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February 23, 2016
State of Missouri General Assembly Hearing For
House Bill Nos. 2068, 2069, 2070, 2071, 2371

To: Distinguished Chair and Honored Members of the Hearing Committee

I am a medically and research trained physician scientist. I have a long-standing interest in serving the public by teaching and training new research scientists; conducting biomedical research in the areas of cancer treatment and stem cell biology; translating research findings into new tools and applications for research and clinical medicine; and providing expert science education in human biology to non-specialists towards better informing discourse and debate on important government policies for biomedical science, medicine, and health.

My medical and research training include a B.A. degree in Biology from Harvard College; combined Ph.D., in molecular biology and genetics, and M.D. degrees from the Johns Hopkins University School of Medicine; and post-doctoral research training in cancer biology at Princeton University.

I have enjoyed a 22-year career in biomedical research including translational cancer research as an Associate Member at the Fox Chase Cancer Center in Philadelphia, PA; teaching and research in environmental health science, cancer biology, and adult stem cell engineering as an Associate Professor at the Massachusetts Institute of Technology in Cambridge, MA; and Senior Scientist and Director of the Adult Stem Cell Technology Center at the now defunct Boston Biomedical Research Institute, in Boston, MA.

Currently, I direct the for-profit biotechnology start-up company, Asymmetrex, LLC, which I founded in 2013. Asymmetrex develops new technologies for adult stem cell medicine and drug discovery.

Since 2001, I have worked both independently and in collaboration with not-for-profit groups opposed to abortion and human embryo research, nationally and internationally, to educate elected officials and the general public in two main respects: 1) the scientific basis for individual human lives beginning at conception; and 2) that human embryo research can be opposed on scientific grounds. Most recently, I was co-plaintiff for the *Sherley v. Sebelius* court action brought to prevent the National Institutes of Health from funding research that involves harm to human embryos (1,2).

I am a native of Memphis, TN, but currently reside in Boston, MA with my wife of 27 years. We are the very proud parents of two daughters who are college students.

I present myself as an expert witness in the field of biomedical science, in particular the discipline of stem cell research. I am available to the committee to consider any topics, issues, or questions that it may have for which I have sufficient expertise to address.

In particular, I wish to give testimony in support on four aspects (**I-IV** below) of the proposed revisions of Missouri law to better insure that neither aborted human fetuses nor any parts of them are managed in any way other than post-mortem diagnostic medical examination and disposal as required by law.

I also wish to be clear that I do not support legalized abortion. Similarly, my testimony is in no way intended to support abortion. Instead, I offer testimony to support efforts to reduce the unethical and inhumane consequences of legalized abortion.

I. Assurance that the biomedical research enterprise will not be irreparably compromised by the lack of access to aborted human fetuses or their tissues for research and medical treatments.

There are few, if indeed any, questions or problems in biomedical research that can only be addressed by a single experimental system. Now, it is the case that, given no legal, ethical, or moral cautions, scientists would often prefer to study the exactly representative biological system for their research. However, there are many examples of seminal advances in medicine due to research with model systems. A well-known example of such progress is the use of

animals, and now even plants, to conduct investigations that could not be performed in human subjects based on ethical grounds.

Often in biomedical research, the exact experimental system is, in fact, not the ideal one for the most efficient and effective research. When it is permissible to perform research with consented human subjects, the studies can be too cumbersome, too imprecise, too expensive, or have too few subjects available to adequately advance research through important stages. In this case, more effective model systems like cell culture might be employed until knowledge is sufficiently advanced to pursue more complicated studies with consented human subjects. The early phases of the development of many drugs employ such non-human model systems.

The stated purpose of research that might be performed with aborted fetuses should also be considered. For example, in the 1960's, aborted fetuses were used to establish cultures of normal human cells because they were particularly effective for this purpose. Later, these cell cultures were infected with human viruses for vaccine development. There is no need to make new cell cultures of this type. The original ones are still effective; and now there are better technologies for making similarly useful cell cultures with cells from consented volunteer human research subjects.

Even the use of aborted fetuses in research to understand and prevent fetal disorders is not without legal and ethical alternatives. Technologies for the examination, diagnosis, and even surgical treatment of living fetuses in the womb are achieving greater and greater facility (3,4). With the consent of parents, such research might be limited to fetuses who would directly benefit from it; and all studies might be designed to provide essential knowledge without unacceptable risks to the mother or her child.

Even though as single approaches none of the described alternatives may fully substitute for research with aborted fetuses or their parts, as a collective they are more than adequate. Moreover, in the biomedical sciences, the higher standard of research is the investigation of a new discovery in several different orthogonal biological systems, which often include cell culture and animal models.

II. The need for increased whistleblower protection

The consequence of whistleblowing can be devastating to a career in any field, including biomedical science. Each of the proposed improvements in protection and support for professionals who report the illegal transfer or use of aborted human fetuses is warranted. This need has even greater importance, if it turns out that whistleblowers are more likely to be more junior staff and investigators who become aware of illegal activities by their supervisors or even advisors.

III. Increasing safeguards against the illegal transfer and use of aborted fetuses and fetal tissues

Many features of the proposed bills are excellent for legislating more comprehensive mechanisms to increase compliance and documentation of compliance with the existing laws. In addition to the excellent additions proposed, it may also be important to legislate increased education about laws prohibiting aborted fetus transfer and use by requiring teaching and training about the regulations to staff in research laboratories in Missouri research universities and pharmaceutical and biomedical industries. The current legislation is focused on compliance before a breach of the law within the source clinics. However, when intentional violation is operating, it might be undone by reporting from individuals in the receiving institutions. If such individuals are sufficiently informed and empowered to know the law and their recourse within the law, they will be better able to participate in insuring that the law is upheld.

IV. The importance of exact reference to the humanity and human dignity of human fetuses and fetal tissues

No matter what final words are decided to pertain to aborted human fetuses and their removed tissues, their essential biological nature will persist as a previously living, human being. How these now dead young individuals are disposed of will impact how those responsible for their disposal regard them. Approach their disposal with humanity and human dignity (*e.g.*, named vessels for cremation by the state of Missouri; or transfer to families for funeral rites), and the motivation to violate transfer and use laws will be reduced. Treat them without humanity and human dignity (*e.g.*, collective trash incineration), and motivation to violate transfer and use laws will be increased (5,6).

References

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