Institute for the Advancement of Food and Nutrition Sciences

2024 Annual Summer Science Symposium

A Unique Gathering of Scientific and Regulatory Experts

Executive Summary

Featuring presenters on AI, dietary guidelines, food microbiology, heavy metals, food processing, and science communications, IAFNS held its Annual Summer Science Symposium at the National Press Club June 4-5, 2024.

1	Keynote by Jim Jones, FDA Deputy Comissioner of Human Foods Program
8	Eight scientific sessions exploring nutrition, food safety, and innovation
10	Ten presenters from the Government sector - including FDA, NIH, and USDA
17	Seventeen presenters from academia - including European, Canadian and US institutions
3	Tri-Partite Audience Engagement: 36% from Academia, 31% from Industry, and 33% from Government

Advancing Science for Impact!

To learn more about our work to support positive change in the food and beverage ecosystem – and to join us – please contact:

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2024 Annual Science Symposium

Summary

The IAFNS 2024 Annual Summer Science Symposium exceeded expectations! The symposium connected researchers and stakeholders as they reviewed new data, and engaged colleagues on advances to catalyze actionable science. Bringing together researchers from government, industry and academia enables the creation of new scientific knowledge. It is through collaboration that science and evidence can inform decision-making for all sectors - from consumers to policy makers.

IAFNS was honored to host keynote speaker Jim Jones, FDA Deputy Commissioner for Human Foods. Mr. Jones outlined the current direction and challenges facing the agency's food programs and detailed elements of the FDA re-organization underway to support better nutrition and food safety practices. Jones outlined priorities and new developments in FDA's food program - including updating the agency's food chemical prioritization and evaluation process.

A diverse slate of cross-sector speakers at the symposium represented organizations like the University of Toronto, Monell Chemical Senses Center, Cornell University, FDA, and the National Institutes of Health. Sessions explored Artificial Intelligence, heavy metals and toxic elements, and global health approaches to sweeteners.

Other sessions included the use of dry sanitation in cleaning production facilities, food processing and health, and the role of food and nutrition in mood and mental health. The meeting closed with a lively session on how to amplify science in the press and on social media. Drs. Ben Chapman and Leigh Frame urged scientists to proactively distribute their work with reporters to enhance the content of stories. The panel, including an independent journalist and an editor from Agri-Pulse, discussed science and social media, building trust and accuracy, and how to negotiate with communications offices to promote accuracy of scientific work.

The following are summaries of sessions from IAFNS 2024 Annual Summer Science Symposium:

Keynote - FDA Human Foods Program

IAFNS leadership welcomed keynote speaker **Jim Jones, FDA Deputy Commissioner of the Human Foods Program** to start the symposium. Mr. Jones provided details about the re-organization of FDA with several components being integrated into the new Human Foods Program to elevate nutrition and food safety and set risk management strategies. Jones emphasized that FDA must lead the way on food chemical evaluations and food safety, as a state-by-state approach is suboptimal in that chemical rules should be based on science and not where you live. He also noted that post-market safety reviews are becoming more systematic and that consumer education campaigns on chemicals and metals in foods are being launched.

Artificial Intelligence: Applications for Food and Nutrition Research

After a welcome from session moderator **Dr. Vince Sewalt** of **IFF**, **Dr. Benoit Lamarche** of the **University of Laval** in Canada spoke about "**Introducing Applications of AI in Nutrition and Health Research**." Dr. Lamarche outlined how AI, machine-learning and deep learning all play key roles in new approaches that model predictive capacities for identifying sickness and health. Big data, -omics, dietary assessment and outcome prediction help identify dietary patterns more accurately. The field shows promise but has challenges as well with data quality, the need for new terms, and standards to guide methods. If data are poor, the adage "garbage in, garbage out" applies as AI is no better than statistics.

Dr. Martin Wiedmann of Cornell University discussed "**Application of AI and Other Digital Tools to Food Safety: Is the Hype Justified?**" Dr. Wiedmann said that AI is hardware, software and research applications combined. After citing the nearly $600 million costs of foodborne illness each year – much of it on children – Wiedmann touched on microbial food storage, precision agriculture and personalized medicine as resources. He said AI is quicker at detecting pathogens than the standard 48-hour microplate. Where data are missing, AI can be a help. Outbreaks are rare events and thus hard to predict, but sensors and data sharing across sectors will advance the field, he concluded.

Dr. Ernest Kwegyir-Afful with **FDA's Center for Food Safety & Applied Nutrition** explored **"Machine Learning and Artificial Intelligence in Food Safety Regulation: Enhancing Efficiencies."** Overall, FDA regulates 78% of the U.S. food supply, 35,000 farms, 300,000 restaurants and 10,500 vending machines and needs more prioritization tools. The agency is developing the "Predict" system to improve detections of food-borne illness outbreaks. Using horizon scanning and signals detection, Dr. Kwegyir-Afful is developing a new approach to anticipate outbreaks. By monitoring 600,000 websites combined with internal FDA data, the "WILEE" system predicted the titanium dioxide issue 6 months before it hit the U.S., he concluded.

