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Joint Hearing: "Exploring Alternatives to Fetal Tissue Research"

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Chairmen Meadows and Jordan, and Ranking Members Connolly and Krishnamoorthi, thank you for the opportunity to testify at this hearing about the value of fetal tissue research. I am Professor of Neuroscience and Scientific Director of the Neural Stem Cell Institute and I am here today on behalf of the International Society for Stem Cell Research, where I served as president. I offer my perspective as representative of nearly four thousand research colleagues around the world, and as a scientist who has spent 32 years pursuing research to fight human disease.

Fetal tissue is an essential resource for study and developing therapies for cancer, HIV, Zika, tuberculosis, and other devastating diseases. Fetal tissues have unique properties. The alternatives mentioned may be useful at times but cannot fully replace fetal tissue.

Zika

Fetal tissue is key for studying developmental conditions – including birth defects associated with Zika. Through studying donated fetal tissue, we are learning how Zika infects specific types of fetal brain cells, producing malformations such as microcephaly that can severely impact quality and length of life (1–3).

This research would not have been possible with other research models because we cannot mimic normal fetal brain tissue using current stem cell technology, including brain organoids.

HIV-AIDS

HIV is a human pathogen that attacks the immune system. Animals that model the human immune system are essential for HIV research. The development of Truvada (4), an antiretroviral therapy that prevents the transmission of HIV, depended on fetal tissue. These animal models, mimicking the human system, are also crucial for ongoing drug discovery for Dengue, influenza, Ebola, Tuberculosis, and other infectious diseases (5).

The alternatives mentioned to this fetal tissue model are not enough.

The so-called ‘NeoThy’ mouse does not model the full- and long-term development of human blood cells, including the immune cells relevant to viruses like Zika and HIV.

Cancer

Fetal tissue research is crucial for understanding why and how many childhood cancers develop. Recent research compared the stages of fetal retina development to samples from childhood eye cancers to identify the genes responsible for the tumor formation and growth, opening new possibilities for drug discovery (6). Similarly, fetal tissue research is helping scientists target genetic mutations responsible for childhood muscle cancers (7).

CAR-T immunotherapy, which has revolutionized cancer therapy, was made possible after decades of fetal tissue research. The development of these products would have not been possible without testing them in mice that closely model the human immune system. Our

ability to develop the next generation of immune therapies for other types of cancer depends on fetal tissue derived mouse models (8).

Alternatives to fetal tissue are not sufficient. All of them come with significant deficiencies:

- Tissues from miscarriages frequently have abnormalities;
- Fetal cell lines are typically cancer-like. They are often composed of a single cell type rather than the many cells present in fetal tissue;
- iPS cell-derived organoids do not contain the full mixture of cells or fully mimic tissue structure;
- Adult stem cells cannot be used for every disorder and it is dangerous to suggest that is the case.

To close, I would like to reiterate that fetal tissue is critical for biomedical research to develop treatment for many human diseases. Alternatives cannot be proven to work until they've been compared to fetal tissue. Without validation, patients are put at risk.

Fetal tissue remains essential and it is simply wrong to suggest otherwise.

Thank you again for allowing me to testify, and I look forward to taking your questions.