

Human-monkey embryo created in bid to learn how cells communicate

US scientists produced 'chimera' cells using human stem cells – but critics say the work 'poses ethical challenges'

By Telegraph Reporters
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The cells were inserted in macaque embryos in petri dishes | CREDIT: REUTERS

Scientists have grown human cells in monkey embryos with the aim to understand more about how cells develop and communicate with each other.

Researchers from the Salk Institute in California have produced what is known as monkey-human chimeras, with human stem cells - special cells - that have the ability to develop into many different cell types - inserted in macaque embryos in petri dishes in the lab.

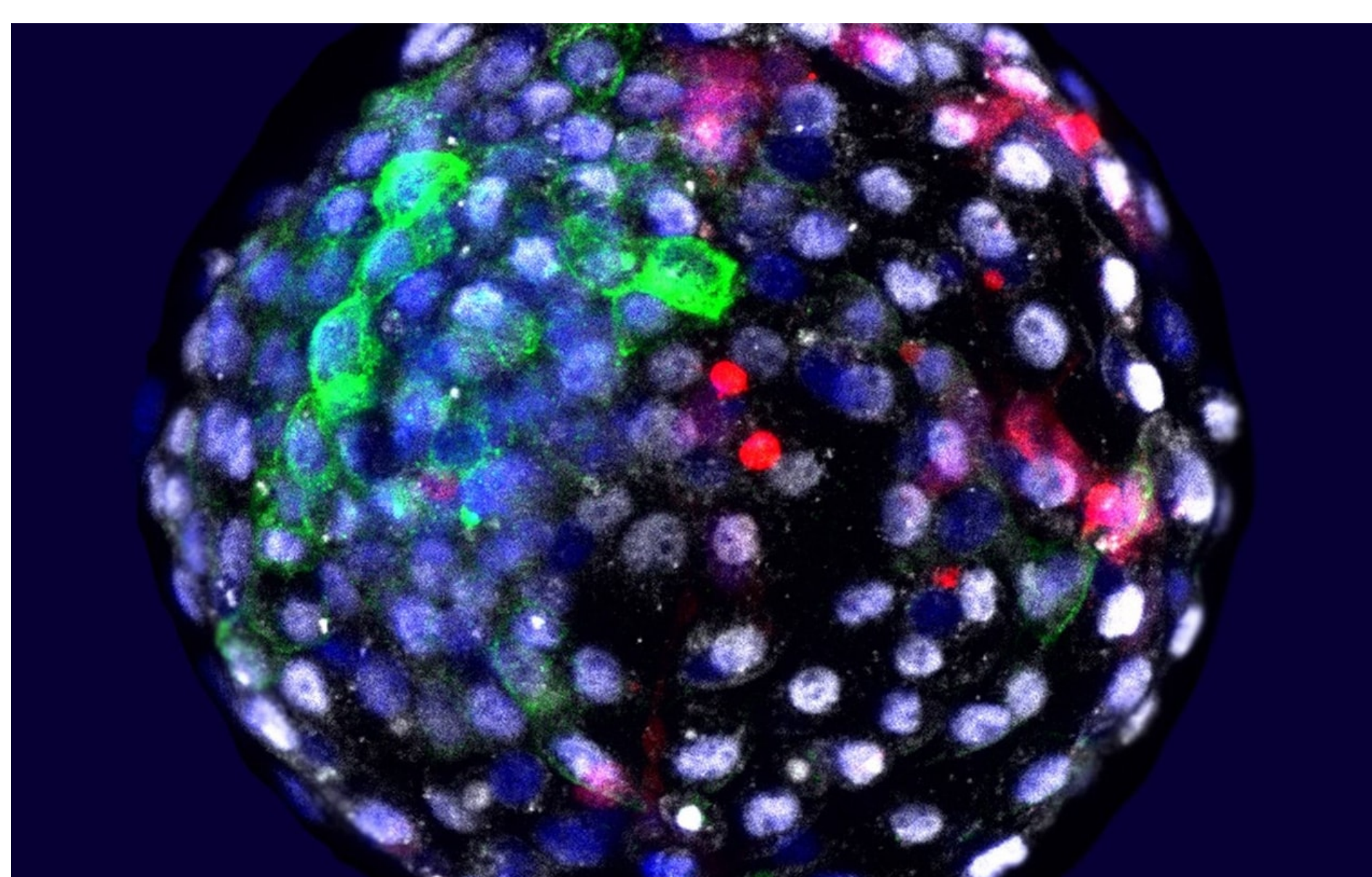
However, some ethicists in the UK have raised concerns, saying this type of work "poses significant ethical and legal challenges" and "opens Pandora's box to human-nonhuman chimeras".