Dr. Alexandra Johnston of **Georgetown University** covered **"Talking About AI: Metaphors of Hope and Hype."** Dr. Johnston said science is an activity meditated by language and thus it's important to consider the linguistic aspects of complex human-tool interactions. Johnston cited the first AI-based risk assessment which came out in January 2023 from the National Institute of Standards and Technology. She spoke to AI's potential in giving assistance and augmenting human knowledge and skills and how her university manages AI use by students. Johnston concluded that AI will not alter the American diet alone but it can help with idea generation and the automation of administrative tasks.

Dialogue on Dietary Guidelines for Americans Scientific Process

IAFNS Director of Science Programs Marie Latulippe interviewed two federal officials who administer the process for developing dietary guidelines: **Dr. Eve Stoody** of **USDA** and **Janet de Jesus** of **US Department of Health & Human Services**. Both discussed the public consultation process and how science is integrated into the proceedings using systematic reviews and other evidence-gathering approaches. Both USDA and HHS share ownership of the 5-year review and guidelines development process, which impact federal nutrition programs like WIC and school lunch requirements. Both said the process has become more transparent and that technical officials constantly upgrade their skills and methods to reflect the latest science.

Food Processing, Formulation and Health: Advancing the USDA Research Roadmap

Moderator **Dr. William Yan, Health Canada** (retired), welcomed the panel and reviewed the USDA Research Roadmap on UPFs. **Dr. Julie Hess,** with the **USDA Agricultural Research Service**, presented the **"Landscape of Nutrition and Ultra-Processed Foods in 2024,"** discussing UPF categories. The Roadmap outlined questions related to classification of foods as UPF, exposure assessment, health risks independent of diet quality, sensory aspects that influence intake, and more. While NOVA criteria are commonly used to define and categorize UPFs, there is variability that leads to inconsistent classification. Dr. Hess also reviewed her research in "**Realistic and Healthy Dietary Patterns: A Role for 'Ultra-Processed' Food?"** Dr. Hess designed a menu aligned with dietary guidance that has 80% or more of its calories coming from UPF foods (according to the NOVA scale).

Dr. Vassilis Kontogiorgos of the **University of British Columbia** gave a presentation on **"Food Matrix and Nutrient Bioaccessibility,"** and how food composition may affect metabolic activity in the body. He explained the food matrix as a concept describing how different micro- and macronutrients are structured in food and break down during digestion. The physical attributes of a food can also influence how quickly gastrointestinal enzymes allow for nutrient bioavailability during digestion. Dr. Kontogiorgos argued that a combination of chemical, clinical and social analyses will be required to develop a more complete understanding of how the food matrix affects health outcomes.

Dr. Kathleen Melanson of the **University of Rhode Island** discussed "**Ultra-Processed Foods: Considerations of Nutritional Quality and Consumer Conceptualization."** She explained her work on what forms of food processing are key risk factors for excess energy intake and how differences in hedonic appeal and palatability influence consumption of UPFs. Dr. Melanson added that nutritional quality varies widely both among and within the NOVA categories. Moreover, understanding how consumers conceptualize food processing is critical for designing interventions to reduce consumption of UPFs.

Dr. Kevin Hall of the **NIH National Institute of Diabetes and Digestive and Kidney Diseases** discussed **"Investigating Mechanisms of Ultra-Processed Foods Related to Energy Intake."** Dr. Hall described a 2019 NIH study in which participants eating a diet of UPFs consumed around 500 more calories per day compared to participants eating a diet of minimally-processed foods. He explained that the high energy density or the palatability of UPFs may explain this excess energy intake. Dr. Hall also noted that an upcoming paper will be published on a study examining whether UPFs meet the criteria for addictive substances.

Low-and-No Calorie Sweeteners: Resolving Scientific Disconnects

After a welcome from **Dr. Ciaran Forde** of the **University of Wageningen**, **Dr. Felicia Wu** from **Michigan State University** presented **"Is Aspartame Safe? How Hazard vs. Risk Assessment Led to Different IARC vs. JECFA Evaluations in 2023."** Dr. Wu explained that IARC conducts hazard assessments of whether certain substances are likely to cause cancer in humans, while JECFA's risk assessments attempt to identify the particular dose of a substance that may be sufficient to cause health risk by including exposures. She explained that in 2023, IARC classified aspartame as a Group 2B carcinogen (probably carcinogenic to humans), but concerns remain about how definitive the evidence is for aspartame alone being carcinogenic. By contrast, JECFA reaffirmed an acceptable daily intake for aspartame of around 40mg per kg of body weight in humans—or about 16 cans of diet soda a day. Dr. Wu added that language in the media can confuse the public or exaggerate the actual dangers of aspartame based on hazard and not full risk assessments.

