

Reproductive technologies, risk, enhancement, and the value of genetic relatedness

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ABSTRACT:

This paper responds to commentaries on my paper “In vitro eugenics” (IVE). I defend the description of any project of multigenerational selective crossing of human embryos as “in vitro eugenics” and argue that, even if IVE should never be pursued, discussion of this possibility may help us better understand the ethics of other NRTs and means of genetic human enhancement. The responses to my paper demonstrate this nicely by: (a) illustrating the selective way in which arguments about risk are mobilised in debates about NRTs; and, (b) highlighting the tension between any obligation of “procreative beneficence” and a concern for genetic relatedness.

Keywords: Gametogenesis; Ethics; Stem Cells; Human Enhancement; Eugenics; Gametes.

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Introduction

In “in vitro eugenics” (IVE), I outlined a theoretical use of a technology of artificial gametogenesis, wherein repeated iterations of the derivation of gametes from embryonic stem cells, followed by the fusion of gametes to create new embryos, from which new stem cells could be derived, would allow researchers to create multiple generations of human embryos in the laboratory and also to produce “enhanced” human beings with desired traits.[1] As a number of commentators observed, my purpose in publishing this paper was to provoke ethical discussion of a largely unremarked upon technological possibility and surrounding issues. Even if this was, as Tim Murphy observes archly [2], to aim “low”, discussion of IVE is valuable for three reasons. First, it may render us better prepared should IVE become practical. I noted of my original discussion that it was speculative and several of the respondents suggest that IVE is even less likely to come about than I allowed there. Nevertheless, second, discussion of IVE is valuable for what it reveals about the ethics of new reproductive technologies (NRTs) more generally and, third, about the ethics of genetic human enhancement in particular. The responses to my paper demonstrate this nicely by: (a) illustrating the selective way in which arguments about risk are mobilised in debates about NRTs; and, (b) highlighting the tension between any obligation of “procreative beneficence” and a concern for genetic relatedness. Even if IVE should never be pursued, then, discussion of this possibility may help us better understand the ethics of other NRTs and means of genetic human enhancement.

Before moving to these topics, however, let me address a number of concerns raised by the commentaries which *do* relate solely to IVE.

The science, name, ethics, and utility of “in vitro eugenics”

Da Fonseca, Ribeiro, Carvalho, & Stancioli are mistaken in suggesting that it would be necessary for researchers to be able to non-destructively assess the genetics of the individual gametes used to create each generation of embryos in order for IVE to be plausible.[3] Animal breeders have had tremendous success in altering the phenotype of domesticated species without knowing anything about the genes carried on the particular gametes involved in any mating. Instead, selection and combination of traits has been achieved simply by deciding which animals to mate with each other. All IVE requires is that researchers are able to identify the presence of desirable traits in embryos (rather than gametes), which they could do using preimplantation genetic diagnosis. Da Fonseca, Ribeiro, Carvalho, & Stancioli are correct, however, to observe that knowing the genetic sequence of a particular embryo would tell us less about the phenotype of the individual it might become than we might wish — including for reasons beyond those I had previously acknowledged. Yet, as I observed in my original paper, this is a problem that besets any attempt to enhance human beings through embryo selection or modification.

Matthews [4]; and, Fujita, Yashiro, and Suzuki [5] object to my characterisation of the process I describe as eugenics and worry that this risks alarming the public unnecessarily about the ethics of artificial gametogenesis and stem cell technologies by associating them with the shameful history of eugenics. There is, of course, no justification for describing all research involving embryos or stem cells as “eugenics” nor for describing the derivation of gametes from stem cell lines as such. However, *contra* these critics, I continue to believe that it is not inappropriate to describe any project of multigenerational selective crossing of human embryos as “in vitro eugenics”. To begin with, note that the use of “in vitro” in the description “in vitro eugenics” qualifies the term “eugenics” by highlighting the fact that the “breeding” will occur in a laboratory system rather than amongst the population at large. Moreover, if it is appropriate to describe the process of bringing individuals into existence with genomes shaped by multigenerational programme of selective crosses between embryos performed in vitro as “in vitro eugenics”, as Matthews, and Fujita, Yashiro, and Suzuki concede, then it is appropriate to describe the process of manipulating embryos up to and including

the penultimate generation as such. That is to say, *contra* Matthews, IVE may take place without producing a living individual. Note also that unlike any other reproductive technology or technology of human enhancement, IVE necessarily involves shaping the genetics of *populations* of human embryos, rendering it the use of the term eugenics here *more* appropriate than many of the other places where it is bandied about.

