

# Ethics Challenge 2016/2017

## GENE EDITING

Gene editing allows sections of DNA from a genome to be precisely replaced or removed using 'molecular scissors'. Techniques such as CRISPR-Cas9 can modify genomes of living organisms at precise locations in more specific and more cost-effective ways than were previously possible.<sup>1</sup> In the future, these tools also hold the potential to be applied clinically to prevent or treat lethal and/or seriously debilitating genetic diseases. Gene editing of somatic cells is currently in clinical development for a variety of conditions, including HIV and leukaemia.<sup>2</sup> Human germline editing, which involves altering genes in sperm, eggs or embryos, holds the possibility of not only correcting genes that cause disease, but also of passing those genetic fixes on to future generations. In April 2015, researchers in China announced that they had attempted to use CRISPR-Cas9 to edit non-viable human embryos with a debilitating disease. The experiment was partially successful, but the team concluded that there are still hurdles to overcome before CRISPR is safe for clinical use.<sup>3</sup> The announcement was welcomed by some in the scientific community as a major step forward in eradicating debilitating human disease. Although these embryos were non-viable – they could not result in a pregnancy – a public outcry

arose that the scientists had taken an alarming step towards the creation of 'designer babies'.<sup>4</sup> Then, in February 2016, the Human Fertilisation and Embryo Authority (HFEA) in the United Kingdom approved an application from Dr Kathy Niakan of the Francis Crick Institute to renew her laboratory's research licence to include gene editing of embryos. In its approval, the HFEA stated that no research using gene editing could take place without research ethics approval, and that it is illegal to transfer any embryo used in research to a woman for treatment.<sup>5</sup> Around the world, laws and guidelines vary widely about whether germline, or hereditary, research is allowed. Some ban any research; some allow only lab research but not pregnancies; and, some have no policies.

### Questions

1. Should a temporary or permanent global ban on human germline editing be introduced and, if so, on what basis?
2. Is there an ethical difference between using gene editing for the avoidance of severe inherited diseases or for 'enhancement' of human capabilities?

### References

1. Ledford H. CRISPR, the disruptor. *Nature*. 2015;522(7554):20-4.
2. Tebas P *et al*. Gene editing of CCR5 in autologous CD4 T cells of persons infected with HIV. *N Engl J Med*. 2014;370(10):901-10.
3. Liang P *et al*. CRISPR/Cas9-mediated gene editing in human tripronuclear zygotes. *Protein Cell*. 2015;6(5):363-72.
4. Lanphier E *et al*. Don't edit the human germ line. *Nature*. 2015;519(7544):410-11.
5. Park A. UK approves first studies of new gene editing technique CRISPR on human embryos. [Internet] Available from: <http://time.com/4200695/crispr-new-gene-editing-on-human-embryos-approved/>.

This is the eighth instalment of the RCSIsmj Ethics Challenge. The editorial staff would like to congratulate Deirdre Harford on her winning essay in the 2015/2016 Ethics Challenge. Please see page 6 for her submission.

We invite students to submit an essay discussing the ethical questions raised in the scenario presented. Medical ethics is an essential aspect of the medical curriculum and we hope to encourage RCSI students to think critically about ethical situations that arise during their education and subsequent careers. All essays will be reviewed by a faculty panel of experts and the winning essay will be published in the 2017 print edition of the RCSIsmj. The deadline for submission of entries will be the same as the general submission deadline for the 2017 edition of the RCSIsmj. Please visit our website at [www.rcsismj.com](http://www.rcsismj.com) for specific dates. Please contact us at [editorsmj@rcsi.ie](mailto:editorsmj@rcsi.ie) with any questions or concerns.

### Submission guidelines

Please construct a lucid, structured and well-presented discourse for the issues raised by this scenario. Please ensure that you have addressed all the questions highlighted and discuss these ethical issues academically, making sure to reference when necessary. Your paper should not exceed 2,000 words.

#### Your essay will be evaluated on three major criteria:

1. Ability to identify the ethical issues raised.
2. Fluency of your arguments.
3. Academic quality with regard to depth of research, appropriateness of references and quality of sources.

#### Good luck!

The winning entry will be presented with a prize at the launch of the next issue.