence and incidence in adults, **2:11–12**  
 type 2 diabetes  
 mortality, **36:1–14**  
 prevalence/incidence in adolescents, **3:16**  
 types 1 and 2 diabetes in pregnancy trend, **5:14**  
 in visual impairment with diabetes, **21:3**

**Tennessee**  
 mortality comparison to general population, **35:5**  
 racial/ethnic differences in stroke in diabetes, **19:7**

**Teplizumab**  
 anti-CD3 intervention studies, **37:11**  
 effects on beta cell function, **37:5,12**  
 in prevention of type 1 diabetes, **37:6–7**

**Teratogenic effects**  
 first trimester drug use, **5:10**  
 glucose effects on malformations, **5:11**  
 uncontrolled diabetic state, **5:66**

**Texas.** *See also* San Antonio Heart Study  
 acute metabolic complications in youth, **15:17**

- gallstone disease in Mexican Americans with diabetes, **26:13**
- genetics of retinopathy, **21:29**
- heritability of retinopathy, **21:29**
- total diabetes percentages, **8:9**
- Texas University Classification (TUC) risk classification for diabetic foot ulcers**, **20:21,22**
- The Environmental Determinants of Diabetes in the Young (TEDDY) study**. See TEDDY study
- The Health Improvement Network (THIN)**  
preexisting diabetes in pregnancy, **5:16**  
venous thromboembolism risk with pregestational diabetes, **5:23**
- Thiamine-responsive megaloblastic anemia (TRMA)**, **7:8**
- Thiazide diuretics**  
hyperglycemic hyperosmolar state precipitation by, **17:7**  
incident diabetes with thiazide, **6:12**  
micro- and macrovascular event reduction, **19:12**
- Thiazolidinedione (TZD) medications**  
bone loss and fractures with, **32:12**  
cancer risks with, **29:11,13**  
cautions for use of, **38:16**  
dementia prevention and treatment, **24:13**  
glucose intolerance progression to diabetes effects, **1:19**  
oral glycemic control, **39:2**  
pioglitazone, **38:10**  
PPARG gene target coding, **14:11**  
side effects of, **38:13**  
steatosis and steatohepatitis effects, **26:4**  
trends in use of, **39:3–4**
- “Thrifty” obesity pathway**, **15:12**
- Thymoglobulin (antithymocyte globulin) ATG**, **37:13**
- Thyroid dysfunction**, **6:15**
- Time-related biases**, **29:10**
- Tinea pedis**, **20:18**
- Tissue plasminogen activator (t-PA)**, **20:8**
- Tissue transglutaminase autoantigen (TTG)**  
in celiac disease detection, **27:9–10**  
in nondiabetic high-risk children, **27:11**
- TNF-beta Ncol gene**, **21:29**
- TOAST classification (stroke)**, **19:2**
- TODAY (Treatment Options for Type 2 Diabetes in Adolescents and Youth) study**  
albuminuria and renal failure risk, **15:24**  
exercise recommendations by, **10:12**  
kidney disease in youth-onset diabetes, **22:2**  
metformin and lifestyle intervention, **15:18**  
retinal evaluations in youth, **15:18**  
sedentary behavior in adolescents, **10:19**
- Tohono O’okham (Papago) Indian residents**, **31:15**
- Tolbutamide**, **38:2,5**
- Tooth loss/missing teeth**  
all-cause mortality association, **31:41**  
diabetes association with, **31:27–32**  
in well-controlled diabetes, **31:32**
- Toronto Consensus on Diabetic Neuropathies**, **23:5,6**
- Total cholesterol**  
diagnosed and undiagnosed diabetes, **9:19**  
ESRD association with, **22:32**  
race/ethnicity prevalence, **3:12**  
retinal hard exudate association with, **21:25**  
types 1 and 2 diabetes in youth, **15:33**
- Transcription factor 7-like 2 gene (TCF7L2)**. See TCF7L2 gene
- Transcription factor NEUROD1**, **7:7**
- Transcutaneous bilirubin estimates**, **5:71**
- Transforming growth factor beta (TGF-β)**  
in diabetic kidney disease, **22:45,54**  
in diabetic nephropathy, **22:31**  