Dr. John Sievenpiper of the **University of Toronto** presented **"Reconciling the Evidence on Low- and No-Calorie Sweeteners and Health Outcomes,"** focused on whether low-calorie sweeteners can help consumers reach their weight goals. He noted that low-calorie sweeteners are gaining prominence as added sugar is widely being criticized in food science and the media. However, public health guidance has been inconsistent on the role of low-calorie sweeteners. Dr. Sievenpiper argued that understanding of low-calorie sweeteners becomes muddled due to reverse causality in risk assessments such as diabetes studies. Moreover, observational studies are relied upon but may not give an accurate long-term view of the effects. Dr. Sievenpiper emphasized that low-calorie sweeteners must be evaluated in the larger context of how they replace actual sugars in the diet.

Advancements in Dry Sanitation Technology

Moderator **Dr. Chuck Czuprynski of the University of Wisconsin** introduced **Dr. Abby Snyder of Cornell University** who spoke on **"Mitigating Cross-Contamination in Dry Food Processing Environments."** Low-moisture and low-water activity foods like flour, nuts, cereals, powdered milk and spices are more prone to microbial growth when wet. Introducing water during cleaning can create an environment conducive to microbial proliferation, posing a significant contamination risk. Dry environments are less likely to support the growth of pathogens such as Salmonella and E. coli, which can thrive in moist conditions. Dry sanitation helps maintain these environments, thus enhancing the overall safety protocols for processing low-moisture foods. Dry steam heated to more than 250F and applied to production surfaces to kill any pathogen or microbe is an emerging technique. It does not leave moisture or condensation to harbor residual pathogen growth.

Dr. Lynn McLandsborough of the University of Massachusetts-Amherst addressed **"Development of Non-Polar Liquid Antimicrobial Delivery Systems for Dry Sanitation."** Dr. McLandsborough is utilizing organic acids in combination with non-polar liquids as a viable alternative to alcohol-based sanitizers. Organic acids are commonly employed as food additives or antimicrobial treatments to inhibit pathogen growth. By utilizing a hydrophobic environment, such as those found in non-polar liquids, the antimicrobial activity of the organic acids can be increased. Moreover, the non-polar liquids would have a higher flash point compared to ethanol or isopropanol-based compounds, thereby enhancing safety by preventing fires during use on heated production lines, she concluded.

FDA Update on Toxic Elements in Food

Dr. Jason Hlywka of the Kraft Heinz Company introduced **FDA's Dr. Conrad Choiniere** who spoke on the agency's **"Closer to Zero Initiative"** to reduce metal uptake in foods. Dr. Choiniere outlined a continuing agency process to evaluate, propose actions, consult with stakeholders and finalize action levels on what's achievable in reducing metal uptake from soils into foodstuffs. Benchmarks and reference values for lead, cadmium, arsenic, mercury and others are under various stages of development. The agency has held hundreds of meetings with growers of carrots, sweet potatoes and other crops, processors and food producers to consult with in developing cost-effective mitigation strategies. In the next few months, he anticipates that baseline estimates of exposure to metals will be available. Metal concentrations are easier to control in processed foods than commodity crops, he noted.

FDA's Dr. Kellie Casavale spoke on **"Closer to Zero: Nutrition and Toxicology,"** and summarized the results of focus groups held with parents on metals in children's foods. Dr. Casavale noted parents sometimes said they felt helpless in their ability to reduce metals in foods their children eat. She noted that recalls, bacteria, pesticides and preservatives are all concerns parents spoke to in the focus groups. Noting the importance of not having people fear healthy foods, Dr. Casavale outlined the extensive outreach efforts FDA has engaged in to customize messages and guidance. Nutrients can protect against exposures to toxic elements and parents were curious about which of those were effective. Some studies suggest foods rich in iron, zinc and selenium decrease absorption of heavy metals, she concluded.

The Role of Food and Nutrition in Mood and Mental Health

Moderator **Dr. Drew Bremer with the NIH Office of Nutrition Research** introduced **Dr. Hayley Young of Swansea University, Wales, U.K**. who addressed "**Considerations for the Selection of Tools for Investigating the Effects of Nutrition on Mood and Mental Health**." Dr. Young reviewed several criteria for choosing among the hundreds of tests available for research on mood and other mental health factors. Part of the challenge is there are over 50 measures of mood and depression. Fatigue, anger and sadness can be combined in a construct called "total mood disturbance" but it can be problematic in research. Many measures are based on assumptions. The psychiatry field's reliance on DSM-5 is "atheoretical," she said. Mood and food research interviews are often based on signs and symptoms. Psychiatry assumes an underlying condition causes symptoms in DSM-5 such as a latent construct called "depression" for example. Dr. Young concluded by noting that it can be complicated to select a test for outcomes you want to study in these areas.

