


# The ethical and legal challenges of cell donation for brain organoid research

---

 [openaccessgovernment.org/article/the-ethical-and-legal-challenges-of-cell-donation-for-brain-organoid-research/178664](https://openaccessgovernment.org/article/the-ethical-and-legal-challenges-of-cell-donation-for-brain-organoid-research/178664)

28 June 2024

## **Ethical and legal concerns raised by the use of human biological materials, especially cells from adult donors and foetal tissues, must be thoroughly examined. This article delves into these challenges, with a specific focus on the issues of consent in cell donation for brain organoid research**

---

Brain organoid research represents a significant leap forward in neuroscience and offers unprecedented insights into brain development and disorders. However, the use of human biological materials, particularly cells from adult donors and foetal tissues, raises critical ethical and legal concerns. <sup>(6, 10)</sup> This report examines these challenges by focusing on the issues of consent in the donation of cells for brain organoid research.

### **Consciousness and brain organoid research**

---

Brain organoids are three-dimensional self-organising structures derived from pluripotent stem cells or tissue stem cells that mimic the early development and structure of the brain. <sup>(2, 4)</sup> One of the main ethical dilemmas in brain organoid research is the potential development of consciousness. <sup>(10)</sup> As these organoids become more complex, they exhibit complex-synchronised electrical activity. The concern is whether these organoids might achieve a level of consciousness or sentience (ability to feel pain), raising profound ethical questions about their treatment and use in research.

While the current scientific consensus is that brain organoids are unlikely to achieve consciousness in any established sense owing to several limitations, including their lack of sensory input and connections to the rest of the body, <sup>(3)</sup> this possibility cannot be completely dismissed.

This uncertainty requires strict ethical oversight and guidelines to ensure that the creation and use of brain organoids respect fundamental ethical principles and human dignity.

### **Consent for cell donation for brain organoid research**

---

Informed consent is the cornerstone of ethical research involving human participants. Obtaining consent from donors of biological materials is particularly complex. <sup>(6)</sup> Donors need to be fully informed about the potential uses of their cells, including the creation of brain organoids and the associated risks and ethical issues. The potential of consciousness is one such issue; however, it does not exhaust related considerations. Some people may be uncomfortable with the idea of creating neural tissues from their

cells. Others may consider unacceptable research that transplants them into animal brains <sup>(7)</sup> or that connects them to a computer to play a video game. <sup>(5)</sup> Donors have the right not to have their donated cells used in ways that violate their moral integrity.

In addition, donors should understand the long-term implications of their participation, including issues related to privacy and the potential commercial use of the research results. Clear communication and transparency are essential to ensure that donors make informed decisions and that their autonomy and rights are respected.

## **Donation of human foetal brain tissue**

---

The use of human brain tissue from aborted fetuses in brain organoid research adds another layer of complexity to the issues of consent and ethical considerations. <sup>(10)</sup> The primary concern is to obtain appropriate consent, which is ethically and legally challenging because of the sensitive nature of abortion. Researchers must ensure that consent for tissue donation is voluntary and free from coercion.

In particular, the possibility of donation should not be a part of the decision-making process for abortion and thus should be presented to donors after the final decision to abort has been made. <sup>(1)</sup> In addition, the potential therapeutic or commercial applications of this research may raise concerns about the commodification of foetal tissue and the moral implications of such uses.

Given the lack of international ethical and legal consensus on research using foetal tissues, Sawai and Kataoka (2024) emphasised the necessity of a globally harmonised regulatory framework to address various challenges, including consent. <sup>(10)</sup>

## **Balancing scientific progress and ethical responsibility**

---

The ethical and legal challenges of brain organoid research, particularly those related to the use of human biological materials, underscore the need for a balanced approach that prioritises both scientific progress and ethical responsibility. Researchers, ethicists, and policymakers must collaborate to develop comprehensive guidelines that address the unique challenges in this field.

Key recommendations include:

1. Developing standardised protocols for obtaining informed consent from donors, with particular attention to the complexities of consent in the context of foetal tissue donation;
2. Promoting transparency in research practices and actively engaging the public to build trust and address ethical and social concerns related to brain organoid research;
3. Strengthening and globally harmonising legal frameworks to protect donor rights, regulate biological materials, and address potential commercial and therapeutic applications of brain organoid research;

4. Developing guidelines to address the ethical implications of potential consciousness in brain organoids, including criteria for assessing consciousness and protocols for humane treatment.

The ethical and legal challenges associated with brain organoid research are numerous and require careful consideration. By addressing these issues through robust ethical oversight, informed consent protocols, transparency, and a comprehensive regulatory framework, the scientific community can advance research on brain organoids responsibly and ethically. Moreover, brain organoid research is not the only field requiring such an approach. Significant developments in stem cell research over the recent years have created increasingly complex entities (e.g. embryo models) that pose a variety of ethical and legal challenges. <sup>(8)</sup> It is critical to ensure that the potential benefits of such groundbreaking research are realised while respecting the rights and dignity of all individuals involved.