nicotine effects on, **22:37**
- Transient ischemic attack (TIA)**  
carotid artery disease and, **19:17**  
defined, **19:2–3**
- Transient neonatal diabetes (TNDM)**  
chromosome 6q24, **7:9–10**  
clinical presentation of, **7:10**  
K<sub>ATP</sub> channel, **7:10**
- Translating Research into Action for Diabetes (TRIAD)**  
barriers to self-care, **39:8**  
death certificate data for mortality, **36:3**  
death certificate limitations for cause of death, **36:3**  
smoking, **10:16–17**
- Transplant recipients, diabetes risk with**, **6:17–18**
- Trial of Org 10172 in Acute Stroke Treatment**, **19:2**
- Trial to Evaluate Cardiovascular and Other Long-term Outcomes With Semaglutide in Subjects With Type 2 Diabetes (SUSTAIN-6)**, **18:16**
- TrialNet Natural History Study**  
assays used for screening, **1:27–28**  
ZnT8 autoantibodies, **1:27–28**
- TrialNet Nutritional Intervention to Prevent Type 1 Diabetes (NIP)**  
monoclonal antibody studies, **37:6–7**  
nutritional supplements on type 1 diabetes, **37:5**  
prevention of type 1 diabetes, **37:12–13**
- Trichophyton mentagrophytes**, **30:11**
- Trichophyton rubrum**, **30:11**
- Triglycerides**, **9:21–22**  
with cardiac autonomic neuropathy, **15:27**  
in diabetes, **1:2,6**  
enzymes in biosynthesis, **7:15**  
in familial partial lipodystrophies, **7:17**  
fenofibrate studies, **18:16**  
in fetal overnutrition, **5:73**  
heart disease association with, **18:8**  
lower extremity amputation association with, **20:25**  
metabolic syndrome traits, **13:24**  
type 1 diabetes mortality, **35:11**
- TRIGR (Trial to Reduce IDDM in the Genetically at Risk) study**  
breastfeeding vs. cow’s milk formula, **15:11**  
cow’s milk formula exposure and autoimmunity development, **37:3**  
enteroviral infections and autoimmunity, **11:4–5**
- Trisomy 21**. See Down syndrome
- Troglitazone**  
diabetes risk reduction with, **38:13**  
liver failure with, **32:12**
- Troglitazone in Prevention of Diabetes (TRIPOD) trials**, **4:12; 38:8**
- Tropical diabetes**, **6:18**
- Tuberculosis**, **30:17–18**
- Tumor necrosis factor receptors 1 and 2**, **22:2**  
in diabetic kidney disease, **22:9**  
in survival models for ESRD, **22:9**
- Tumor necrosis factor-alpha (TNFα)**  
adipose tissue inflammatory pathway, **13:19–20**  
etanercept blocking of, **37:14**  
in insulin resistance, **13:19**  
levels with sleep deprivation, **25:10**  
with obstructive sleep apnea, **25:20**  
in type 1 diabetes immune response, **37:2**  
type 2 diabetes risk factors, **13:19**
- Turner syndrome**  
diabetes risk with, **6:17**  
growth hormone in, **6:13**
- 25-hydroxyvitamin D (25(OH)D)**  
islet autoimmunity and, **11:12**  
type 1 diabetes risk and levels of, **11:11–12**  
type 2 diabetes incidence, **13:7**
- 2-hour plasma glucose (PG)**  
A1c comparisons, **1:14–15**  
by age stratification, **9:5**  
association with heart disease risk, **18:7**  
diagnostic criteria for diabetes, **1:2; 36:1**  
FPG comparison for prediction, **1:19**  
glycated albumin correlation, **1:15**  
in impaired glucose tolerance definition, **1:18**  
levels in undiagnosed diabetes, **9:5**  
NHANES methods for, **9:2**  
nonsense p.Arg684Ter variant, **14:6**  
prediabetes criteria, **9:5**  
prediction of cardiovascular disease and mortality, **1:17**  
race/ethnicity variations in, **1:12**  
TBC1D4 gene, **14:6**  
undiagnosed diabetes detection by, **3:15**  
untreated diagnosed diabetes, **9:5**
- Type 1 diabetes**  
acute complications in youth, **15:17**  
albuminuria progression or regression, **22:5–6**  
autoantibodies in, **1:6**  
binge eating disorder prevalence in, **33:20**

