

Will an anti-sperm contraceptive vaccine gain public acceptance?

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Despite decades of research on contraceptive vaccines and their long-term usage in animals, there is no human contraceptive vaccine on the market today. As a scientist setting out to develop such a vaccine, I am concerned about the causative elements of past failures. Were they rooted in the science? Was safety an issue? Efficacy? Or was/is there a social stigma associated with the idea of immunocontraception?

I am a biochemist, but my scientific “hobby” has always been the study of human population. I have given dozens of public talks on its various aspects over the last decade and over the last three years I have offered a 1-semester, upper-level undergraduate course on the subject, open to students of any major. As part of my course, called “Human Population”, we address the psychological aspects of global overpopulation as a topic of discussion. In short, the subject is a taboo. One political scientist, Diana Coole, has gone to the trouble of breaking down and classifying the modes of disavowal of population as a problem [1]. Suffice it to say, the topic brings dark thoughts to the surface. In my interactions with students, friendly audiences, and my academic colleagues, I have found that the mention of a technological “solution” to the overpopulation problem brings thoughts of genocide, racism, ethnic cleansing, and eugenics to the surface in some people, despite these terms being assiduously avoided in my presentations. Non-technological solutions, such as family planning and female empowerment, never receive negative reviews, but crossing over from family planning to a contraceptive vaccine, even though the latter enables the former, is received with increased scrutiny and apprehension in general. One of my colleagues even ruled it out as an option, expressing adamant opposition. Interestingly, an explanation for the opposition was never provided, suggesting that the reasoning behind the opposition was not rational but emotional. (In my course we study an article by Lisa Tessman about how human emotions, or first-order judgement, hijack logical reason, or second order judgement [2].)

Furthermore, funding for new methods for contraception, such as a contraceptive vaccine, is very limited. Out of the total 2017 NIH budget of \$37.3 billion, \$437 million, or 1.2%, was awarded in the Contraception/Reproduction category, and within this category,

only 1.8%, or \$7.69 million, was awarded to the development of new contraceptives [3]. Private foundations (with one exception) do no better. One prominent private foundation offered a call for proposals for new research in contraception but specifically excluded immune-based methods [4].

Birth control vaccines target antigens of gametogenesis (immune sterilization), fertilized egg implantation (immuno-abortifacient, according to some), or sperm function (immunocontraception). Many are 100% effective in various mammals [5], including potentially in human [6]. If administered in the female, the anti-sperm antibodies in the vaginal mucosa may be neutralized by antigenic overdosing, temporarily reversing the vaccine effect and restoring fertility [6]. In reviewing the extensive literature, I can conclude that safety, efficacy and reversibility are not the reasons for the continued absence of a contraceptive vaccine in the world market. Unless another hypothesis is brought forward, I conclude that a powerful stigma exists!

Should my lab should proceed with an anti-CatSper [7] vaccine?

References

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