DEPARTMENT OF HEALTH AND HUMAN SERVICES
NATIONAL INSTITUTES OF HEALTH

216th Meeting of the
NATIONAL DIABETES AND DIGESTIVE AND KIDNEY DISEASES ADVISORY COUNCIL

DIVISION OF DIGESTIVE DISEASES AND NUTRITION SUBCOMMITTEE
Meeting Summary

Thursday, May 13, 2021
Zoom Video Conference

Open Session

1) Dr. Stephen James opened the meeting by welcoming everyone.

2) The minutes of the January 28, 2021 subcommittee meeting were approved.

3) Dr. David Saslowsky reviewed three DDDN Funding Opportunity Announcements and Notices.
Question: Re: Dissemination and Implementation Research in Health (R01 Clinical Trial Optional), will the reviewers on the study section have expertise in the fields being reviewed?
Answer: Yes; there is a new standing study section with expertise related to the topics being discussed. The Center for Scientific Review (CSR) follows standard guidelines for reviewing applications and assigns each application to the reviewers whose expertise is most closely aligned with the science described in the application. While this is the current standard, there is still room for improvement with getting more expertise to review the wide variety of study applications.

4) Four DDDN Initiative Concept Clearances were presented during the Open Session of the Full Council on Wednesday, May 12, 2021 and further discussed during the DDDN subcommittee (more details on the clearances can be found in the appendix):
   a) Drug Induced Livery Injury Network (DILIN)
   Question: There seems to be an increasing incidence of dietary supplements causing liver toxicity and the drugs/herbs are probably not well characterized. Is there any attempt to categorize what is in the drugs/herbs sold as dietary supplements?
   Answer: Yes, in the last five years, DILIN in collaboration with the FDA have conducted analyses on the ingredients of the dietary supplements collected by the DILIN. DDDN is also partnering with NCCATS to help with the analyses as DILIN has collected a massive amount of data.
   Question: What is the official relationship between LiverTox and DILIN?
   Answer: LiverTox, which was developed by Jay Hoofnagle, arose out of the DILIN experience of realizing that knowledge of DILI was fragmentary and the literature was spread across many specialties, nations and languages. LiverTox attempts to include all agents implicated in cases enrolled in DILIN and new agents pop up regularly.
   b) Lymphatics in Health and Disease in the Digestive System
   c) Expansion of the Childhood Liver Disease Research Network (ChiLDReN) to add a Genomics Bioinformatics Center
   Question: Will consideration be paid to race or other kinds of disparities to ensure that whatever algorithms are developed will be generalizable and appropriate for all groups?

Answer: Yes, we did an analysis about a year ago exploring the racial makeup of the network and it was fairly balanced. We will ask the expertise of the bioinformatics center for guidance on how to integrate the data captured.
Question: Is the sequencing data of the network tied to a biobank where the genetic data can be integrated in the future?
Answer: Yes, the genomics data will be linked to the NIDDK biobank.

d) Improving Medication Adherence in Children who had a Liver Transplant (iMALT) 1-year extension

5) Dr. Saslowsky reminded everyone that the Digestive Diseases Interagency Coordinating Committee (DDICC) facilitates cooperation, information exchange, and collaboration across interested NIH Institutes and partnering Federal agencies to provide a structure for coordinated efforts to combat digestive diseases. Dana Andersen provided an overview of the discussion from the first DDICC coordinating meeting which was held on April 21, 2021. The outcomes of this meeting are to explore possible areas of further research; this may include workshops and other interactions with institutes who have expressed interest.
Question: There are a lot of agencies and medical societies represented, will any patient representatives be included to have their viewpoint and voice included in these talks?
Answer: This is very good point for consideration in planning workshops and other types of meetings, but the DDICC is narrowly focused on interaction with other agencies and departments of the government. While patient presentations may not be a standard agenda item, we will consider their inclusion moving forward, based on the topic of the meeting.
Comment: Council members suggest including liver and biliary cancer, tests on microbiota, metabolomics and obesity as topics for future meetings.