- biomarkers for initiation phases of, **12:11–12**
- candidate genes for, **11:16**
- celiac disease association, **27:11–12**
- celiac disease in, **27:9–15**
- chronic kidney disease in, **22:4**
- clinical stages of, **37:2–3,5,6,7,11**
- current surveillance systems, **2:5**
- data sources and limitations, **2:2–5**
- defined, **2:3–4**
- diabetes-periodontitis interactive effects, **31:17–21**
- etiology of, **1:1**
- IFIH1* gene representation in, **12:6**
- incidence in age <20 years, **2:6–7**
- incidence trends in, **2:9–10**
- initiation of, **11:13; 12:11–12**
- international comparisons for, **2:7**
- onset and progression of, **1:2**
- polio model for, **11:6**
- prevalence and incidence, **1:54–70; 2:10–11**
- public health surveillance/implications, **2:4–5**
- race/ethnicity projections for, **2:10**
- seasonality of onset in children, **2:7–9**
- surveillance for, **2:5,12–13**
- treatment during pregnancy, **5:2–3**
- U.S. adult population, **2:11–12**
- U.S. age <20 years, **2:6–7**
- Type 1 Diabetes Genetics Consortium (T1DGC)**
- affected sibpair families for, **12:6,9**
- childhood diabetes and viral infections, **6:5**
- GWAS meta-analysis, **12:6–7**
- GWAS scans for, **11:3; 12:6–9,12**
- ImmunoChip data, **12:9,11**
- sample characteristics in, **12:12**
- type 1 diabetes risk factors, **12:7–8**
- Type 1 diabetes immune response**
- etanercept effects in, **37:14**
- initiation of, **37:2**
- postprandial hyperglycemia trigger for, **38:8**
- Type 1 diabetes in youth.** See also Diabetes in youth
- cardiac autonomic neuropathy in, **15:27**
- cardiovascular endpoint predictors, **15:34**
- complications, **15:1,13–17**
- coronary artery calcification in, **15:38**
- glycemia and cardiovascular disease in, **15:28**
- incidence, **2:6–7; 15:2,5–6**
- microalbuminuria regression in, **15:23–24**
- mortality in, **15:38–39**
- prevalence, **2:5; 15:4–5**
- prevalence trends in, **1:14**
- projections for, **15:6–8**
- retinopathy in, **15:18**
- Type 1 diabetes incidence.** See also *specific age groups and populations*
- in adults, **2:3,11–12**
- age 15–29 years, **2:11**
- data for, **2:3**
- race/ethnicity projections in youth, **2:10**
- surveillance for, **2:12**
- trends in youth, **2:9–10**
- worldwide incidence/prevalence, **2:6–7**
- in youth, **1:54**
- Type 1 diabetes mortality**
- age of onset, **35:6**
- causes of death, **35:7–8**
- cause-specific in Norway vs. U.S., **35:10**
- complication-specific causes of death, **35:8–10**
- current (post-1980 era) findings, **35:3–4**
- death certificate limitations for determining, **35:7–8**
- dyslipidemia, **35:11**
- early/premature mortality with, **15:38–39; 35:1,9**
- general population comparisons, **35:5**
- glycemic control as risk factor for, **35:10**
- historical (pre-1980 era), **35:2–3**
- hypertension, **35:11**
- insulin resistance, **35:12**
- life expectancy improvement in, **35:5**
- race/ethnicity, **35:7**
- renal failure, **35:11**
- risk factors for, **35:11**
- sex-specific differences in, **35:6–7**
- smoking, **35:11**
- socioeconomic factors, **35:10**
- standardized protocol for classification, **35:8**
- U.S. active duty military personnel, **2:3**
- U.S. compared to other countries, **35:12**
- Type 1 diabetes prevalence.** See also *specific conditions and populations*
- adults, **2:10–12**
- by age, sex, race/ethnicity, **2:5**
- age <20 years, overall, **2:5**
- age 0–4 years, **2:5**
- age 15–19 years, **2:5**
- European ancestry, **12:1**
- HLA allele/haplotype population frequencies, **12:4**
- NHANES 1999–2010 data, **2:2–3**
- SEARCH study identification of, **2:5**
- in youth, **2:2; 15:4–5**
- Type 1 diabetes risk factors.** See also Risk scores from clinical factors
- dietary factors, **11:9–14**
- environment x environment interactions, **11:17**
- gene x environment interactions, **11:15–17**
- genetic factors, **12:1–16**
- genetic prediction of, **12:10**
- genetic study designs for, **12:1–2**
- HLA genotype, **11:3**
- infectious agents, **11:3–8**
- insulin (*INS*) gene in susceptibility, **12:6**
- interactive/additive MHC effects, **12:3–5**
- intestinal microbiota, **11:8**
- major histocompatibility complex, **12:2–5**
- metabolic studies, **11:14**
- MHC loci, **12:2–5**
- non-MHC risk loci, **12:6**
- with pediatric-onset inflammatory bowel disease, **27:15**
- pre- and perinatal factors, **11:15**
- psychosocial/socioeconomic factors, **11:15**
- susceptibility genes, **12:6**
- toxins and chemical compounds, **11:14**
- vaccines, **11:8**
- Type 1a diabetes**
- diagnostic criteria, **1:3**
- in neonates, **7:9**
- Type 1b diabetes**
- characteristics of, **1:3; 6:18**
- diagnostic criteria for, **15:2**
- risk factors for, **6:18**
- single gene defects, **7:8**
- Type 1.5 diabetes.** See Combined types 1 and 2 diabetes
- Type 2 diabetes**
- A1c for screening, **1:26**
- albuminuria association with, **22:6–7,12,15–16**
- albuminuria with, **22:18**
- alcohol consumption effects in, **13:9**
- Asian subgroups, **3:7–8**
- autoantibody positivity with, **1:5; 11:2**
- benefits of early screening, **1:24**
- biases in observational studies for, **29:10**
- biomarkers for, **13:1**
- biomarkers in, **13:6**
- breastfeeding protective effect for, **15:13**
- chronic hypertension with pregestational, **5:33**
- chronic kidney disease in, **22:4**
- chronotype and glycemic control, **25:27–28**
- common intronic rs7903146 polymorphism, **14:2**
- comparison of A1c and OGTT, **1:26**
- contraceptive use in youth, **5:11**
- criteria for screening, **1:22–23**
- data sources and limitations, **3:2–4**
- definition and diagnostic criteria for, **1:4,6; 2:3**
- early-onset types, **15:11**
- effects of pregnancy on retinopathy, **5:27**
- epithelial fragility with type 2 diabetes, **21:37**
- genetic architecture analysis for, **14:2–6**
- glaucoma risk with, **21:37**
- glomerular filtration barrier changes in, **22:9**
- healthcare results of screening, **1:27**
- hypoglycemia incidence in, **17:10**
- onset and progression of, **1:2; 13:16; 15:2**
- periodontal treatment effects on, **31:12–14**
- post-surgical infections, **30:15**
- preconceptional care use with, **5:10**
- pregestational diabetes prevalence during pregnancy, **5:18**

