“Part-Human Chimeras: Worrying the Facts, Probing the Ethics” (2007), by Françoise Baylis and Jason Scott Robert

By: Darby, Alexis Keywords: Part-Human Animals, Ethics of chimera research, Stem cell research

In 2007, Françoise Baylis and Jason Scott Robert published “Part-Human Chimeras: Worrying the Facts, Probing the Ethics” in The American Journal of Bioethics. Within their article, hereafter “Part-Human Chimeras,” the authors offer corrections on “Thinking About the Human Neuron Mouse,” a report published in The American Journal of Bioethics in 2007 by Henry Greely, Mildred K. Cho, Linda F. Hogle, and Debra M. Satz, which discussed the debate on the ethics of creating part-human chimeras. Chimeras are organisms that contain two or more genetically distinct cell lines. Both publications discuss chimeras with DNA from different species, specifically in response to studies in which scientists injected human brain cells into mice. “Part-Human Chimeras,” contributes to a chain of ethical and scientific discussion that occurred in the mid-2000s on whether people should be able to conduct research on chimeras, especially in embryos.

Chimerism is a condition in which a single organism has at least two genetically distinct cell lines. That means that any individual cell has a certain set of DNA, the material that makes up genes, but that there are at least two fully distinct sets of DNA present in different cells in the organism’s body. Chimeras, organisms which experience chimerism, can occur naturally or through laboratory manipulation. Chimerism has been documented occurring naturally in species such as humans. Scientists believe that happens when two fertilized eggs fuse at an early stage of development, producing a single fetus with cells from two different, genetically distinct sources. Chimeras can also be created in a laboratory setting, including the case discussed in the report by Greely and colleagues and in the response by Baylis and Robert. Both sets of authors discuss a proposed experiment in which researchers would implant human brain stem cells into mice. The resulting mice would be interspecies chimeras because they would have both human and mouse genes. The creation of chimeras, especially those using human cells, has been a source of controversy and debate, of which “Part-Human Chimeras” is a part.

A common argument in favor of part-human chimeras is how they could be used to improve research about and provide medical resources for humans. One example is the creation of non-human animals that could grow human organs, allowing many more people to get potentially life-saving organ transplants. Another is the creation of part-human animals to be used as an assay system, or a simplified system which researchers can use to study the effects of something, like a drug. Both Baylis and Robert and Greely and colleagues write about that kind of research in regards to putting human brain cells into mice. Studying the human brain is often difficult because of human’s ethical status, meaning that people think it is unethical to experiment on living humans. Researchers cannot dissect a human brain to, for example, see the effects of a drug. One solution is to cultivate human neural cells in a lab. However, that is not ideal because cells typically behave differently inside and outside of a body. The purpose of the proposed human-mouse chimera, therefore, would be to put human brain cells in an environment where they would still be inside a body, but one that has fewer ethical restrictions and is easier to manipulate.

The authors of “Part-Human Chimeras” both worked within the fields of ethics at the time of article’s publication. In 2007, Baylis was a professor and Canada Research Chair in bioethics and philosophy at Dalhousie University in Halifax, Nova Scotia. Her research focused on the intersection of bioethics and policy. In 2007, Robert was working as a professor in the School of Life Sciences at Arizona State University in Tempe, Arizona, and had previously worked at Dalhousie University. The pair had collaborated on numerous articles, many of which they reference in “Part-Human Chimeras.” They wrote their article in response to “Thinking About the Human Neuron Mouse,” by Greely and colleagues. In that article, Greely and colleagues discuss the benefits, risks, costs, and further recommendations of part-human chimera research, particularly in the context of adding human brain cells into mouse brains. Baylis and Robert disagreed with the content of that report, prompting them to respond with “Part-Human Chimeras” later on in 2007.

The authors split “Part-Human Chimeras,” into six sections. In the first section, an untitled introduction, the authors outline why they decided to respond to the Greely report with their commentary, which was to correct their errors and provide what they called a more comprehensive account of the debate. Then, in a section titled Science, they correct some of Greely’s proposed science that they perceived as inaccurate within that report. In the third section, Law and Policy, Baylis and Robert amend some of the claims Greely and his team made about policies preventing chimera research in both Canada and the United States, further claiming that Greely’s interpretation could mislead readers about Canadian research rules. Furthermore, from both an American and Canadian perspective, Greely’s team does not offer critique on regional ethical oversight into the debate, and Baylis and Robert suggest joint national oversight. In their fourth section, Ethics, they argue that Greely and his team misrepresented a previous article Baylis and Robert had published. Within the fifth and sixth sections, Comments on the
Then, Baylis and Robert make three recommendations for improvement to the Greely report in their article’s fifth section, Comments on the Recommendations. First, the authors suggest that Greely and colleagues consider extending their
perceptions on the debate of part-human animal research to review deeper philosophical questions. They state that the report only showed a harms and benefits analysis in terms of its ethical investigation and propose that they should consider deeper philosophical questions about what it means to be a human. Then, Baylis and Robert argue that Greely and colleagues should correct how they refer to a mouse injected with human brain cells. In the original report, Greely and colleagues call amouse injected with human brain cells a mouse. However, Baylis and Robert suggest that they should instead refer to it as a part-human animal. They state that by referring to the organism as a part-human animal, it may satisfy those who believe the organisms have a higher moral status than non-chimeric laboratory animals. This references another recurring argument in the broader discussion of part-human chimeras, that part-human animals have higher moral status than other, entirely non-human animals.

In the final section of their article, Conclusion, Baylis and Robert note that there have been many new articles and perspectives on whether scientists should or should not do chimera research. While they do not make a specific recommendation, the authors do state that scientific justifications for the research are scarce, and ethical arguments for doing such research are underdeveloped.

Greely and his team responded to Baylis and Robert’s article in a 2007 commentary response published in the American Journal of Bioethics called “Response to open peer commentaries on ‘Thinking about the human neuron’.” Greely and colleagues argue that Baylis and Robert only pointed out things they believed to be errors or ways they would have written the article themselves, rather than offering a substantive response. Greely and his team also imply that Baylis and Robert misconstrued their original perception of the pair’s 2003 article. The team does concede that they made a mistake by referring to a chimera as a hybrid once, and thank Baylis and Robert for their correction.

As of 2021, Baylis and Robert’s article has been cited over thirty times, primarily in other articles on the ethics and politics of part-human chimeras. The debate on the use of human cells, especially stem cells, in chimera research remains active, and experts continue to discuss whether scientists should proceed with such research, and what its legal and ethical implications would be.

Sources


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