In the end, whether the name I chose to use is appropriate or not seems to me a matter for the judgement of a larger audience than have yet had the opportunity to comment on the matter. A recent treatment of this topic by Carl Shulman and Nick Bostrom [6] calls the same technology “iterated embryo selection” — a name that Matthews, and Fujita, Yashiro, and Suzuki, may prefer. I believe that drawing attention to those aspects of the technology that it shares with historical dreams of breeding human beings through the use of the term eugenics may usefully foreground important intuitions which are inchoate in the context of debates about other (potential) technologies of genetic enhancement. It will be a matter of regret if — as my critics fear — my use of the word eugenics further distracts participants from an accurate assessment of the full range of issues involved.

Tim Murphy [2] appears to deny that concerns about the creation of embryos for research purposes stands as an “ethical barrier” to the development of this technology and is unhappy that I adduced the claim that this is prohibited in some jurisdictions as evidence for the fact that there might be an ethical barrier here. I trust Murphy will welcome Jonathan Pugh’s helpful discussion of the arguments against the creation of embryos for research purposes and their (lack of) force.[7] I quite deliberately did not engage with the substance of this debate for two reasons. First, this issue is hardly unique to IVE and has been discussed extensively elsewhere in the literature about the ethics of stem cell technologies.[8] Second, whatever the merits of the case against creating embryos for purposes other than reproduction, when it comes the question of whether IVE is ever likely to be pursued — and therefore worth discussing to see what other issues it might raise — *contra* Murphy

the key issue is not whether objections to research involving human embryos also have force against IVE but whether this objection is likely to prove politically compelling. Thus even if Pugh is right — as I suspect he is — that, **regardless of the philosophical merit of their case**, those who are opposed to the creation of embryos for research purposes will be unmoved by the claim that research into artificial gametogenesis might ultimately allow many infertile couples to reproduce, this does not alter my belief that popular demand for a safe and effective technology of artificial gametogenesis as an infertility treatment will sweep any such objections aside and thereby clear the way for IVE.

Where a technology offers a realistic prospect of significant medical benefits — and especially where these include helping infertile couples to have children — scientists are usually able to mobilise a sufficiently strong political constituency in support of research to overcome objections based on a concern for the status of the embryo, if not always in every country in the world.

Debra Matthews argues that there will be no need for IVE for enhancement because of recent advances in the technology available for the genetic modification of organisms, which make possible much more precise alterations of the genome.[4] Da Fonseca, Ribeiro, Carvalho, and Stancioli [3] in turn question the extent to which it will be useful for Matthews' preferred purpose of studying the genetics of inheritable conditions.

I accept that the progress of the science of stem cells, gametogenesis, and genetic modification may vitiate the utility of IVE — indeed may, perhaps, already have done so — and emphasise that my description of IVE was always intended merely as an investigation of one theoretical technology of manipulating the human genome. Admittedly, I did argue that it would have some advantages over recombinant DNA technology as a method of human enhancement, which now look much less compelling. However, it remains the case that IVE would have the significant advantage that any child born of this process represents a genetic possibility that might have emerged as a result of successive generations of ordinary reproduction and for that reason IVE might be perceived by some as both more natural and safer than direct genetic modification.[9] Moreover, even if IVE is never

used, *contra* Matthews, I believe that it enhances rather than detracts from the discussion of possible genetic modification of human beings in so far as we may learn things about the ethics of more familiar technologies, such as recombinant DNA technology, which might be used for human enhancement from our intuitions regarding this more outré possibility. Indeed, the objections to IVE raised in the commentaries relating to the risks to future children and the importance of genetic relatedness offer precisely such lessons.

Risk, enhancement, and genetic relatedness

Murphy [2], da Fonseca, Ribeiro, Carvalho, and Stancioli [3]; Siegel [10]; and, Mertes [11] all argue that I underestimate the extent to which the risks to children involved in IVE constitute an objection to the ethical use of IVE. Mertes goes so far as to suggest that there should be a moratorium on it for this reason.

The recourse to a claim about “risk” to suggest that IVE could never be ethical seems to me to be somewhat disingenuous — as it does in many contexts in which it arises in debates about the ethics of NRTs. I believe that concerns about the possible risks to the people brought into existence using a technology often function as a proxy for — or in the service of — other agendas. People who are opposed to NRTs for (other) moral or ideological reasons, such as a concern for the status of the embryo, will often object that the proposed NRTs are essentially untested and experimental because they know that concerns about “risks to children” will allow them to appeal to the broadest possible audience. More cynically, it seems to me that the argument that some particular use of a reproductive technology to controversial ends would be “too risky” is sometimes used by researchers who in fact support the development of the technology to buy time for research on it to progress in the face of looming regulatory pressure. For instance, saying “of course it would be unethical to clone a human being, because of the risk” allows scientists to work on animal models or *in vitro* systems until such time as they can point to these models and systems as evidence that the

technology meets a — now miraculously lower — threshold of safety required for human trials to begin.

