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Research Highlight

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Meeting summary: the inaugural meeting of the US DOHaD society

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Abstract

The US chapter of the International Developmental Origins of Health and Disease (DOHaD) Society recently held its inaugural meeting in Detroit, MI. US-based DOHaD researchers gathered both to create this new society chapter and share their latest research. The US DOHaD Society will provide a much-needed domestic forum for a broad range of DOHaD topics including nutrition, toxicology, stress, epidemiology, epigenetics, and more.

Key words: toxicology; epigenetics; epidemiology; nutrition; developmental origins of health and disease; sex-specific effects

Body

Founding members of a new United States society devoted to the Developmental Origins of Health and Disease (DOHaD) met at the Henry Ford Hospital in Detroit, Michigan on 17 and 18 October 2016. This meeting represented the official birth of this new national society, as confirmed by unanimous voice vote the morning of 17 October. At the outset of the meeting, co-organizer Jerry Heindel (NIEHS) delivered a presentation outlining the rationale for a US DOHaD Society. Dr. Heindel made the case that the scope of the US DOHaD Society should be sufficiently broad in order to encompass developmental programming due to all aspects of 'environment' including environmental chemical exposures, stress, alcohol, and drugs. Meeting participants generally agreed, given that—like nutritional programming—exposure to a wide variety of environmental stressors during development can induce disease/developmental outcomes with similar defining characteristics (critical windows, sex-specific effects, latent effects, etc.) and overlapping experimental approaches/paradigms used to study them (e.g. epigenetics, cell-type specific effects, etc.). Given the many US-based researchers working in the DOHaD field, a national chapter of the International DOHaD society will provide important opportunities for collaboration, coordination, and dissemination of research findings. Meeting co-organizer Michael Ross (UCLA) led discussions on the organizational and

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administrative aspects of the new society, including the establishment of a governance structure, the frequency of future meetings, and their potential themes. It was decided that meetings should be held annually, with the next one taking place in the fall of 2017, again in Detroit (for practical reasons). Michael Ross was appointed the interim president of the new society until a charter is worked out and an official nomination/election process can be conducted. The US DOHaD Society will be organized as an affiliate of the International DOHaD Society, joining other affiliates/chapters such as the Ibero-American, Australian, and Canadian, Japanese and French organizations. This affiliation will leverage the international recognition and political influence of the International DOHaD Society, and give the US researchers a more unified voice in its direction. Key among the practical issues discussed during the meeting was the breadth of science to be embraced by the new society, spanning developmental biology, nutrition, environmental toxicology, and epidemiology. A major goal of the US DOHaD Society will be to encourage interdisciplinary collaboration to advance the DOHaD field as a whole.

The program included five keynote talks. In the first, Linda Birnbaum (Director, NIEHS) presented 'Environmental exposures and later life disorders', an historical review of the DOHaD field from the perspective of environmental toxicology, teratology, and epidemiology. She pointed out the striking example that environmental chemicals are often concentrated in breast milk, underscoring the interrelated nature of nutritional and toxicological exposures during development. As long-term goals for the field she suggested the importance of defining critical periods of susceptibility, characterizing biomarkers of exposure, and exploring the reversibility of induced epigeneztic alterations. In her talk on 'DOHaD and Nutrition', Rebecca Simmons (University of Pennsylvania) considered how several diverse models of intrauterine growth restriction produce similar diabetes-like phenotypes. Whether there is a single mechanism unifying these models remains an open question, but she proposed that mitochondrial dysfunction, epigenetics, and inflammation may all be important contributors. Matt Gillman, Director of the NIH Environmental Influences on Child Health Outcomes (ECHO) program, gave an overview of the goals and structure of ECHO. Emily Oken (Harvard University) presented a keynote on 'Epidemiological aspects of obesity and metabolism', highlighting novel approaches to infer causality in human epidemiological studies in the DOHaD field. In the final keynote, on 'Effects of toxic chemicals on health and neurodevelopment of children', Philippe Grandjean (Harvard University) reviewed several examples of the deleterious effects of exposure to environmental pollutants during critical periods of human brain development.

The 1½ day meeting included 25 short presentations representing a broad swath of DOHaD research including work in mouse models (effects of paternal alcohol consumption on offspring insulin sensitivity (Richard Chang, TX A&M) and effects of cell type-specific epigenetic alterations in the hypothalamus (Harry MacKay, Baylor College of Medicine)) and human studies, such as a randomized controlled trial of the effects of maternal vitamin D supplementation on the maternal epigenome (Cindy Anderson, OH State). In the evening of the first day attendees enjoyed a dinner reception and poster session. The 24 posters covered topics including sex-specific effects of maternal obesity on the gut microbiome (Kartik Shankar, Arkansas Children's Nutrition Center) and long-term effects of early-life bisphenol A exposure on DNA methylation in mouse peripheral tissues (Joseph Kochmanski, University of Michigan).

Throughout the meeting and during a 'wrap up' concluding session, many of the 116 registered attendees expressed excitement and optimism about this nascent society. The impressive attendance, despite a lead-time of only a few months, demonstrated the considerable interest in promoting DOHaD research in the USA. The well-organized conference was highly effective, resulting in the development of the new society's mandate, organizational structure, and meeting schedule. As Linda Birnbaum enthused, 'A good start lasts a lifetime!' We hope that researchers across diverse fields relevant to DOHaD will be interesting in promoting the healthy development of this new society. Information regarding the US DOHaD Society can be found at www.usdohad.org.

Conflict of interest statement. None declared.