6) Planned Workshops (more details can be found in the appendix):
   a) **Pancreatic Pain: Knowledge Gaps and Research Opportunities in Children and Adults** **https://www.niddk.nih.gov/news/meetings-workshops/2021/pancreatic-pain-knowledge-gaps-research-opportunities-children-adults** will be held virtually on July 21, 2021. The purpose of this workshop is to explore recent developments in understanding the origin and mechanisms of pain in pancreatic disease, the relationship of visceral neural pathways and central pain centers, the role of behavioral factors and disorders on the perception of pain, and differences in pain perception and processes in children compared to adults.

7) Completed Workshops (more details can be found in the appendix):
   a) **Accelerating Progress in Celiac Disease (CD)** was held virtually on March 18-19, 2021. The objectives of the workshop were to:
      - Evaluate current understanding of CD pathogenesis, with special consideration of mechanisms.
      - Identify barriers hindering progress, emerging areas and gaps in knowledge, and novel diagnostics and therapeutics for patients with CD.
      - Facilitate crosstalk among NIDDK and NIAID program staff to enhance partnerships opportunities for supporting CD research.

      NIDDK is collaborating with NIAID to get the results of the workshop published. The workshop was not recorded or made available to the public.

   b) **Understanding of Risk and Causal Mechanisms for Developing Obesity in Infants and Young Children** **https://www.niddk.nih.gov/news/meetings-workshops/2021/think-tank-meeting** was held virtually on April 29-30 2021. The overall goal of the workshop was to identify gaps, opportunities, and approaches for future research to better characterize early-life

risk factors and determine underlying causal mechanisms through which these factors contribute to the development of obesity during early childhood.

c) **NIDDK K Awardees' Workshop** **https://www.niddk.nih.gov/news/meetings-workshops/2021/k-awardees-workshop** was held virtually on April 22-23, 2021. The purpose of the workshop was to offer NIDDK career development awardees an in-depth view of the NIH, NIDDK and the grant review process. The workshop provided an opportunity to become familiar with the roles of various staff, the types of grant support and resources available, and the inner workings of the peer review system.

Closed Session

Council members reviewed competing applications; two applicants with >$1M in NIH funding (direct costs) and three budget restorations. There were no appeals, foreign applications or skipped applications to review. In all discussions, Council members concurred with NIDDK/DDDN.

Comments and critiques regarding discussion topics and initiatives from council members are welcome and should be emailed to Drs. James and Saslowsky in advance of the meeting.

-Appendix-

Concept Clearances

Continuation of the Drug Induced Liver Injury Network (DILIN)

DDN Subcommittee Meeting

May 13, 2021

Program Contacts: Jose Serrano, Averell Sherker and Jay Hoofnagle

The Need/Background

- DILI is the most common cause of acute liver failure in the US and the major reason for the FDA not to approve or to withdraw drugs from the US market, limiting therapeutic alternatives for patients.

- Furthermore, as shown by the Drug Induced Liver Injury Network (DILIN), Herbal and Dietary Supplements (HDS) are the second most common cause of DILI in the US, a finding which will likely continue to increase as US consumption of HDS is increasing.

- A better understanding of the clinical manifestation, risk factors (genetic and environmental) and pathogenesis of DILI can improve the safety of drugs and to advance personalized medicine and innovative approaches to prevention, control and treatment of DILI.

Outcomes of Previous Cycles

- Over the last 18, years DILIN has become the reference standard for information on drug induced liver injury (DILI) for clinicians, liver experts and the public at large (LiverTox).
- The DILIN have studied over 2200 patients with severe liver injury secondary to prescription drugs and over-the-counter HDS, resulting in more than 75 publication describing new information of the epidemiology, clinical manifestations, outcomes, genetics and immune pathogenesis of idiosyncratic DILI. ***For most drugs, the DILIN experience has provided the largest case series in the literature***.
- The DILIN has documented the severity (13% death/Liver Tx) and potential chronicity (19%) of liver injury from drugs and shown that an increasing proportion of cases are due to HDS products (> 20%).

The Opportunity and Plans

Pending input from an External Expert Panel, the Network's future approach, while continuing with a strong enrollment of DILI cases due to drugs and HDS, could focus in three areas:

1. Clinical, biochemical, histologic and biologic characterization of DILI: Acute and chronic disease; HDS-induced, ethnic and racial differences, HLA and genetic studies, cytokines and immunological profiling.

