

**MINUTES OF THE
SCIENCE BOARD TO THE FDA MEETING**
FDA White Oak Campus, Building 31, The Great Room (Rm. 1503A)
10903 New Hampshire Ave. Silver Spring, MD 20993

Monday, October 22, 2018

The Science Board to the FDA (Science Board) meeting was convened at approximately 9:00 a.m.

Members Present

Cynthia A. Afshari, PhD, DABT
Anthony Bahinski, PhD, MBA, FAHA
Rhondee Baldi, MD, MSHS (consumer representative)
J. Rodney Brister, PhD, MS (temporary member)
Lynn R. Goldman, MD, MPH
Annalisa Jenkins, MBBS
Barbara B. Kowalczyk, PhD
Mark R. McLellan, PhD (chair)
Lisa K. Nolan, DVM, PhD (via phone)
Bruce Psaty, MD, PhD, MPH
Theodore Reiss, MD, MBE (via phone)
Dave Rejeski, MPA (temporary member)
Minnie Sarwal, MD, PhD (via phone)
Rebecca Sheets, PhD, CAPT (retired) (temporary member)
Scott Steele, PhD
Laura Tosi, MD
Connie Weaver, PhD (via phone)
Xiang-qun (Sean) Xie, MD, PhD

Designated Federal Officer

Rakesh Raghuvanshi, MPH, Office of the Chief Scientist

FDA Representatives

Emilio Esteban, DVM, PhD
Jeremiah Fasano
Scott Gottlieb, MD
RADM Denise Hinton
Peter Marks, MD, PhD
Donna Mendrick, PhD
Cindy Osborn, PhD
Annie Saha, PhD
Steve Solomon, DVM, MPH
Leah Stitz, MS
Carolyn Wilson, PhD

Following member introductions, Mr. Raghuwanshi provided the conflict of interest statement for the meeting.

The following is a high-level summary of the meeting. Meeting minutes are not intended to be a substitute for the actual transcript of the meeting. Additional information and specific details may be obtained from the transcript of the meeting. The transcript may be viewed on the Science Board to the Food and Drug Administration web page approximately 6 – 8 weeks after the meeting.

Science Board member introductions and FDA staff introductions

Conflict of Interest statement by Rakesh Raghuwanshi, MPH, Designated Federal Officer, Science Board, FDA

Chief Scientist Updates by RADM Denise Hinton, Acting Chief Scientist, FDA

- Since the last meeting there have been 29 training events for almost 3,500 participants; FDA awarded close to 700 CE units; 6 Ground Rounds for almost 3,000 attendees, awarding over 650 CE units.
- Predatory Publishing Initiative – protecting the integrity of FDA scientists
- Senior Science Council added 2 new working groups – Research Impact WG, and Additive Manufacturing WG
- RADM Hinton captured several other areas of progress and highlights at FDA since the last Science Board meeting

Commissioner's Update by Scott Gottlieb, MD, Commissioner of Food and Drug

- Two members of Science Board members reached their term limit – the Commissioner thanked them for their service.
- The Commissioner highlighted several areas of progress since the last Science Board meeting
- The Commissioner described several of his priority areas, including the opioid epidemic, e-cigarettes and tobacco use, and drug pricing
- The Commissioner answered several questions from the Science Board members

Response to the Science Board's NARMS Review Report by Patrick McDermott, PhD, Director, National Antibiotic Resistance Monitoring System

- Dr. McDermott provided a brief overview of the NARMS program
- He described the request to the Science Board to review the NARMS program and gave an overview of the Science Board's review of the program
- He then provided FDA's response to the recommendations made in the Science Board's NARMS program review report.

Introduction to Topics for Discussion by Susan Mayne, PhD, Director, Center for Food Safety and Applied Nutrition, FDA

- Dr. Mayne provided background information on the animal cell culture and food safety topic on today's agenda

CFSAN Session: Identification of potential hazards, and nutritional considerations, in the production of food derived from animal cell culture technologies

Presentation 1: Overview of Animal Cell Culture Technology for food production

Presentation 2: Current Uses of Cell Culture: Challenges in Clinical Applications

