



Bioethical reflections on the right to benefit from the advancement of science and its applications



Vardit Ravitsky, PhD

Bioethics Program, University of Montreal



Machine M.D.

University of Ottawa

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AI and medicine – historical context

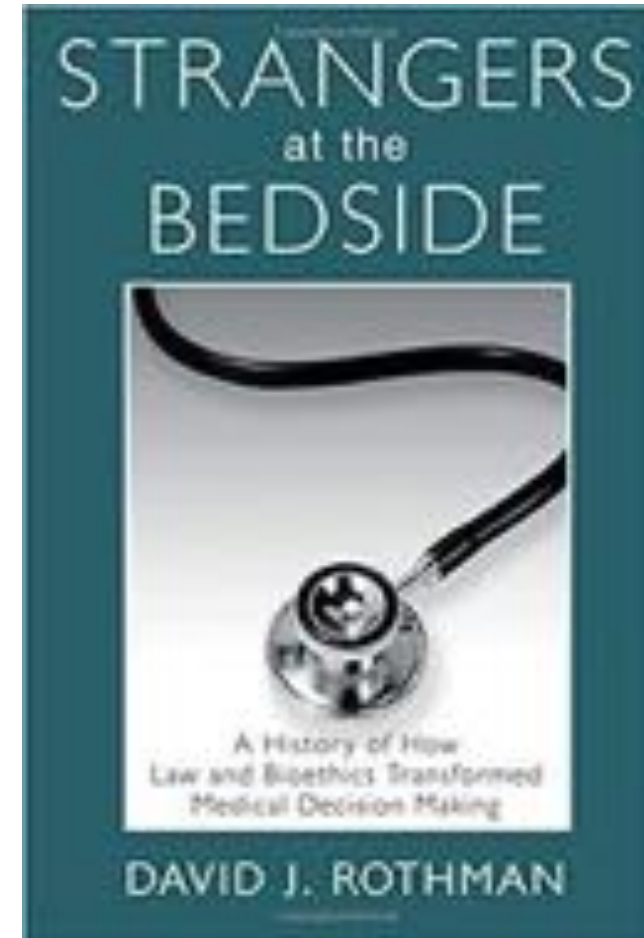
- Medicine traditionally hermetically closed to ‘outsiders’
- MDs as sole decision-makers
 - vis-a-vis their patients (paternalism)
 - vis-a-vis society (professionalism)





AI and medicine – historical context

- Medicine traditionally hermetically closed to ‘outsiders’
- MDs as sole decision-makers
 - vis-a-vis their patients (paternalism)
 - vis-a-vis society (professionalism)
- Ex: resistance to the emergence of bioethics in the 1960s





AI and medicine – historical context

- Perception of medicine as blending science and *art*
- Requiring skills that must be learned through *practice*
- Machines as “encroaching on realms of decision-making revered as the province of expert professionals” (London)





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- Professionals routinely overestimate their performance
- Even in the face of evidence that machines often outperform them





AI in the clinic

- Diagnosis, prediction and prognosis, treatment decisions
- ...matter of life and death





AI in the clinic

- Diagnosis, prediction and prognosis, treatment decisions
- ...matter of life and death

- The challenge of 'black-box decisions'
 - Performance versus capacity to explain

- Long-standing tradition of clinical judgement as combining empirical and theoretical knowledge

- Machine learning as relying on big-data and being 'theory-agnostic'





AI in medicine – ethical perspective



- Medicine ought to embrace the power of AI for the benefit of patients
- Imperative to responsibly adopt what AI has to offer
- Neglecting to rely on highly accurate algorithmic decision tools is “potentially lethal hubris” (London)
- Overcome aversion to innovation that may threatens the prerogative of clinical judgement



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- **Ethical foundations:**
 - principles of beneficence and do-no-harm
 - a human rights approach

EDITORIAL OPEN

Human gene editing: revisiting Canadian policy

regenerative medicine 2018, vol. 1, no. 1, pp. 1-2

ABSTRACT

Given the rapid evolution of gene editing technologies, international policy is becoming increasingly complex. Canada can address the emerging scientific, technological and legal challenges for regenerative and precision medicine by adopting gene editing technologies, including the CRISPR/Cas9 gene editing technology, in a principled and progressive manner, and thereby accelerate research into regenerative medicine. This can be done through the creation of a new range of research institutions and a clear set of potential ethical guidelines. Considering the implications of human gene editing for scientific, medical and commercial research, it is time to re-evaluate policy in Canada. Instead of being dependent on others in the areas of research and innovation, and the approval and regulatory framework for gene editing, Canada should take a leadership role in the development of these technologies, careful consideration of their potential, as well as ethical and regulatory standards that are globally applicable.

With the advent of human gene editing, there are several key areas that need to be considered: the current state of research, the current state of Canada's 2016 Human Genome Research Act (HGRA), the impact of a decade of scientific advances, the need for a principled and progressive approach to gene editing research, and the need for a clear set of ethical and regulatory standards that are globally applicable.

In Canada, the current regulatory framework for gene editing research is based on the 2016 Human Genome Research Act (HGRA) and the current state of research. The current state of research is based on the 2016 Human Genome Research Act (HGRA) and the current state of research. The current state of research is based on the 2016 Human Genome Research Act (HGRA) and the current state of research.

On October 17, 2018, Health Canada issued a notice of intent to conduct research under the HGRA and this effort is intended to address the need for Canada to meet the demand for research and development in the field of regenerative medicine.

ethical, legal and social implications of human gene editing. The goal of this editorial is to provide a comprehensive overview of the current state of research and the need for a principled and progressive approach to gene editing research in Canada. The goal of this editorial is to provide a comprehensive overview of the current state of research and the need for a principled and progressive approach to gene editing research in Canada.

KEYWORDS TO CONSIDER

We discuss the current Canadian policy and regulatory framework surrounding human gene editing, including the gene editing of somatic tissues, research in light of ethical standards and regulations, and emerging genetic technologies. A review of the current state of research in the field of human gene editing is provided.

1. There is a scientific and medical need to accelerate research, including research that may involve gene editing, to advance regenerative and precision medicine.
2. The modification of human genes can be done in a principled and progressive manner.
3. Current laws are not fully sufficient to regulate gene editing research, including the approval of research and the development of ethical guidelines.
4. A principled and progressive approach should underlie any decisions about future advances in human gene editing, including genetic modification in the clinical setting.

ABOUT THE EDITORIAL

When there may be other considerations of certain health risks, we consider that allowing gene editing in the context of research, including gene editing of somatic cells, is a principled and progressive approach. It is based on the current state of research and the need for a principled and progressive approach to gene editing research in Canada.

ACKNOWLEDGMENTS

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“Right to benefit from the advancement of science and its applications” as promulgated in:

- article 27 of the Universal Declaration of Human Rights. and
- article 15(b) of the International Covenant on Economic, Social and Cultural Rights

signed and ratified by many countries, including Canada



AI in medicine – a human rights approach

- This right has recently been applied in the context of genomics other technological innovation



- It is important to also apply it to advancements in AI
- Call for openness to the integration of human and artificial intelligence in medicine





Thank you