2. Pharmacovigilance of HDS and newly approved prescription medications and a public source for accurate information on DILI.

3. The network will also provide the critical knowledge and manpower to pursue pilot innovative, pragmatic approaches to the prevention or treatment of severe and symptomatic acute and chronic DILI injury.

Lymphatics in Health and Disease in the Digestive System

DDN Subcommittee

Meeting May 13, 2021

Program Contact: Patricia Greenwel

Background/Need

- Lymphatics vessels play active roles in maintaining fluid homeostasis, trafficking and activation of immune cells, absorption of nutrients and transport of hormones.

- Lymphatic vessels are dynamic, showing changes under conditions of inflammation, tissue remodeling and fibrosis.

- Very little is known on mechanisms governing interactions of lymphatics with the different organs/cells of the digestive system during physiological and pathological conditions.

Opportunity

- During the last few years there have been significant advances in the understanding of the genetic and molecular mechanisms by which lymphatic vessels are specified, grow, and function.

- However, progress in understanding the role of GI lymphatics in health and disease is lagging.

Approach

- To reissue an FOA soliciting applications focused at studying the role of lymphatics in the digestive system in health and disease states.

- The initiative will be aimed at stimulating and enhancing partnerships between investigators with a strong background in lymphatics biology and researchers conducting comprehensive research on digestive and/or liver diseases.

- Areas of particular interest will include study of the interactions between organ cells and lymphatics and their role in organ function/dysfunction, and mechanisms by which alterations of lymphatic vessel function affect organ function during health and disease in the digestive systems.

Expansion of ChiLDReN to Add a Genomics Bioinformatics Center

DDN Subcommittee Meeting

May 13, 2021

Program Contact: Ed Doo

ChiLDReN Network

- Renewed under RFA-DK-13-011 and henceforth, charged with developing translational studies
  - Unfunded mandate
  - Genomics Working Group
    - Supported via a series of intermittent supplements
    - Charged with strategically planning Network genomics projects
  - Within the ChiLDReN Network, a total of 6401 samples remain to be sequenced across all cholestatic liver diseases (including biliary atresia)*
  - Opportunity: the largest BA genomics analysis of highly phenotyped BA patients

*** As of February 2021**

ChiLDReN: Genomics Working Group

- Tight junction protein 2 gene (TJP2) mutations disrupt tight-junction structure, leading to severe cholestatic liver disease (Nat Genet. 2014 Apr;46(4):326-8.)
- Thrombospondin 2 expression perturbs JAG1-NOTCH2 signaling in Alagille patients lead to a more severe liver phenotype. (Cell Mol Gastroenterol Hepatol. 2016 May 26;2(5):663-675.e2.)
- Polycystic Kidney Disease 1 Like 1 Gene (PKD1L1) variants to be associated with clinical biliary atresia with splenic malformations. (Hepatology. 2019 Sep;70(3):899-910)

Administrative Process

- Establishment of a Bioinformatics Center dedicated to the analysis of the genomics data
  - expertise in the strategic analysis of large sequence data sets
  - programming of analysis algorithms
  - strategizing, operationalizing, and managing integrated multi-omics data sets
  - cooperatively interacting with the ChiLDReN investigators

