Developing an action plan for collaborative research on cultured meat and seafood safety

Outcomes from a January 2024 workshop with industry, academia, and governmental stakeholders

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Since 2020, the Cultured Meat Safety Initiative (CMSI) has sought to address the critical technical, methodological, and informational issues related to evaluating the safety of cultured meat and seafood (CM) products. In our previous work, CM industry developers and governmental scientists have identified research priorities for CM safety demonstration[1,2]. To begin the next phase of CMSI's work, a workshop was held at the Tufts University Center for Cellular Agriculture (TUCCA) on January 12, 2024 to discuss CM safety research priorities, develop research action plans, and initiate collaborations. This workshop engaged 25 participants, including 9 academic stakeholders from 6 universities; 3 governmental scientists from 2 agencies; and 13 industry representatives from 11 companies, and was conducted under Chatham House rules to promote open discussion.

Breakout group topics were selected based on the main themes brought forward in previous work[1,2]: *cells, inputs, adventitious agents, manufacturing practices,* and *final product*. Participants generated and prioritized safety research questions for each topic, as well as potential challenges and resources needed, ultimately developing a preliminary roadmap to address each question.

Key safety research questions identified:

Cells

- What methods/approaches can be used to identify genetic changes (due to genetic drift or intentional modifications) that have the potential to produce food safety hazards (*i.e.,* allergens)?
- Can we develop predictive methods to screen for known or novel allergens?
- Are some processes, conditions, or cell types more likely to be associated with genetic drift?
- What are the safety considerations for different immortalization methods (spontaneous or intentional modifications)?

Inputs

- How to assess the suitability of inputs for use in food (*e.g.,* growth factors, inputs derived from animals/insects/allergenic sources)
- What methods/approaches can be used to quantify inputs (*e.g.,* residues and metabolites) in the final product?
- What are consumer perceptions of inputs, and how does this affect acceptance of final products?
- Should there be specific documentation needed to use scaffolding in CM products?

Adventitious Agents

- What are the common microbiological contaminants in CM?
- What adventitious agents are important to test for to assess food safety? What methods and microbiological limits should be used?
- How can omics technologies (*e.g.,* whole genome sequencing) be used for microbial assessments?

Manufacturing Practices

- What manufacturing practices can be implemented to ensure consistency in safety and quality?
- How can we develop and disseminate best practices (*e.g.,* GMP, HACCP, safety standards) for CM production amongst industry and other stakeholders?
- What methods/approaches can be used to prevent leaching or confirm the leaching is negligible from bioprocess equipment and consumables?

[1] Ong, Kimberly J., et al. "Food safety considerations and research priorities for the cultured meat and seafood industry." Comprehensive Reviews in Food Science and Food Safety 20.6 (2021): 5421-5448.

[2] Ong, Kimberly J., et al. "Cultured Meat Safety Research Priorities: Regulatory and Governmental Perspectives." Foods 12.14 (2023): 2645.

Final Product

- What methods/approaches can be used to compare CM to conventional products, and which parameters are relevant to safety?
- Is the shelf life of CM products the same as for conventional products?
- What are proper labeling and risk communication strategies to implement for final CM products?

Challenges, Barriers, and Potential Solutions

Some common research barriers arose across all of the CM topic groups, such as lack of available samples for testing, lack of standardization and specifications, lack of funding, and consumer perception concerns. Additionally, participants identified barriers for stakeholders to work collaboratively, primarily intellectual property challenges for companies to share data and samples, and lack of funding available.

Participants identified potential leaders, collaborators, and funding opportunities that will be used to overcome identified barriers. Proposed solutions for collaboration included the randomization and anonymity of data from companies, the creation of consortiums, and using neutral third parties to collect and analyze data for the creation of databases.

Outcomes and Next Steps

In addition to identifying research priorities, participants were able to make connections and identify additional potential collaborators across stakeholder groups (*i.e.*, academics, industry, and regulators). Key outcomes of this workshop also include participants' enhanced understanding of CMSI's vision for addressing safety knowledge gaps as well as eagerness for ongoing participation.

Through this and future multi-stakeholder workshops, we will continue to facilitate partnerships between CM developers who can provide materials (e.g. cells, media, growth factors, scaffold) and governmental and academic organizations who are well-positioned to undertake the work needed on methods development and data generation. We will maintain open communication lines with participants to form research projects addressing the identified priorities. Anyone interested in participating in this work can reach out to us at the contact information below.

About CMSI

The Cultured Meat Safety Initiative (CMSI) is a collaborative effort between New Harvest and Vireo Advisors, LLC). Through CMSI, we aim to progressively build open access resources toward regulatory, consumer, and market acceptance by convening and coordinating pre-competitive research to develop knowledge, shared practices, and databases. CMSI Phases 1 and 2 engaged 50 companies and 48 governmental scientists from 15 jurisdictions to understand research priorities for CM safety demonstration, culminating in two peer-reviewed publications [1,2]. With this understanding of the field's needs for safety research, CMSI Phase 3 aims to convene diverse stakeholders to create the infrastructure for shared knowledge, methods, and data. Our long-term goal is to coordinate and launch regional efforts to develop and validate analytical methods for CM safety analysis and use these methods to generate datasets that can be made publicly available to support transparent food risk assessments and policy-making processes.

New Harvest is a global non-profit organization founded in 2004, focused on building the field of cellular agriculture following the principles of responsible innovation.

Vireo Advisors is an expert advising firm aiming to advance market adoption of safe and sustainable technologies, including CM, through the creation of shared knowledge and practices for safety and regulatory acceptance.

For more information on CMSI or to join our network, reach out to us at breanna@new-harvest.org or jashatkin@vireoadvisors.com.

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