prevalence and incidence of, **3:1–32**  
 prevalence of screening, **1:25**  
 prostate cancer risk with, **29:9**  
 SGSM2 as causal locus, **14:6**  
 sleep disturbances and, **13:15; 25:20–21**  
 spontaneous abortions with, **5:35–36**  
 sRAGE association, **19:11**  
 visual impairment and blindness,  
**21:12,33–34**

**Type 2 diabetes in youth.** See also Diabetes  
 in youth

characteristics of, **15:2**  
 diabetic nephropathy in Pima Indians,  
**15:24**  
 ESRD incidence in Pima Indian studies,  
**22:37**  
 fetal overnutrition effects in, **15:12**  
 kidney disease course in, **22:2**  
 microalbuminuria at diagnosis, **15:24**  
 mortality in, **15:39**  
 prevalence and incidence, **15:8–9**  
 projections, **15:10**  
 risk factors, **15:11–13**  
 screening for, **1:14**

**Type 2 diabetes incidence**

C-reactive protein association with, **13:19**  
 diet and activity effects, **28:19**  
 insulin resistance/sensitivity prediction of,  
**13:17–18**  
 trends in, **15:9–10**  
 in youth, **3:17,18; 15:9**

**Type 2 diabetes mortality, 36:1–14**

cardiovascular disease and, **36:8,10**  
 data sources and limitations, **36:5–7**  
 early/premature mortality with, **15:38–39**  
 epidemiologic surveillance methods,  
**36:3–5**  
 increased risk of cardiovascular disease,  
**36:10–12**  
 life expectancy with, **36:8**  
 methodological challenges in assessment,  
**36:1–3**  
 mortality ascertainment, **36:3**  
 nonvascular disease in, **36:9**  
 vascular disease with, **36:8**

**Type 2 diabetes prevalence.** See also specific  
 populations

Asian subgroups, **3:7**  
 Hispanic ethnicity, **3:7**  
 obstructive sleep apnea association, **25:14**  
 prostate size association with, **28:5**  
 trends in, **3:17**  
 in youth, **3:4,17; 15:8–9**

**Type 2 diabetes risk factors, 13:1–37; 15:12–**

**13.** See also Risk scores from clinical factors  
 adiponectin level relationship, **13:18–19**  
 age and sex demographics, **13:3**  
 atypical antipsychotic medications,  
**33:21,24**  
 biomarkers for, **13:19–21**  
 birth weight, **13:13**  
 depression and antidepressant medica-  
 tions, **13:15**

dietary factors, **13:5**  
 early postnatal exposure, **13:13–14**  
 gene-environment interactions, **13:5**  
 impaired glucose metabolism, **13:16–21**  
 insomnia and short sleep, **25:29**  
 insulin resistance in progression, **13:17**  
 intrauterine exposure, **13:12–13**  
 KCNJ11 mutations/polymorphisms, **7:11**  
 low acute insulin response, **13:17**  
 metabolic syndrome, **13:21–25**  
 migration and acculturation, **13:14**  
 modifiable risk factors for, **13:1**  
 nocturnal melatonin secretion, **25:28–29**  
 nutrition, **13:6–10**  
 obesity, **13:11–12; 15:12**  
 physical inactivity, **13:10–12; 15:12**  
 plasminogen activator inhibitor-1, **13:19**  
 polycystic ovary syndrome, **13:21**  
 posttraumatic stress disorder, **33:16**  
 previous gestational diabetes, **1:28–29;**  
**4:11; 5:7; 13:21**  
 for progression, **13:16–18**  
 proinsulin:insulin ratios, **13:17**  
 reduction with whole grains, **13:10; 29:6**  
 schizophrenia, **33:22**  
 sleep disturbances and, **13:14–15; 25:2,3**  
 smoking and, **13:15–16; 33:22,23**  
 socioeconomic status, **13:13–14**  
 sugar-sweetened beverages, **13:9,14**  
 type 2 diabetes risk, **13:20**  
 in utero exposure to maternal diabetes,  
**15:13**

**Types 1 and 2 diabetes combination, 1:4–5**

**U**

**U.K. National Institute for Health and Care  
 Excellence (NICE)**

A1c for pregestational pregnancy, **5:10**  
 blood glucose recommendations, **5:72**

**UKPDS Risk Engine, 19:11**

**Ulcerative colitis.** See Inflammatory bowel  
 diseases

**Ultralente insulin.** See Insulin

**Undiagnosed diabetes**

with A1c criteria, **36:1**  
 A1c detection of, **3:15**  
 age-specific prevalence, **3:10**  
 blood pressure screening detection of,  
**1:22; 9:17**  
 criteria for diagnosis, **3:19**  
 disability/impairment status, **34:7–8**  
 gallstone disease with, **26:13,15,17**  
 lipid measures in, **9:17–22**  
 lower extremity amputations in, **20:24**  
 methods for diagnosis, **1:15,26; 3:3**  
 NHANES data on blood pressure for  
 screening, **1:22–23**  
 in nonpregnant women of childbearing  
 age, **5:4–5**  
 physical inactivity in, **10:15**  
 prevalence by measurement/criteria,  
**3:15–16**

prevalence by sex, **3:10–12**  
 prevalence of, **3:9; 16:3**  
 prevalence with age, **3:10**  
 prevalence with Hispanic ethnicity, **3:12**  
 race/ethnicity variation in A1c, **3:13**  
 relation to total diabetes, **3:19**  
 sex differences in, **3:10**  
 2-hour plasma glucose levels in, **9:6–7**  
 waist circumference measures in, **9:14**

**United Kingdom National Screening  
 committee recommendations, 1:23**

**United Kingdom Prospective Diabetes  
 Study (UKPDS)**

A1c measures by, **1:7**  
 blood pressure control and mortality,  
**36:10**  
 cardiovascular risk assessment model,  
**19:11**  
 cholesterol levels and heart disease, **18:8**  
 control of systolic hypertension, **19:12**  
 declines in beta cell function before clinical  
 diagnosis, **1:22**  
 glucose control and neuropathy, **23:11**  
 glycemic control benefits, **16:13**  
 heart disease association blood pressure,  
**18:9**  
 insulin-cardiovascular disease association,  
**18:11**  
 intensive glycemic control, **18:13–14**  
 intensive vs. conventional insulin therapy  
 in, **19:13**  
 lower extremity amputation and glycemic  
 control, **20:25**  
 metabolic memory with type 2 diabetes,  
**21:22**  
 micro- and macrovascular complication  
 reduction, **22:46–47**  
 peripheral arterial disease prevalence,  
**20:5–6**  
 progression of kidney disease with type 2  
 diabetes, **22:17**  
 risk estimation model for stroke with type  
 2 diabetes, **19:11**  
 stroke risk with diabetes and metabolic  
 syndrome, **19:10**  
 visual angle change risk factors, **21:7–8**