One Year Extension of iMALT

DDN Subcommittee Meeting
May 13, 2021
Program Contact: Ed Doo

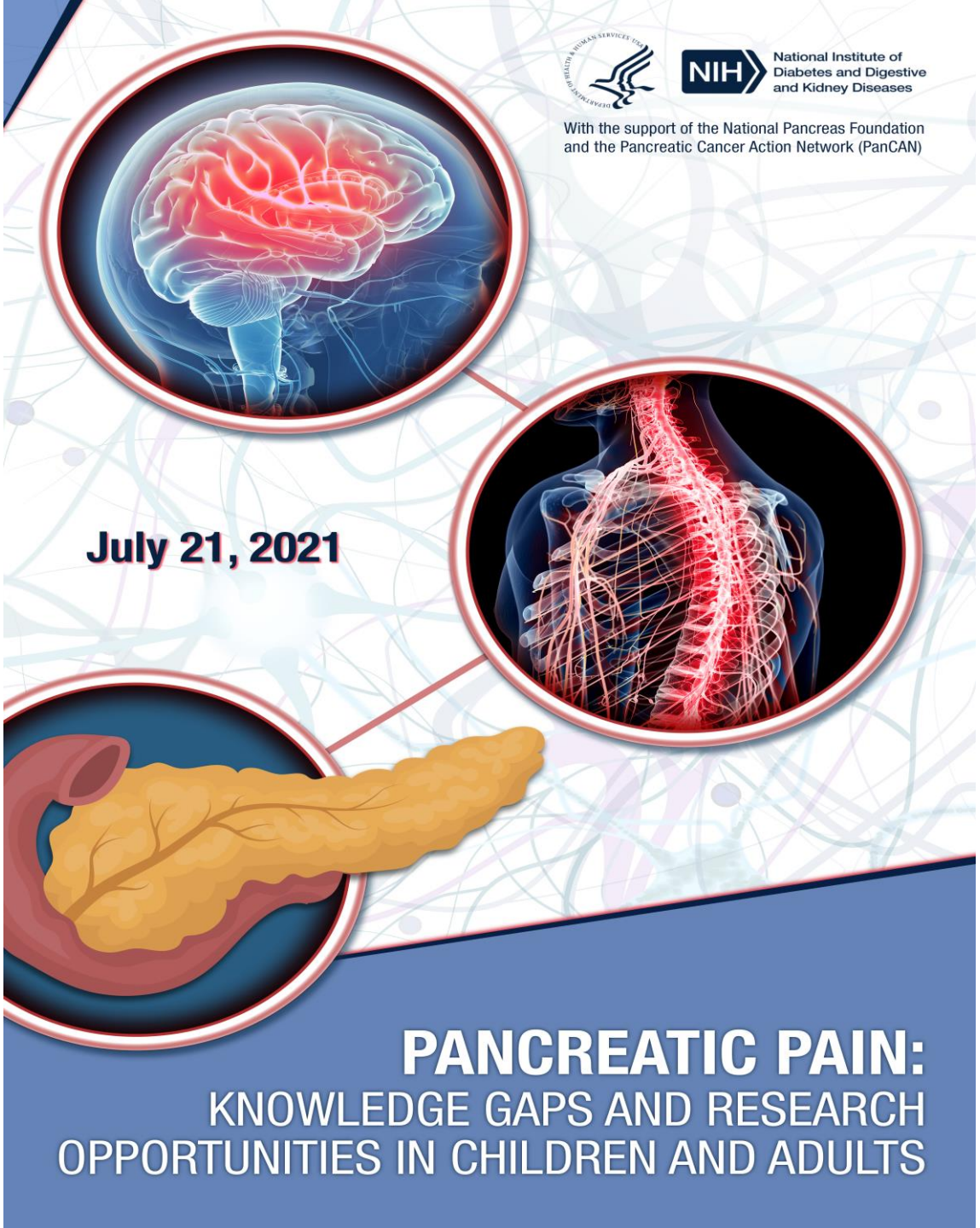
iMALT

- **iMALT:** improving Medication Adherence in Adolescents who had a Liver Transplant
- RCT focused on high-risk adolescent liver transplant recipients, investigating the efficacy of a remote (telehealth) intervention in reducing the number of patients with biopsy-confirmed rejection
- R01 DK 80704 in 2009: Medication Level Variability Index (MLVI)
- U34 DK 112661-01 in 2016: validation of MLVI
- U01 DK 119200 in 2018: iMALT

Administrative Process

- One year extension to the iMALT study
- Allows for completion of patient follow up
- Data analysis
- Data repositing to the DK Repository

Planned Workshops



Dana Andersen, M.D.