Thus while da Fonseca, Ribeiro, Carvalho, and Stancioli [3] and Mertes [11] insist that the risks involved in germline engineering are too great for it to be ethically permissible, Debra Matthews thinks we need to be having an urgent discussion of its ethics [4], presumably because she does *not* believe that such modification is straightforwardly ruled out by a concern for the well-being of those children who would be born as a result of the technology. Given that the first use of any NRT will be essentially experimental and risk unanticipated consequences for those children born of it, no matter how carefully it has been tested *in vitro* or in animal models — and presuming that none of these authors wish to argue that it would *never* be ethical to trial a new reproductive technology — the real dispute between these authors cannot concern the question whether it is ever ethical to impose unknown risks on future children but rather *when* it is ethical to do so. My claim, then, is just that if IVE could be used to produce embryos that might develop into children with much higher welfare than normal children as a result of being significantly genetically enhanced then this might plausibly be thought a better grounds for trialling the technology than (for instance) the desire of couples to have children who were genetically related to them rather than (for instance) adopting.

Murphy [2]; Siegel [10]; and Mertes [11] all suggest that the fact that IVF would produce children without significant genetic ties to their social and/or commissioning parents (or, indeed, to any individual, living or dead!) is more problematic than I acknowledge.

Siegel [10] thinks that the lack of genetic relation between parent and child means that there will be little demand for IVE despite its potential for enhancement. I agree with Siegel and Mertes that parents are typically far more concerned to produce genetic offspring than to have the best child possible — and therefore that demand for IVE may in practice be limited. However, I take it that this is strong evidence that the influential account of the ethics of human enhancement developed by John Harris [12] and Julian Savulescu [13-15], is implausible in so far as, **in postulating an obligation**

to have the best child possible, it implies that (all) these parents are morally blameworthy. Mertes' remarks about the significance of the desire for genetic parenthood suggest that she would agree.

Siegel disputes whether this conclusion follows, because he thinks that “welfarists” might excuse parents' desires to bring into existence only their own genetic offspring or prefer that parents adopt rather than reproduce at all. It is unclear to me whether Siegel here mistakes my reference to a concern for the welfare of the child for an observation about the implications of welfarism more generally for reproduction rather than a claim about the implications of the influential account of the “obligation” to enhance developed by Harris and Savulescu, as I intended, or whether, like those authors, he is trading on the fact that decisions about reproduction are typically not person-affecting in order to allow that parents could be subject to an obligation (maximise their future child's expected welfare) that they could defeat merely by desiring to do something else (have a child genetically related to them). If the former, he is mistaken: my point was just that if individuals who are considering reproducing are — as Savulescu has argued explicitly and Harris's arguments imply — “obligated” to have the best child possible then it is very likely indeed that an enhanced unrelated child produced by IVE will have “better” life prospects than their own genetic offspring. If the latter, then there is a longer argument to be had here than space allows, about the nature and force of the obligation produced by procreative beneficence; I have discussed this matter elsewhere.[16-17]

Murphy bemoans the fact that I did not defend the moral permissibility of bringing children into existence who might lack knowledge of their genetic origins. I did not for two reasons. First, I discussed this objection extensively in my paper “Orphaned by conception” [18], which I referenced at the appropriate point in my discussion of IVE. Second, as I observed therein, it is obvious that this objection, if valid, would rule out anonymous gamete and embryo donation as well as implying that the very large number of individuals living in ignorance of the fact that their social father is not their genetic father have suffered a profound harm of which they are unaware. There is indeed an issue here but it is hardly unique to IVE and for that reason I chose not to discuss it further in my paper.

Conclusion

Finally, to return to the question of the virtues or otherwise of my discussion of IVE. Murphy castigates me for not providing “a full moral defence across the gamut of meaningful objections”. That I have not met Murphy’s admirably high standards in this regard does not surprise me. I ran drafts of this paper past almost a dozen colleagues and reviewers, each of whom reacted strongly to the possibility of IVE and wanted me to say more about either the science or the ethics in response to objections they raised. As a result of trying to address their concerns the paper is 8000 words in length where JME will normally only accept submission of 3500 words — or 7000 words for a feature article (as this one eventually appeared). Reasons of space alone therefore prevented me from addressing the further objections Murphy would like me to have considered. However, more importantly, my purpose was never to defend this technology — my own hostility towards human enhancement is a matter of public record — but only to draw attention to it and show that it is plausibly defensible in the context of the larger debate about assisted reproductive technologies... indeed, *more* plausibly defensible than many of the other putative methods of genetic human enhancement. As I have argued here, most of the objections that people have raised to IVE, including most of those raised by the commentators, apply equally or even more forcefully to existing reproductive technologies and/or to other proposals for human enhancement which are debated extensively in the bioethics and applied ethics literature. If we feel uncomfortable with the idea of IVE this suggests that we may have reason to think harder about the ethics of other, more familiar, technologies.

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