National Aeronautics and Space Administration



Safety and Regulatory Considerations for Engineered Foods for Spaceflight

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Plant SynBio for Space
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NASA Human Research Program

- Applied research program
- Food and Nutrition Risk Strategy
  - Determine nutritional requirements to maintain health and performance for DRM
  - Determine nutrient content, safety, and acceptability of spaceflight food system for DRM
  - Develop countermeasures to mitigate DRM impacts on health and performance outcomes, and/or risks to food safety, stability, and/or acceptability
    - Within the food system (i.e. variety, process improvements, crop growth)
    - In addition to the food system (i.e. supplementation)
- Food Safety
  - Previously, typically focused on microbiological concerns
  - Advent of new tools and techniques, enthusiasm in SynBio, and future flight of a GE plant prompted a Technical Interchange Meeting on Regulations for Genetically Engineered Plants and Microorganisms Intended to be Grown and Consumed in Spaceflight (31 Mar 23)

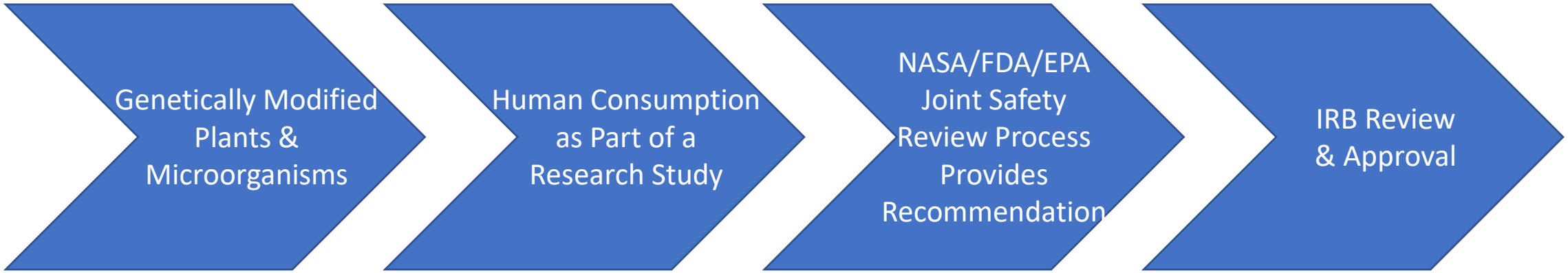
Coordinated Framework for Regulation of Biotechnology

	EPA	USDA	FDA
Statutes for Regulatory Oversight	**FIFRA** Federal Insecticide Fungicide and Rodenticide Act **FFDCA** Federal Food Drug and Cosmetic Act	**PPA** Plant Protection Act	**FFDCA** Federal Food Drug and Cosmetic Act
Protection Goals (Jurisdiction)	No unreasonable adverse effects (Pesticides)	Protection of plant health (Plant and animal health)	Safe for use in food and feed (Plants as food/cosmetics)
Compulsory/Voluntary	Dependent on **pesticide** determination and exemption criteria	Permits required for import and interstate shipments	Voluntary

If exempted from regulation, how can NASA ensure foods are safe for consumption?

TIM Outcomes

- Establishment of a NASA/FDA/EPA joint safety review process to provide a recommendation for IRB approval.
- Two-pronged approach:
  1) NASA will facilitate an initial meeting with FDA and EPA to discuss safety approach and testing
  2) Second meeting to assess safety testing results




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