Pancreatic Pain: Knowledge Gaps and Research Opportunities in Children and Adults

- **Rationale:** Pain is the most common symptom and the most poorly understood manifestation of benign and malignant pancreatic disease.
- **Purpose:** To explore recent advances in neurobiology, genetic and circulating biomarkers of pain, emerging methods to identify mechanisms and inform treatment strategies, and therapeutic approaches including non-narcotic drugs and cognitive behavioral therapy
- **Format:** The workshop will be open to the public and will be held virtually on July 21, 2021 immediately preceding the virtual annual PancreasFest meeting

Pancreatic Pain: Knowledge Gaps and Research Opportunities in Children and Adults

- **Agenda**
  - Overview Lecture: The clinical problem of pancreatic pain
  - The Physiology of Pancreatic Pain
    - Recent discoveries on the pathophysiology of pancreatic pain
    - Central Pain Processes: CNS Pathways and CNS Imaging of Pain
  - Biomarkers, Mediators, and Pharmacology of Pain
    - Genetic Biomarkers, Pain in Children, Depression and Anxiety as Mediators of Pain, Placebo Effects in Studying and Treating Pain
  - Pain Assessment
    - Systems and Tools, Central Sensitization of Pain, and Quantitative Sensory Testing
  - Pain Treatment
    - Neurolysis, Nerve Stimulation, Ketamine and other experimental non-opioid drugs, Cognitive Behavioral Therapy, Endocannabinoid Signaling and Cannabinoid Treatments

Pancreatic Pain Workshop Faculty

- Aliye Uc MD Co-chair Univ of Iowa
- Dhiraj Yadav MD MPH Co-chair Univ of Pittsburgh
- Vania Apkarian PhD Northwestern Univ
- Melena Bellin MD Univ of Minnesota
- Luana Calloca MD PhD Univ of Maryland
- Asbjørn Drewes MD PhD Univ of Aalborg, Denmark
- Ellen Dunbar MS Univ of Pittsburgh
- Christopher Forsmark MD Univ of Florida
- Marc Goodman PhD Cedars Sinai and UCLA
- Leo Kapural PhD Wake Forest Univ
- George Koob PhD NIAAA, NIH
- Tonya Palermo PhD Univ of Washington
- Stephen Pandol MD Cedars Sinai and UCLA
- Jay Pasricha MD Johns Hopkins Univ
- Anna Phillips MD Univ of Pittsburgh
- Danielle Piomelli MD PhD Univ of California Irvine
- Jami Saloman PhD Univ of Pittsburgh
- Sarah Jane Schwarzenberg MD Univ of Minnesota
- Vikesh Singh MD MPH Johns Hopkins Univ
- Gwendolyn Sowa MD PhD Univ of Pittsburgh
- Thomas Strouse MD UCLA
- Glenn Treisman MD PhD Johns Hopkins Univ
- John Windsor MD Univ of Auckland, New Zealand