They are calling for a public discussion about the ethical and regulatory challenges associated with human-animal chimeras.

Chimeras are organisms whose cells come from two or more individuals.

In humans, chimerism can naturally occur following organ transplants, where cells from that organ start growing in other parts of the body.

The scientists, led by Professor Juan Carlos Izpisua Belmonte, say their work could pave the way in addressing the severe shortage in transplantable organs as well as help understand more about early human development, disease progression and ageing.



Human cells grown in an early stage monkey embryo | CREDIT: PA

Prof Izpisua Belmonte said: "These chimeric approaches could be really very useful for advancing biomedical research not just at the very earliest stage of life, but also the latest stage of life."

In 2017, Prof Izpisua Belmonte and his team [created the first human-pig hybrid](#), where they incorporated human cells into early-stage pig tissue but found that human cells in this environment had poor molecular communication.

So the team decided to investigate lab-grown chimeras using a more closely related species - macaques.

The human-monkey chimeric embryos were monitored in the lab for 19 days before being destroyed.

According to the scientists, the results, published in the journal *Cell*, showed that human stem cells "survived and integrated with better relative efficiency than in the previous experiments in pig tissue".

The team said understanding more about how cells of different species communicate with each other could provide an "unprecedented glimpse into the earliest stages of human development" as well as offer scientists a "powerful tool" for research on regenerative medicine.

Prof Izpisua Belmonte maintains that their work has met the current ethical and legal guidelines, adding: "As important for health and research as we think these results are, the way we conducted this work, with utmost attention to ethical considerations and by coordinating closely with regulatory agencies, is equally important.

"Ultimately, we conduct these studies to understand and improve human health."



Professor Juan Carlos Izpisua Belmonte said the work could help to address the severe shortage in transplantable organs | CREDIT: PA

Commenting on the research, Dr Anna Smajdor, lecturer and researcher in biomedical ethics at the University of East Anglia's Norwich Medical School, said: "This breakthrough reinforces an increasingly inescapable fact: biological categories are not fixed - they are fluid.

"This poses significant ethical and legal challenges."

She added: "The scientists behind this research state that these chimeric embryos offer new opportunities, because 'we are unable to conduct certain types of experiments in humans'.

"But whether these embryos are human or not is open to question."

Prof Julian Savulescu, director of the Oxford Uehiro Centre for Practical Ethics and co-director of the Wellcome Centre for Ethics and Humanities, University of Oxford, said: "This research opens Pandora's box to human-nonhuman chimeras.

"These embryos were destroyed at 20 days of development but it is only a matter of time before human-nonhuman chimeras are successfully developed, perhaps as a source of organs for humans. That is one of the long-term goals of this research.

"The key ethical question is: what is the moral status of these novel creatures? Before any experiments are performed on live-born chimeras, or their organs extracted, it is essential that their mental capacities and lives are properly assessed."

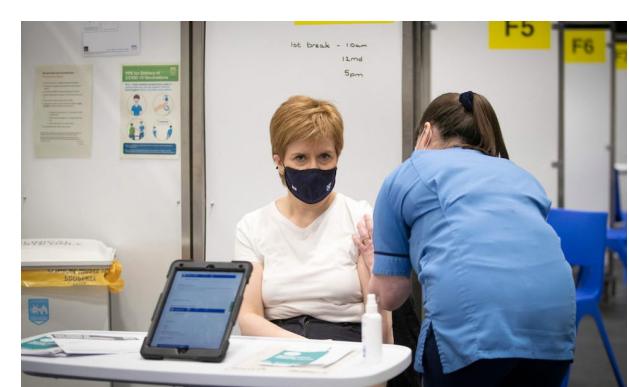
Sarah Norcross, director of the Progress Educational Trust, said that while "substantial advances" are being made in embryo and stem cell research, which could bring equally substantial benefits, "there is a clear need for public discussion and debate about the ethical and regulatory challenges raised".

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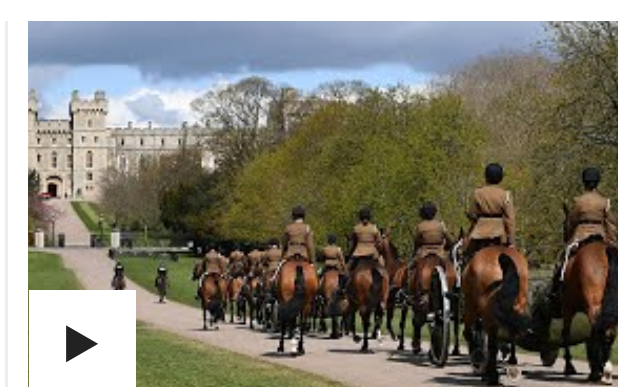
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