**United Kingdom (U.K.) studies.** See also  
 England

chronic hypertension rates >10%, **5:33**  
 diabetes registries, **2:5**  
 gestational age at stillbirth, **5:43**  
 hypertension in pregnancy grading, **5:30**  
 invited vs. random screening, **1:23**  
 major malformations with type 2 diabetes,  
**5:62**  
 pregnancy outcomes with diabetes, **5:36**  
 prevalence of pregestational diabetes  
 during pregnancy, **5:16**  
 risk for antenatal stroke, **5:22**  
 risk for venous thromboembolism with  
 pregestational diabetes, **5:23**  
 severe maternal morbidity, **5:25**

stillbirths in types 1 vs. 2 diabetes, **5:43**  
 type 2 diabetes prevention studies, **38:2–5**

**United States Renal Data System (USRDS) registry**, **22:25,27**

**United States (U.S.) population.** See also BRFSS data; NHANES data; NHIS data  
 all-cause mortality with diabetes, **36:1**  
 blood pressure and heart disease association, **18:9**  
 burden of diabetes among youth, **15:4**  
 cardiovascular risk with metabolic syndrome traits, **18:9**  
 cause-specific mortality comparison, **35:10**  
 chronic hypertension rates in pregnancy with preexisting diabetes, **5:33**  
 coronary vascular disease decline in, **18:10**  
 deliveries with pregestational diabetes, **5:16**  
 diabetes burden in youth, **15:8–10**  
 diabetes prediction of cognitive decline, **24:8**  
 diagnosed diabetes prevalence by age, **3:4–5**  
 early mortality with type 1 diabetes, **35:9**  
 heart disease prevalence in diabetic persons, **18:1–30**  
 lower extremity amputation risk in Medicare population, **20:25**  
 maternal mortality, **5:21**  
 NAION incidence in, **21:37**  
 nephropathy prevalence data, **5:29**  
 PDR and NPDR frequency with pregestational diabetes, **5:27**  
 periodontitis prevalence in, **31:4–7**  
 physical activity and type 2 diabetes risk, **13:11**  
 prevalence of type 1 diabetes in youth, **2:2–3,5,6–7**  
 race/ethnicity projections age in youth, **2:9–10**  
 retrospective insurance claims analysis, **5:14–15**  
 risks with chronic hypertension in pregnancy, **5:33**  
 state ranking with total diabetes percentages, **8:9**  
 stroke association with maternal diabetes, **5:22**  
 type 1 diabetes incidence in youth, **2:6–7**  
 type 1 diabetes mortality comparisons, **35:12–13**  
 type 2 diabetes prevalence trends in youth, **3:17**  
 visual impairment with diabetes, **21:2**

**University of North Carolina Health Care System**, **2:4**

**Uremia**, **22:5**

**Urinary albumin.** See Albuminuria

**Urinary incontinence (UI)**  
 prevalence with type 2 diabetes, **28:14**

racial disparities in, **28:14**

**Urinary tract infections (UTIs)**  
 asymptomatic bacteriuria, **22:55–56; 28:20; 30:9**  
 autonomic neuropathy role in, **30:4–5**  
 cystitis and pyelonephritis, **30:9–10**  
 emphysematous pyelonephritis, **30:10**  
 general infections, **30:9**  
 with pregestational diabetes in pregnancy, **5:24**  
 renal and perinephric abscess, **30:10**  
 susceptibility with diabetes, **22:55–56**

**Urine albumin-to-creatinine ratio (UACR).**  
 See ACR (albumin:creatinine ratio)

**Urologic disease, congenital anomalies with maternal diabetes**, **5:60,65**

**Urologic disease in diabetes**, **28:1–26.** See also Sexual dysfunction with diabetes  
 bacteriuria and urinary tract infection in women, **28:20**  
 benign prostatic hyperplasia, **28:4–6**  
 lower urinary tract symptoms in men, **28:2–6**  
 lower urinary tract symptoms in women, **28:10–20**  
 malformations with maternal diabetes exposure, **5:62,65**  
 neuropathy vs. benign prostatic hyperplasia, **28:2**  
 urinary tract infections, **30:9–10**

**U.S. Agency for Healthcare Research and Quality (AHRQ)**, **41:2**

**U.S. Food and Drug Administration (FDA)**  
 adverse event reporting system data, **29:12**  
 oral medications approved by, **39:2**  
 pancreatic islet cell transplants, **39:10**  
 pharmacological preventive interventions and, **38:16**  
 pioglitazone use with bladder cancer, **29:11**  
 protease inhibitor hypoglycemia warning requirement, **6:12**  
 statin safety label changes, **6:12**  
 updated rosiglitazone safety review, **38:13**

**U.S. Health Information Technology for Economic and Clinical Health Act (HITECH Act)**, **2:13**

**U.S. National Longitudinal Survey of Youth**, **15:12**

**U.S. Preventive Services Task Force (USPSTF)**  
 diabetes screening recommendations, **1:22–23**  
 gestational diabetes screening and treatment recommendations, **4:2–3**  
 glycemia and risk for heart disease, **18:2**  
 hyperbilirubinemia screening, **5:71**

**U.S. regional characteristics**  
 regional variations in quality of care, **41:12**  
 seasonality of type 1 diabetes, **2:7**  
 “stroke belt” region, **19:7**  
 “stroke buckle” region, **19:7**

**U.S. Virgin Islands.** See also Black/African American  
 mortality by race, **35:7**  
 non-Hispanic blacks type 1 incidence, **2:7**

**Utah**  
 gestational hypertension/pregestational diabetes, **5:34**  
 periodontitis prevalence, **31:4,6**  
 type 2 diabetes before second pregnancy, **5:10**