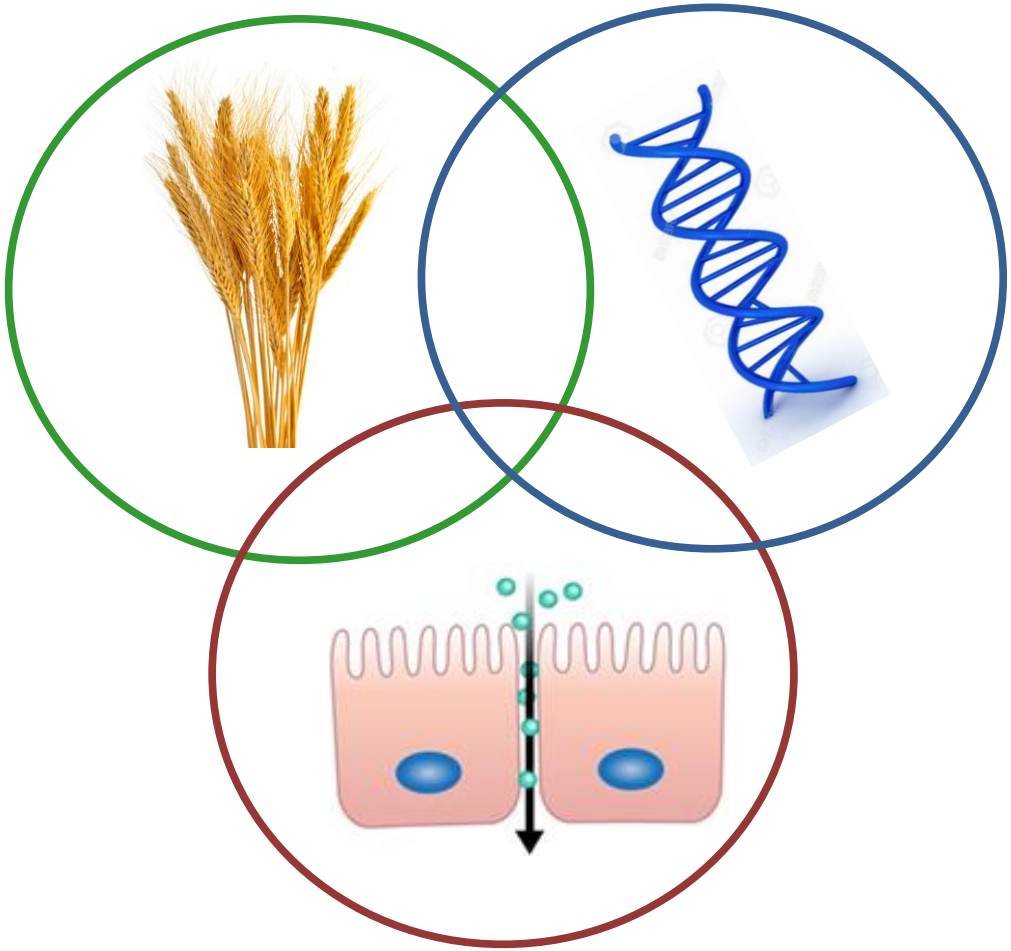
Pancreatic Pain: Knowledge Gaps and Research Opportunities in Children and Adults

- **Patient and Patient Advocate Involvement**
  - Patient attendance will be promoted via the NIDDK Upcoming Meetings website, and by announcements by the APA, NPF, and PanCAN
  - Patient comments, questions, and priorities will be recognized
- **Workshop Products**
  - A conference summary manuscript will be published
  - Knowledge gaps and research priorities will be identified for possible further funding opportunity development

Completed Workshops

n.b. two of these workshops will have occurred by May Council (May 13, 2021)

Accelerating Celiac Disease Research



Virtual Meeting
March 18-19, 2021

Organizing Committee
Joseph Murray (Mayo Clinic)
Alessio Fasano (MGH)
Andrei Ivanov (Cleveland Clinic)

Annette Rothermel (NIAID)
Terez-Shea Donohue (NIDDK)
Patricia Greenwel (NIDDK)

National Institute of Diabetes and Digestive and Kidney Diseases

Objectives

- To evaluate the current understanding of celiac disease pathogenesis, with special consideration of mechanisms.

- To provide an opportunity to engage scientists at all academic levels working in research relevant to celiac disease.
  - Special consideration of early state investigators
  - Identify impediments to new investigators interested in this research space

- To identify barriers hindering progress, emerging areas and gaps in knowledge, and novel diagnostics and therapeutics for patients with celiac disease.

Agenda

Session 1: Celiac Disease Overview

- Celiac Disease: The Spectrum of Disease and its Outcomes - Benjamin Lebwohl (Columbia, NYC)
- Patient Advocate - Marilyn Geller (Celiac Disease Foundation)
- How Does Celiac Disease Fit into the Spectrum of Autoimmune Diseases - Mark Anderson (UCSF)
- The Genetics of Celiac Disease: From GWAS to Single Cell RNAseq to Celiac Disease-On Chip - Iris Jonkers (University of Groningen, NL)

Session 2: Modeling Celiac Disease

- Modeling to Detect the Triggers of Celiac Disease - Bana Jabri (University of Chicago).
- Organoids as a Model for Celiac Disease - Calvin Kuo (Stanford)
- In Silico Modeling of Celiac Disease Pathogenesis and Progression - Ali Zomorrodi (Harvard)
- Gut-On-Chip to Advance Celiac Research - Hyun Jung Kim (University of Texas, Austin)

