

Protect your fibroblasts before they become gametes

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LETTER TO THE EDITOR

About 5 years ago, we wrote a science-fiction essay describing the creation of a super-talented tennis player (carrying the imaginary name Rofa Nadofederal) by using stem cells of two great tennis champions, Rafael Nadal and Roger Federer (1). In a subsequent communication, we drew attention to tennis players and other athletes, not to share their towels with the audiences after the competition is completed, because fibroblasts, which are abundant in their sweat, could be used to generate gametes. It is conceivable that these gametes could then be unlawfully used for reproductive purposes (2). These hypothetical scenarios have now come much closer to becoming a reality. In a September 2021 paper in Science (3), Yoshino et al reported generation of ovarian follicles (eggs and supporting ovarian tissue) by using only mouse pluripotent stem cells. These functional mouse eggs, that

could be fertilized in a dish, are capable of forming mouse embryos. The primary goal of this new advance was to develop new treatments for infertility. A review of the rapid progress in this field, including human in-vitro gametogenesis has been recently published (4).

This new work confirms that it is now possible, at least in the mouse, that offspring could be created by reprogramming of only fibroblasts. In humans, fibroblasts obtained without consent, or even the knowledge of the donors, could, in the near future, be harvested from sweat and used to produce offspring with a unique genetic make-up, and presumably abilities, like the ones described for Rofa Nadofederal (1). We suggest, in view of the latest results (3), that it is now time for people of all walks of life to start paying more attention as to who, and under which circumstances, could get possession of their easily assessable fibroblasts, like those from sweat. We expect that this issue will gain paramount importance if and when a human offspring is created solely by using reprogrammed fibroblasts. It seems that this evolving technology is only a few years away from implementation in humans (4). The huge ethical implications of these new reproductive possibilities are obvious. At present,

the best defense against such activities seems to be intense vigilance as to who could have access to your easily obtainable fibroblasts, such as those from sweat.



Authors' disclosures

Authors declare no potential conflict of interest.



REFERENCES

1. Diamandis EP. Rofa Nadofederal-The greatest tennis player that ever lived: A science fiction story depicting a future where biotechnology is unchecked. *Clin Biochem.* 2017; 50:977-978. doi: 10.1016/j.clinbiochem.2017.08.016.
2. Diamandis EP. Athletes beware before throwing towels to audiences. *Clin Chem Lab Med.* 2018;56:e82. doi: 10.1515/cclm-2017-1001
3. Yoshino T, Suzuki T, Nagamatsu G, Yabukami H, Ikegaya M, Kishima M, Kita H, Imamura T, Nakashima K, Nishinakamura R, Tachibana M, Inoue M, Shima Y, Morohashi KI, Hayashi K. Generation of ovarian follicles from mouse pluripotent stem cells. *Science.* 2021;373(6552):eabe0237. doi: 10.1126/science.abe0237.
4. Saitou M, Hayashi K. Mammalian in vitro gametogenesis. *Science.* 2021;374(6563):eaaz6830. doi: 10.1126/science.aaz6830.