## V

**Vagal neuropathy**, **27:4,7**

**Vaginal delivery**  
 after cesarean delivery, **5:46**  
 birth trauma with, **5:59**  
 instrumental/assisted, **5:46**  
 maternal complications with diabetes, **5:25**  
 shoulder dystocia and trauma with, **5:56–59**

**Valproic acid (Depakote)**, **33:22**

**Vardenafil**, **28:10**

**Vascular cognitive impairment (VCI)**  
 presentation and course, **24:2**  
 relation to diabetes, **24:8**  
 risk factors for, **24:3**

**Vascular disease.** See Macrovascular complications; Microvascular complications

**Vascular endothelial growth factor (VEGF)**  
 in diabetic nephropathy, **22:31**  
 in POEMS syndrome, **6:16**  
 retinopathy association, **21:29**

**Venous beading**, **21:12**

**Venous plasma glucose in gestational diabetes screening**, **4:4**

**Venous reduplication**, **21:12**

**Venous thromboembolism (VTE)**  
 pregestational diabetes and, **5:23–24**  
 prevalence of, **5:23**  
 pulmonary embolism trends in pregnancy-related hospitalizations, **5:23**

**Very low-density lipoprotein (VLDL)**, **22:32,34**

**Veterans Administration Diabetes Trial (VADT)**  
 A1c levels and cardiovascular disease risk, **1:24**  
 cardiovascular disease prevention, **16:13**  
 in geriatric population, **16:13–14**  
 intensive vs. conventional insulin therapy in, **19:13**  
 seasonal variations in A1c, **1:12**  
 standards for diabetes screening, **1:20**

**Veterans Affairs High-density lipoprotein Intervention Trial (VA-HIT)**, **22:52**

**Veterans Affairs Nephropathy in Diabetes (VA NEPHRON-D)**, **22:49**

**Vibratrip**, **23:5**

**Vibrio vulnificus**, **30:14**

**Vietnamese population.** See also Asian/Pacific Islander

- type 2 diabetes in Asian subgroups, **3:8**
- Viral etiology of type 1 diabetes (VIGR), 11:5**
- Viral hepatitis.** See Hepatitis
- Viral infections.** See also Hepatitis
- autoimmune trigger for, **11:4**
  - congenital, **6:4–5**
  - Coxsackie virus, **11:4**
  - cytomegalovirus, **6:4–5; 11:8**
  - enterovirus, **11:4–6**
  - HIV, **22:56**
  - IFIH1* gene function, **12:6**
  - immunizations, **15:10**
  - Kilham rat virus, **11:8**
  - measles, mumps, and rubella (MMR) vaccine, **11:9**
  - parvovirus, **11:8**
  - picornaviruses, **12:6**
  - postnatal, **6:5**
  - rotavirus, **11:8**
  - rubella virus, **11:8,15**
  - seasonal variations in diagnosis, **11:3**
  - viral-mediated mechanisms for diabetes, **6:5**
- Visceral fat.** See also Abdominal obesity
- accumulation with glucocorticoids, **25:11**
  - gastroesophageal reflux with, **27:8**
- Vision-threatening retinopathy, 21:12**
- Visual impairment, 21:1–49.** See also Cataracts; Retinopathy
- age and duration of diabetes, **21:8–9**
  - age-related macular degeneration, **21:38**
  - age-related macular edema, **21:38**
  - changes in prevalence with type 2 diabetes, **21:3–4**
  - contact lens use with diabetes, **21:37**
  - corneal lesions and dry eye, **21:37**
  - cost in persons with diabetes, **21:11**
  - cranial nerve dysfunction, **21:39**
  - criteria for impairment classification, **21:2**
  - diabetic papillopathy, **21:39**
  - glycemic control and systemic risk factors, **21:7–8**
  - impairment and blindness, **21:2–12**
  - incidence of, **21:4–7**
  - incidence of blindness, **21:5**
  - legal blindness criteria, **21:2**
  - lens opacities, **21:33–34**
  - macular edema, **21:16**
  - nonarteritic anterior ischemic optic neuropathy, **21:37–38**
  - ocular findings associated with diabetes, **21:39**
  - open-angle glaucoma, **21:36–37**
  - prevalence by age and diabetes duration, **21:3–4**
  - prevalence of diabetes-related, **21:2–3**
  - prevalence with type 1 diabetes, **21:1**
  - quality of life with, **21:9–10**
  - retinal arteriolar emboli, **21:38**
  - retinal vein occlusion, **21:38**
  - retinopathy, **21:2**
  - review of data sources, **21:2–3**
  - self-reported diabetes and, **21:3**
  - sex differences, **21:9**
  - sociodemographic/economic relationships to, **21:11**
  - visual acuity after cataract surgery, **21:35–36**