Agenda

Session 3: Immunology of Celiac Disease

- Modeling Overview of Celiac Disease Immunology and Pathology - Riccardo Troncone (University “Federico II, Italy)
- Intraepithelial T cells - Mahima Swamy (University of Dundee, UK)
- B cell Repertoire - Valerie Abadie (University of Chicago)
- Immunology of Mucosal Barrier Function in the Context of Celiac Disease - Dr. Declan McCole - (UC Riverside)

Session 4: Emerging Areas

- Bioengineering Sensors to Detect Enteric Host-Bacteria Interaction - Timothy Lu (MIT)
- Role of Gut Microbiota in Celiac Disease Pathogenesis - Maureen Leonard (MGH)
- Microbiota and Gluten - Elena Verdu (McMaster University)
- Celiac Disease and Gut-Brain Communication - Alessio Fasano (MGH)

Agenda

Session 4: Diagnostics and Therapeutics

- Current Therapeutic Targets - Joseph Murray (Mayo, Rochester)
- Current and Future Diagnostics and Biomarkers - Dr. Jocelyn Silvester (Harvard)
- Use of Endopeptidases and Nanoparticles - Daniel Leffler (Senior Medical Director, Takeda; Beth Israel)
- Use of Antigen Trafficking Inhibitor Larazotide Acetate - Patrick Griffin (9 Meters Biopharma, NC)
- Anti-IL15 as Treatment for GFD Non-Responsive and Refractory Celiac disease - Francisco Leon (Provention Bio, NJ)

Invited Discussants
Armin Alaedini (Columbia University)
Rok Seon Choung (Mayo Clinic)
Kathryn Knopp (Mayo Clinic)
Martin Kriegel (Yale University)
Eric Marietta (Mayo Clinic)

Invited Discussants
Craig Maynard (The University of Alabama)
Luisa Mearin (Leiden University, NL)
Florian Rieder (Cleveland Clinic)
Stefania Senger (MGH)

Gaps

- Innate and adaptive immunity in celiac disease
- Misconceptions regarding the efficacy and convenience of the gluten free diet
- Lack of non-dietary therapies
- Characterization of the natural history
- Biomarkers that coincide with pathology
- Genetics of at-risk individuals who develop and who do not develop disease
- Overlooked environmental factors
- The effects of manipulating the microbiome
- Targeting adult versus childhood disease - loss of tolerance versus inability to develop tolerance

Opportunities

- **Establish cohorts**
  - Need large patient cohorts with different types of celiac disease with samples collected according to defined protocols where timing of gluten exposure is known
  - Creating mechanisms for efficient and timely data sample sharing
  - Non-invasive biomarkers
- **Develop models**
  - Computational approaches
  - New animal models
  - Need in vitro modeling of the genetic component of the innate response
- **Celiac disease as a model for other autoimmune disease**

Understanding of Risk and Causal Mechanisms for Developing Obesity in Infants and Young Children

A Virtual Workshop:

April 29, 2021 10:00–3:00 p.m. ■ April 30, 2021 10:00–2:30 p.m.

Voula Osganian, M.D., Sc.D.

Leadership

Meeting Co-Chairs

- Shari L. Barkin, M.D., M.S.H.S., *Vanderbilt University School of Medicine*
- Charles F. Burant, M.D., Ph.D., *University of Michigan School of Medicine*
- Susan Carnell, Ph.D**.,** *Johns Hopkins University School of Medicine*

NIH Organizing Committee

- Voula Osganian, M.D., Sc.D., M.P.H. and Susan Yanovski, M.D., *National Institutes of Diabetes and Digestive and Kidney Diseases*
- Andrew Bremer, M.D., Ph.D., M.A.S. and Ashley Vargas, Ph.D., M.P.H., R.D.N, *Eunice Kennedy Shriver National Institute of Child Health and Human Development, National Institutes of Health*
- Charlotte Pratt, Ph.D., R.D., *National Heart, Lung, and Blood Institute*
- Christine Hunter, Ph.D., ABPP Deborah Young-Hyman, Ph.D., *Office of Behavioral and Social Sciences Research*
- Jacqueline Lloyd, Ph.D., M.S.W., *Office of Disease Prevention*

OBJECTIVES

- Overall goal was to identify gaps, opportunities, and approaches for future research to better characterize early-life risk factors and determine underlying causal mechanisms through which these factors contribute to the development of obesity during early childhood.
- The meeting brought together scientists from diverse disciplines to discuss:

  (1) what is known regarding the epidemiology and underlying biological and behavioral mechanisms for rapid weight gain and the development of obesity in early life; and

  (2) what new approaches can be used to improve risk prediction and gain novel insights into the causal mechanisms for developing of obesity in early life.
- This research can inform the development of innovative, targeted, and more effective strategies for childhood obesity prevention and treatment.

