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The Scholl Institute of Bioethics is a nonprofit, Judeo-Christian organization that addresses bioethical issues including euthanasia, physician-assisted-suicide, the withholding or withdrawing of food and water from non-dying patients, brain death, organ transplantation, genetic engineering, and the rights of disabled or mentally ill persons.

Safeguarding Human Dignity in the Age of CRISPR-Cas 9 Technology

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In November 2018, several prestigious academies of science sponsored the Second International Summit on Human Genome Editing held at the University of Hong Kong. The purpose of the Summit was to explore topics such as the potential benefits and risks connected to genome-editing research, together with possible applications and legal, regulatory, and policy considerations. However, on the eve of the Summit, the world learned that twins, who had had their genes edited in such a way that it would affect their progeny, had been recently born in China.¹ This news endowed the moral, legal, and policy gene-editing questions and answers with grave significance and urgency. The questions and answers were no longer just theoretical, they now had real-world application.

The most significant scientific and technological breakthrough that prompted the Second, as well as the First Summit was CRISPR-Cas9 technology. CRISPR stands for clustered regularly interspaced short palindromic repeats and Cas9 is the name of an enzyme used with the technology. This technology enables the editing of genes more precisely, easily, and less expensively than other gene editing technology. In fact, for only \$159, anyone can purchase a kit that will allow editing the bacterial genome at home using CRISPR technology.²

Apart from many indirect potential benefits to human beings, such as helping to eliminate mosquitos that cause dengue and yellow fever, CRISPR has many possible direct benefits.³ This technology may help overcome many genetic diseases such as those connected with cancers, blood disorders, blindness, aids, cystic fibrosis, muscular dystrophy, and Huntington's.⁴

Possible gene editing therapies developed from CRISPR technology may be somatic or germline. Germline therapies modify germline cells (gametes and cells that divide to produce gametes) and are inheritable whereas somatic therapies modify non-germ cell and are not inheritable.

As with the case of any new medical technology, there are worries about the possible risks that CRISPR poses to human beings. In its official statement, the Organizing Committee of the Second International Summit expressed the following concerns. First, there is a possibility that the changes made in early-

embryo cells may leave out other relevant cells allowing the disease to persist.⁵ Second, germline editing may produce detrimental effects not only for the individual whose cells that were modified but for their descendants.⁶ Third, the unforeseen effects may be due to the genetic differences in persons or to environmental influences.⁷ Unforeseen genetic and environmental variables will complicate the development of therapies. However, the Committee declares that once the risks are suitably addressed, germline editing may be acceptable.

In 2008, the Roman Catholic Church's Congregation for the Doctrine of Faith published "*Instruction Dignitas Personae on Certain Bioethical Questions*."⁸ The purpose was to provide guidelines that safeguard human dignity within the field of biomedical research, from conception until death. Though published before the advent of CRISPR, we may apply its sage advice to this technology.

In particular, Point 26 includes an applicable principle, "*Procedures used on cells for strictly therapeutic purposes are in principle morally licit*," if there is informed consent and if

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the risks are proportionate to the benefits.⁹ In this context, *therapeutic* purposes refer to medical treatment used to correct defects in the genes. The other option is to use the technology for *enhancement* purposes, though *Dignitas Personae* does not use this term. That is, some may want to use the technology to augment the capacities of human beings, making them more than human or super-human.

How does this enhancement threaten human dignity? Apart from posing unnecessary medical risks, using the technology for enhancement purposes “exhibit[s] a certain dissatisfaction or even rejection of the value of the human being as a finite creature and person.”¹⁰ Also, *Dignitas Personae* explains that such enhancements promote a eugenic mentality that leads to disastrous effects including the undermining of peaceful co-existence in society.¹¹ Further, through the use of technology for enhancement, the Church recognizes that in creating a new type of being, there is “an ideological element in which man tries to take the place of his Creator.”¹²

Last, as in the case with the Second International Summit Committee, *Dignitatis Personae* claims that, given our current state of understanding, we should not use gene-editing technology for germline editing, for this imperils future generations.¹³

From another perspective, Lutheran Bioethicist, Gilbert Meilander, claims that the National Academy of Sciences and the National Academy of Medicine 2017 report, “Human Genome Editing: Science, Ethics and Governance,” gives us a “yellow light” on gene-editing, asking us to proceed with caution.¹⁴ It recommends that “at this time” society should focus on therapy and not on enhancement. Nonetheless, Meilander suggests there are lines of research to which we should place a permanent “stop”, to which we should not proceed.¹⁵ In other words, Meilander is asking us to consider which lines of gene-editing procedures we should abandon for moral reasons. *Dignitatis Personae*, on the other hand, implies which lines of research we should abandon by circumscribing morally licit research.

In sum, *Dignitas Personae* informs us that in order to use human gene-editing technology (such as CRISPR) in a morally licit manner that safeguards human dignity, it is to be used 1) on somatic cells for therapeutic purposes, 2) with informed consent, and 3) with consideration of risks and benefits.

As scientists and researchers move forward with their applications of CRISPR-Cas9 technology while safeguarding humanity, they would do well to heed *Dignitas Personae*.

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(Endnotes)

- 1 Dennis Normile, “CRISPR bombshell Chinese researcher claims to have created gene-edited twins,” *Science Magazine*, Nov. 26, 2018, <https://www.sciencemag.org/news/2018/11/crispr-bombshell-chinese-researcher-claims-have-created-gene-edited-twins>. Accessed May 8, 2019.
- 2 The product is the DIY Bacterial Gene Engineering CRISPR Kit. Accessed April 19, 2019, <http://www.the-odin.com/diy-crispr-kit/>
- 3 Victor Tangermann, “A CRISPR Future: Five Ways Gene Editing Will Transform Our World,” January 30, 2018. Accessed on 4/17/2019, <https://futurism.com/crispr-genetic-engineering-change-world>
- 4 Clara Rodríguez Fernández, “7 Diseases CRISPR Technology Could Cure,” June 25, 2018, <https://labiotech.eu/tops/crispr-technology-cure-disease>. Accessed May 4, 2019.
- 5 See the “Statement by the Organizing Committee of the Second International Summit on Human Genome Editing,” November 29, 2018. Accessed 4/24/19, <http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=11282018b>
- 6 Ibid.
- 7 Ibid.
- 8 Congregation for the Doctrine of the Faith, “Instruction: Dignitas Personae on Certain Bioethical Questions,” http://www.vatican.va/roman_curia/congregations/cfaith/documents/rc_con_cfaith_doc_20081208_dignitas-personae_en.html. Accessed May 4, 2019.
- 9 Ibid.
- 10 Ibid.
- 11 Ibid.
- 12 Ibid.
- 13 Ibid.
- 14 Gilbert Meilander, “Gene Editing: Promise & Peril: Is Caution Enough?” April 14, 2017 issue of *Commonweal*. https://www.commonwealmagazine.org/gene-editing-promise-peril?utm_source=Pew+Research+Center&utm_campaign=b4ab78583e-EMAIL_CAMPAIGN_2017_03_17&utm_medium=email&utm_term=0_3e953b9b70-b4ab78583e-400036553 Accessed 7/19/19.
- 15 Ibid.