  - visual acuity definition, **21:1**
  - visual acuity prediction of death, **21:11–12**
  - visual angle change risk factors, **21:1,7–8**
  - visual loss/blindness risk factors, **21:7–9**
- Vitamin B6**
- levels with peripheral arterial disease, **20:8**
  - malabsorption of, **27:10**
  - prevention trials, **37:5**
- Vitamin B12 deficiency**
- with autoimmune gastritis, **27:15**
  - effects on A1c measurement, **1:12**
  - peripheral neuropathy from, **27:10**
- Vitamin C**
- insulin sensitivity effects of, **25:20**
  - intake, **10:10**
  - lower extremity osteoarthritis risks, **32:12**
- Vitamin D**
- adult-onset type 1 diabetes, **11:12**
  - deficiency and tuberculosis infection, **30:18**
  - diabetes and periodontitis risk factors, **31:23**
  - dietary intake of, **10:10**
  - genes associated with metabolism of, **11:12**
  - in geriatric population, **16:15**
  - HLA interaction, **11:16**
  - with lower extremity osteoarthritis, **32:12**
  - prevention of type 1 diabetes, **37:5**
  - in prevention trials, **37:3**
  - resistance in congenital generalized lipodystrophy, **7:25**
  - role in glucose metabolism, **13:7**
  - sarcopenia and deficiency of, **34:11**
  - supplementation as prevention, **11:11–12**
  - type 2 diabetes incidence and levels of, **13:7**
- Vitamin E**
- effects in cardiovascular autonomic neuropathy, **23:9**
  - insulin sensitivity effects of, **25:20**
  - intake, **10:10**
  - lower extremity osteoarthritis risks, **32:12**
  - malabsorption of, **27:10**
  - protection against diabetes, **11:13**
- Vitamin K, with celiac disease, 27:10**
- VLDL (very low-density lipoprotein), 22:32,34**
- Voglibose study, 38:9**
- Von Willebrand factor**
- with peripheral arterial disease, **20:8**
  - type 2 diabetes risk, **13:20**
- W**
- Waist circumference**
- with abdominal obesity, **13:12**
  - abdominal obesity assessment, **13:1**
  - with BMI for stratification, **13:12**
  - cardiovascular disease association with, **18:11**
  - by diabetes status, treatment, age, **9:11–13**
  - with diagnosed or undiagnosed diabetes, **9:14**
  - measurement of, **9:2**
  - NHANES abdominal criteria, **9:14**
  - risk factors for type 2 diabetes, **13:11**
- Waist-to-hip ratio.** See also BMI (body mass index); Waist circumference
- cardiovascular disease risk, **18:10–11**
  - metabolic syndrome characteristics, **18:9**
  - myocardial infarction risk association, **18:10,11**
  - reproducibility of adiposity measures, **18:11**
  - with type 2 diabetes, **13:11**
  - type 2 diabetes risk factors, **15:12**
- Wake time after sleep onset (WASO), 25:6**
- Washington, D.C., periodontitis prevalence, 31:4**
- Washington state**
- chronic kidney disease risk, **22:42**
  - dementia and diabetes, **24:8**
  - diagnosed diabetes prevalence, **3:4**
  - major malformations with type 1 diabetes, **5:60**
  - pyelonephritis with diabetes, **30:10**
  - U.S. centers for SEARCH, **2:2; 15:4**
- Wechsler Adult Intelligence Scale, 24:8**
- Weight gain**
- breast cancer chemotherapy, **29:13**
  - with mood stabilizers, **33:22**
  - pioglitazone effects, **38:10**
  - smoking cessation and, **18:12; 33:23**
  - stillbirth risks, **5:43**
  - type 1 diabetes in youth and accelerated, **15:11**
- Weight loss**
- adiponectin gene association with, **38:11**
  - in adults, **18:3**
  - and cancer association, **29:6**
  - cardiovascular autonomic neuropathy effects, **23:8,13**
  - for care of persons with diabetes, **41:13**
  - in celiac disease, **27:12**
  - cognitive effects with, **24:12**
  - distal symmetrical polyneuropathy with, **23:11**
  - in DPP study, **18:18**
  - eating disorders and, **33:19–21**
  - with erectile dysfunction, **28:10**
  - in estimating stillbirth risk, **5:43**
  - evening preference and, **25:27**
  - functional status improvement with, **34:12**
  - gallstone disease risks and, **26:13**
  - with gestational diabetes, **5:7**
  - in high-risk individuals, **1:19,22**
  - insulin sensitivity effects of, **38:10**
  - intensive lifestyle intervention and, **34:12**