Agenda - Day 1

Session 1: State of Childhood Obesity Prevention

Risk and Causal Factors for Accelerated Growth Trajectories and Development of Obesity *Lori A Francis, Ph.D., The Pennsylvania State University*
Overview of Obesity Prevention Trials for Infants and Young Children- Lessons Learned *Ihuoma Eneli, M.D., M.S., F.A.A.P., The Ohio State University College of Medicine*
Moderated Discussion Amelie G. Ramirez, Dr.P.H., M.P.H., UT Health, Lozano Long School of Medicine, San Antonio, Texas

Session 2: Biological and Behavioral Mechanisms: Pregnancy and the In-Utero Environment

Maternal & Paternal Risk Factors/Fetal Programming and Epigenetic Mechanisms *Kjersti Marie Aagaard, M.D., Ph.D., F.A.C.O.G., Baylor College of Medicine*
Nutrition during Pregnancy *Linda Van Horn, Ph.D., R.D., Northwestern University Feinberg School of Medicine*
Environmental Exposures During Pregnancy *Leonardo Trasande, M.D., M.P.P., New York University Grossman School of Medicine*
Moderated Discussion *Marie-France-Hivert, M.D., M.M.Sc., Harvard Medical School*

6 Lightning Talks and 9 Poster Presentations

Agenda - Day 2

Sessions 3 and 4 : Biological and Behavioral Mechanisms- Infancy through Early Childhood

The Exposome and Obesity *Rosalind Wright, M.D., M.P.H., Icahn School of Medicine at Mount Sinai, New York*
Genetic Predisposition and Polygenic Risk *Ruth Loos, Ph.D., Icahn School of Medicine at Mount Sinai, New York*
Nutrition, the Gut Microbiome, and Growth: Associations vs. Causality *Sharon Donovan, Ph.D., R.D., University of Illinois, Urbana-Champaign*
Human Milk Composition, Complementary Foods and Growth and Body Composition *Ellen Demerath, Ph.D., University of Minnesota*
Moderated Discussion *Melissa Wake, MB.ChB., M.D. F.A.H.M.S., University of Melbourne, Australia*

Appetite and Eating Behaviors *Diane Gilbert-Diamond, Sc.D., Dartmouth Geisel School of Medicine*
Temperament, Self -Regulation, and Executive Function *Alison Miller, Ph.D., University of Michigan*
Sleep and Circadian Rhythm *Monique K. LeBourgeois, Ph.D., M.A., M.S., University of Colorado at Boulder*
24-hr movement behaviours (physical activity, sedentary behavior, and sleep) *Anthony Okely, Ed.D., University of Wollongong, Australia*
Moderated Discussion *Julie Lumeng, M.D., University of Michigan*

Research Needs and Approaches

- How do we **define** obesity? What are the **sensitive timepoints** of risk and resiliency for developing obesity?
- Many areas need **further exploration**-maternal diet composition, appetite, self regulation, and microbiome and genetic risk scores.
- Need for **longitudinal studies** and use of **integrated omics and other technologies** such as fMRI to understand mechanisms and underlying pathways and processes
- Need for data on more **diverse samples** who are at risk (race/ethnicity and SES) and need to disentangle **independent effects** of **race and SES**.
- Studies that examine **within-group differences** in high-risk populations to understand **resiliency and risk within these high-risk** groups.
- **Team science** to address obesity in a comprehensive and integrated way.
- Prospective, comprehensive and **standardized data collection** across studies to pool data and reduce inconsistent findings.
- Workshop summary and manuscript under development.

NIDDK K Awardees' Workshop

April 22 – 23, 2021