Presentation 3: Considerations for Food Safety Assessment

Presentation 4: Food Safety and Inspection Service

Adventitious Agents in Source Materials and in Culture

1. Could adventitious agents be plausibly introduced into culture from seed cells or culture materials that might pose risks to human health from a finished food product? If so, what are they, and what tools would be most effective at managing these risks?
 - a. Obvious answer is yes – we know a lot of the kinds of agents that get into cell culture. We also know a lot about primary culture, although not so much from muscle but more so from other organs – kidney, epithelial cells, and so on.
 - b. Have to worry a bit about what would be left if meat is undercooked or not cooked. Lot of adventitious agents would be killed by the cooking process.
 - c. Oral ingestion – different from parenteral vaccines – food goes in through normal portal, through normal defense systems. Most agents will be digested and those are the ones of particular concern – E. coli, etc.
 - d. Monitor source materials. If producing from a cell bank, qualify the cell bank and show it was free of bacterial contamination as well as other adventitious agents before beginning production. During production, monitor for bioburden.
 - e. There may be other hazards we don't know enough about. Agency should better understand how consumers would handle and consume these products.
 - f. Cooking may address microbiological contamination but not necessarily toxicological contamination.
 - g. Additional comments available via transcript.
2. What does previous cell culture experience tell us about the potential for contamination during the culture process, scaling effects, and likelihood of risks to human health from a finished food product?
 - a. We can learn from cell culture of vaccines and therapeutics in the 1980s which were done successfully

- b. However, there isn't enough information about the unknown agents nor do we fully understand the risks
- c. Contamination can occur – you have to watch for it, you have to be vigilant.
- d. Additional comments available via transcript.

Added Substances: Culture Media and Structural Materials

- 3. What kinds of substances used in cell culture media would be present in meaningful amounts in the finished food product, and are ordinary food ingredient evaluation procedures sufficient to ensure safety?
 - a. In terms of meaningful amount in the finished product – that depends on the processing after harvest.
 - b. Antibiotics are a possibility – could be added to the culture
 - c. A lot of products are made so that there are no antibiotics left.
 - d. There are a number of substances, but it depends on meaning of the word “meaningful”
 - e. Substances from the culture itself – not the media – may also present
 - f. Not sure of substances of particular special concern that would be from the media unless it is something that came from the recombinant process or from the extraction process from where you got the well-defined media
 - g. Possibly nothing that was unusual or something that isn't familiar from the context of manufacturing cells for therapeutic uses
 - h. Exposure may not be meaningful if it's sporadic; but could be meaningful if there's repeated exposure over time.
 - i. Those with lack of diet diversity – children and elderly – may be vulnerable to higher exposure
 - j. Additional comments available via transcript

- 4. What kinds of structural materials might be used to culture tissues, e.g. scaffolding, and are there any that could not be addressed by ordinary food ingredient safety assessment?
 - a. Currently, items like collagen are used. Also, microbead carriers, devascularized vegetables like lettuce leaves, fish gelatin, alginates
 - b. Potentially synthetic materials, hydrogels, materials that are already regulated in the food supply
 - c. Additional comments available via transcript

Properties of Cultured Cells

- 5. How likely is it that cultured animal cells could produce harmful substances as a result of errors in the culture process?

- a. Instead of thinking about it in terms of errors in the culture process, one could think of it in terms of if a culture process weren't optimal or if it was not an optimized process, then certainly you could begin to see the cells die.
 - b. If there was a massive amount of cell death, you'd probably end up with something that wasn't harvestable
 - c. Cell culture experts would be worth speaking to about this.
 - d. Additional comments available via transcript.
6. What are the characteristic nutritional properties of foods produced by traditional techniques from animals such as cattle, swine, poultry, and fish; and what departures from these characteristics would be expected in food products of animal cell culture technology derived from their respective sources? Are these departures material with regard to nutritional or non-nutritional considerations?
- a. Iron content of different muscle types depends on myoglobin concentration, which responds to exercised muscles;
 - i. Dark meat is the exercised muscles
 - ii. No exercise in tissue cultures
 - iii. Iron content may be lower in cultured meat
 - b. Copper comes from connective tissue – levels could be different
 - c. Need to be mindful of quality of protein in replacement sources
 - d. Role of gut microbiome in supplying nutrients or health-promoting byproducts
 - e. Additional comments available via transcript

Open Public Hearing

1. New Harvest
2. Finless Food
3. Good Food Institute
4. Memphis Meats

Final Thoughts and Closing Comments by Mark McLellan, PhD, Science Board Chair

- Dr. McLellan closed by saying he personally believed any effort to find new foods, new food sources, is critically important. There are millions that will go to bed tonight hungry so finding food sources is critical. This may be an opportunity and it is worth exploring. It's critical for FDA to understand that the Science Board's role is to advocate for the science being used in all of FDA's decision-making is sound – hence all the board's queries and questions that might at times feel uncomfortable.

I certify that I attended the October 22, 2018, meeting of the Science Board and that these minutes accurately reflect what transpired.

_____/s/_____
Rakesh Raghuwanshi, MPH
Designated Federal Officer

_____/s/_____
Mark McLellan, Ph.D.
Chair