Dr. Aron Keith Barbey of the University of Nebraska-Lincoln spoke to **"Precision Nutrition: Advances in Nutritional Cognitive Neuroscience."** Dr. Barbey underscored that diet affects the physiological response to stress, called allostatic load. Chemical mediators are released by events and diet that help us cope but can boost wear and tear on our physiological system and "age" our brains at different rates. Brain imaging methods can be brought to bear on age-related cognitive and neurobiological decline as measured by nutrient biomarkers in the blood. Personalized solutions to healthy brain aging starts with using AI and other techniques to identify factors that moderate brain health. 32 nutrient biomarkers' role in functional brain activity were examined in relation to cognitive and brain health. 10 patterns emerged for further examination with functional brain connectivity and demonstrated clear links. Some patterns have favorable associations with brain network efficiency like executive function, he concluded.

Dr. Patrice Hubert with the Monell Chemical Sciences Center gave a presentation **"Sensory Connection: Exploring the Relationship Between Our Senses, Food Choices and Mental Health."** Dr. Hubert looked at taste preferences, behavior change and some mental health conditions. Sensory science affects mood and food intake behavior as some seek rewards. Appearance, taste and smell of food informs purchasing decisions and satisfaction with food choices. Vision and smell work in anticipating food such as seeing and smelling popcorn at a movie theater. These factors influence liking and consumption behaviors which affect our mental status. In addition, anti-depressant medications can influence food preferences. She concluded that sensory processes of food and our emotions are intertwined.

Amplifying Science: Perspectives from Scientists and Journalists

Moderator **Dr. David Kitts of the University of British Columbia** introduced **Dr. Ben Chapman of North Carolina State University** who spoke on **"Engaging the Public: Modern Approaches to Food Safety Communication."** Dr. Chapman gives over 150 media interviews a year and hosts several popular podcasts on food safety issues ranging from chicken washing to risky food handling practices. He encouraged other communicators to begin by getting to know your audience and how they act and also to assess what competing messages are out there. Trust in science is down since the pandemic, he said and storytelling skills are key in bringing one's message to target audiences. He encouraged communicators to collaborate and not take a combative stance online, challenging misinformed influencers through direct messages instead of public spats.

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Dr. Leigh Frame of George Washington University spoke about **"Amplifying the Impact of New Knowledge"** before several reporters responded to the talks at the session. Dr. Frame highlighted the need to use social media and proactive news releases to give voice to new findings and research papers instead of reliance on just journal publication and conference presentations. She encouraged communicators to share authentically on social media channels and celebrate the work of colleagues and others contributing new knowledge above the din of mis- and disinformation.

Independent journalist Cheryl Hogue, who used to be an editor at Chemical & Engineering News, reiterated what Drs. Chapman and Frame shared in regards to communicating early and often about new findings. She shared research on spreaders of false information on social media platforms and encouraged collaboration, not combat, online. This is particularly true because "feeding the trolls" only encourages dissent – the purpose of some actors' online presence. She encouraged a focus on the real-world impacts of science.

Agri-Pulse Deputy Managing Editor Steve Davies also echoed what others said in the session about constructively participating in social media. He reviewed the policy and issue coverage areas that Agri-Pulse addresses and noted that being prepared is important when asked to address controversial areas. The session concluded with a series of questions about building trust between scientists and journalists, how to handle funding disclosures, and negotiating with university communications officials to improve the accuracy of claims made about your research in university press releases.

Institute for the Advancement of Food and Nutrition Sciences

- At IAFNS we live our Core Values:
  - Scientific Integrity
  - Transparency
  - Collaboration
  - Public Benefit
- IAFNS mobilizes government, industry and academia to drive, fund and lead actionable science - food safety and nutritional science - to advance public health
- We catalyze the creation of scientific knowledge by funding external researchers and convening experts to support positive change
- Our collaborative and inclusive structure empowers members to bring forward the diverse perspectives of the entire food and beverage ecosystem
- IAFNS is proud to provide connections, support collaborations, and catalyze the science that matters - in support of public health.

Our Scientific Committees are actively supporting over 40 projects - working with scientists in the US, Canada, and around the world. With programs focused on catalyzing science, mobilizing knowledge, and embracing the future, we invite you to JOIN US. Together we can bring positive change for the food and beverage ecosystem.

To learn more about our work to support positive change across the food and beverage ecosystem – and **JOIN US** – visit www.iafns.org or email wendelyn@iafns.org

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