## References

---

1. Barker, R. A., Boer, G. J., Cattaneo, E., Charo, R. A., Chuva de Sousa Lopes, S. M., Cong, Y., Fujita, M., Goldman, S., Hermerén, G., Hyun, I., Lisgo, S., Rosser, A. E., Anthony, E., & Lindvall, O. (2022). The need for a standard for informed consent for the collection of human fetal material. *Stem Cell Reports*, 17(6), 1245–1247. <https://doi.org/10.1016/j.stemcr.2022.05.013>
2. Hendriks, D., Pagliaro, A., Andreatta, F., Ma, Z., van Giessen, J., Massalini, S., López-Iglesias, C., van Son, G. J. F., DeMartino, J., Damen, J. M. A., Zoutendijk, I., Staliarova, N., Bredenoord, A. L., Holstege, F. C. P., Peters, P. J., Margaritis, T., Chuva de Sousa Lopes, S., Wu, W., Clevers, H., & Artegiani, B. (2024). Human fetal brain self-organizes into long-term expanding organoids. *Cell*, 187(3), 712–732.e38. <https://doi.org/10.1016/j.cell.2023.12.012>
3. Hyun, I., Scharf-Deering, J. C., Sullivan, S., Aach, J. D., Arlotta, P., Baum, M. L., Church, G. M., Goldenberg, A., Greely, H. T., Khoshakhlagh, P., Kohman, R. E., Lopes, M., Lowenthal, C., Lu, A., Ng, A. H. M., Pasca, S. P., Paulsen, B., Pignoni, M., Scott, C. T., Silbersweig, D. A., ... Lunshof, J. E. (2022). How collaboration between bioethicists and neuroscientists can advance research. *Nature Neuroscience*, 25(11), 1399–1401. <https://doi.org/10.1038/s41593-022-01187-2>
4. Lancaster, M. A., Renner, M., Martin, C. A., Wenzel, D., Bicknell, L. S., Hurlles, M. E., Homfray, T., Penninger, J. M., Jackson, A. P., & Knoblich, J. A. (2013). Cerebral organoids model human brain development and microcephaly. *Nature*, 501(7467), 373–379. <https://doi.org/10.1038/nature12517>
5. Kagan, B. J., Kitchen, A. C., Tran, N. T., Habibollahi, F., Khajehnejad, M., Parker, B. J., Bhat, A., Rollo, B., Razi, A., & Friston, K. J. (2022). In vitro neurons learn and exhibit sentience when embodied in a simulated game-world. *Neuron*, 110(23), 3952–3969.e8. <https://doi.org/10.1016/j.neuron.2022.09.001>
6. Kataoka, M., Gyngell, C., Savulescu, J., & Sawai, T. (2024). The donation of human biological material for brain organoid research: The problems of consciousness and consent. *Science and Engineering Ethics*, 30(1), 3. <https://doi.org/10.1007/s11948-024-00471-7>

7. Revah, O., Gore, F., Kelley, K. W., Andersen, J., Sakai, N., Chen, X., Li, M. Y., Birey, F., Yang, X., Saw, N. L., Baker, S. W., Amin, N. D., Kulkarni, S., Mudipalli, R., Cui, B., Nishino, S., Grant, G. A., Knowles, J. K., Shamloo, M., Huguenard, J. R., ... Paşca, S. P. (2022). Maturation and circuit integration of transplanted human cortical organoids. *Nature*, 610(7931), 319–326. <https://doi.org/10.1038/s41586-022-05277-w>
8. Rivron, N. C., Martinez Arias, A., Pera, M. F., Moris, N., & M'hamdi, H. I. (2023). An ethical framework for human embryology with embryo models. *Cell*, 186(17), 3548–3557. <https://doi.org/10.1016/j.cell.2023.07.028>
9. Sawai, T., Hayashi, Y., Niikawa, T., Shepherd, J., Thomas, E., Lee, T. L., Erler, A., Watanabe, M., & Sakaguchi, H. (2022). Mapping the ethical issues of brain organoid research and application. *AJOB Neuroscience*, 13(2), 81–94. <https://doi.org/10.1080/21507740.2021.1896603>
10. Sawai, T., & Kataoka, M. (2024). The ethical and legal challenges of human foetal brain tissue-derived organoids: At the intersection of science, ethics, and regulation. *EMBO Reports*, 25(4), 1700–1703. <https://doi.org/10.1038/s44319-024-00099-5>

Please Note: This is a Commercial Profile



This work is licensed under [Creative Commons Attribution 4.0 International](https://creativecommons.org/licenses/by/4.0/).