- lifestyle modification and, **38:5–6,8–11,13–15,16**  
 with major depressive disorders, **33:2**  
 and mortality in geriatric patients, **16:10**  
 phentermine-topiramate combination, **38:10**  
 postpartum, after gestational diabetes, **5:73**  
 for schizophrenia treatments, **33:22**  
 with serious mental illness, **41:12**  
 small fiber neuropathies with, **23:3**  
 for stroke prevention, **19:11**  
 with type 1 diabetes, **1:3,16; 15:2**  
 type 2 diabetes prevention and, **38:1–2**  
 urinary incontinence prevention, **28:19**  
 vertebral fracture association, **32:1**
- Wellcome Trust Case-Control Consortium (WTCCC), 12:6–7**
- WESDR cohort**  
 A1c levels and neuropathy risk reduction, **23:11**  
 age at diagnosis of diabetes, **21:23**  
 alcohol consumption, **21:27**  
 all-cause mortality association of visual impairment, **21:11–12**  
 blood pressure and retinopathy, **21:23–24**  
 body mass index, **21:25–26**  
 cataract extraction prevalence and age, **21:35**  
 cataracts with type 2 diabetes, **21:33**  
 comorbidity and mortality, **21:30**  
 decreased tactile and temperature sensitivity in type 1 diabetes, **23:9**  
 duration of diabetes and, **21:3–4,19–20,26**  
 glaucoma incidence in types 1 and 2 diabetes, **21:37**  
 glycemic control, **21:20–23**  
 glycemic control and systemic risk factors, **21:7–8,9**  
 glycemic control as risk factor, **35:10**  
 hormonal/reproductive exposure in women, **21:26–27**  
 hypertension and visual impairment, **21:8–9**  
 incidence of proliferative retinopathy, **21:22**  
 incidence of retinopathy, **21:16–18**  
 lipid control effects, **21:25**  
 prevalence of blindness, **21:11**  
 progression of retinopathy, **21:18**  
 proteinuria and nephropathy, **21:25**  
 puberty, **21:23**  
 quality of life with visual impairment, **21:9**  
 race/ethnicity, **21:27–29**  
 renal complications, **15:20**  
 retinopathy prevalence, **21:12–16**  
 risk factors for vision loss/legal blindness, **21:7–9**  
 risk of retinopathy at age  $\leq 30$  years, **15:17–18**  
 smoking, **21:27**
- sociodemographic/economic relationships to impaired vision, **21:11**  
 socioeconomic status, **21:29–30**  
 type 1 diabetes mortality, **35:4**  
 visual acuity as predictor of death, **21:11–12**  
 visual acuity decrease with duration of type 1 diabetes, **21:4–5**  
 visual angle changes, **21:7**  
 visual impairment by sex, **21:9**  
 visual impairment incidence with type 1 diabetes, **21:5**
- West Virginia**  
 age-adjusted total preexisting diabetes during pregnancy, **5:13–14**  
 pregestational diabetes prevalence, **5:5**
- Western Pacific island of Nauru, albuminuria prevalence in, 22:14**
- White matter hyperintensities (WMH)**  
 correlates of cognitive impairment, **24:4**  
 in mild cognitive impairment, **24:2**  
 subclinical brain injury, **19:2–3**
- White/Caucasian.** *See also* Race/ethnicity  
 ESRD incidence rate in, **22:27–30**  
 estimated chronic kidney disease prevalence by type of diabetes, **22:12**  
 haplotype association in type 1 diabetes, **12:3**  
 knee osteoarthritis prevalence in, **32:16**  
 prevalence of peripheral arterial disease, **20:4**  
 prevalence of persistent albuminuria, **22:12**  
 trend in prevalence of hyperinsulinemia, **13:18**  
 type 1 diabetes in, **1:4**  
 type 1 diabetes risk in siblings, **12:1,3**
- Whitehall study, 38:2**
- Williams syndrome, 6:17**
- Wisconsin.** *See also specific regional studies*  
 A1c and mortality, **35:4,5**  
 albuminuria with insulin treatment, **22:12**  
 diabetes duration and proteinuria incidence, **22:16,30**  
 distal symmetrical polyneuropathy symptoms, **23:9**  
 fatty liver disease and type 2 diabetes mortality, **26:6**  
 retinopathy with type 1 diabetes, **15:17–18**  
 temporal trends in type 1 diabetes incidence, **2:9**  
 visual impairment and diabetes duration, **21:3–4**
- Wisconsin Diabetes Registry Study (WDRS)**  
 diabetic retinopathy, **15:18**  
 retinopathy prevalence in, **21:12**
- Wisconsin Epidemiologic Study of Diabetic Retinopathy (WESDR).** *See* WESDR cohort
- Wisconsin Sleep Cohort Study**  
 leptin/ghrelin levels with sleep, **25:11**  
 obstructive sleep apnea and fasting hyperglycemia, **25:14**
- prevalence of obstructive sleep apnea, **25:12**
- Wolcott-Rallison syndrome, 7:11**
- Wolfram Syndrome, 7:8**
- Women's Health and Aging Study (WHAS), 34:11**
- Women's Health Initiative Observational Study (WHI-OS)**  
 dietary fat and insulin sensitivity, **13:6**  
 incident fracture data, **32:2–3,6**  
 markers for type 2 diabetes incidence, **13:19–20**  
 risk for type 2 diabetes, **13:18**  
 type 2 diabetes and vitamin D association, **13:7**  
 type 2 diabetes risk factors, **13:18**
- Women's Healthy Eating and Living (WHEL) Study, 29:13**
- Working Group on Outcome Definitions, 5:3**
- World Health Organization (WHO)**  
 A1c diagnostic criteria for, **1:2**  
 A1c endorsement of, **1:13**  
 adiposity measurement recommendations, **18:10**  
 DIAMOND project, **2:5**  
 disability definition and measurement, **34:2**  
 estimates of type 1 diabetes incidence, **2:5**  
 fasting plasma glucose criteria for diagnosis of diabetes, **1:6**  
 gestational diabetes criteria, **4:10**  
 gestational diabetes recommendations, **4:2**  
 glucose cutpoints acceptance by, **1:13**  
 maternal death definition, **5:21**  
 metabolic syndrome criteria, **18:9**  
 mortality in childhood-onset type 1 diabetes, **35:12**  
 osteoporosis definition, **32:2**  
 screening recommendation review, **1:23**
- World regional characteristics.** *See specific countries and populations*
- 
- X**
- 
- Xerostomia, 31:38**
- 
- Y**
- 
- YMCA of the USA Diabetes Prevention Program (Y-USA DPP), 38:15**
- Youth.** *See* Children and adolescents; Diabetes in youth
- Youth-onset diabetes.** *See* Children and adolescents; Diabetes in youth
- 
- Z**
- 
- ZAC (zinc finger) gene**  
 apoptosis regulation, **9:16**  
 transient neonatal diabetes, **7:10**

**Zensharen study of lifestyle intervention,**  
**38:10****Zinc**

dietary intake of, **13:5**  
levels in type 1 diabetes, **11:13**

**Zinc transporter 8 (ZnT8)**

autoantibodies in screening for type 1  
diabetes, **1:27,28**  
autoantibodies in type 1 diabetes in youth,  
**15:2**  
beta cell destruction, **15:2**  
glucose metabolism effects of, **13:5**  
identification of type 1 diabetes, **37:2**  
in islet autoimmunity, **11:2**  
in newly diagnosed type 1 diabetes, **11:13**  
in seroconversion, **11:2**  
types 1 and 2 diabetes differentiation, **1:3**  
variant, **13:5**

**ZMPSTE24 (zinc metalloproteinase) gene,**  
**7:17**