

Transhumanism and governance: Bridging genetic engineering and cybernetics?

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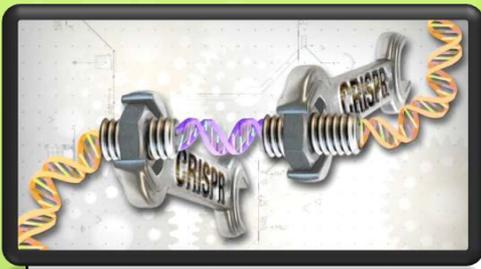
<http://www.abhominal.com/posthumans>

Outline

- Technological breakthrough
- Stakeholders' perspectives
- Policy options

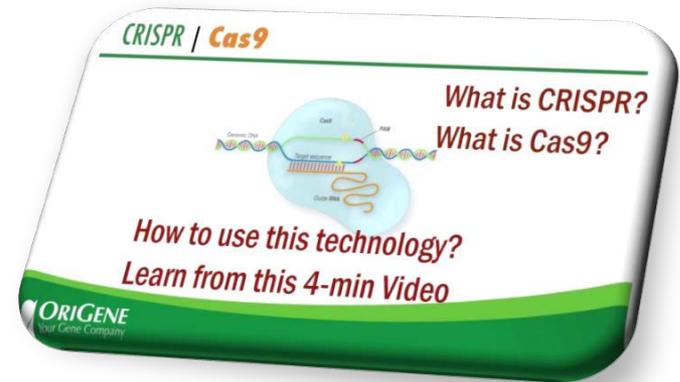


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The technology

- CRISPR-Cas9
- Simple, precise, rapid and inexpensive genetic engineering tool
- Used to edit genomes of non-viable human embryos to correct mutation that causes beta thalassemia (April 2015)
- British scientists given permission by regulators to genetically modify human embryos by using CRISPR-Cas9 and related techniques (February 2016)
- Crispr could be used to make “better” humans, not just to prevent diseases.

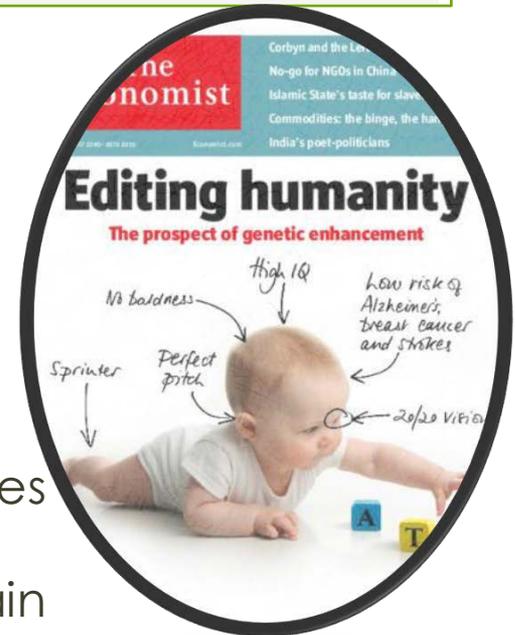


The technology

Potential targets for genetic enhancement?

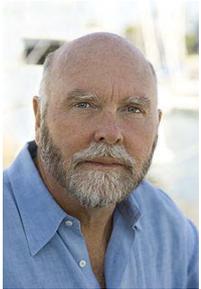
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|--------------|---------|-----------------------|
| ● LRP5 | G171V/+ | Extra-strong bones |
| ● MSTN | -/- | Lean muscles |
| ● SCN9A | -/- | Insensitivity to pain |
| ● ABCC11 | -/- | Low Odor production |
| ● CCR5, FUT2 | -/- | Virus resistance |
| ● PCSK9 | -/- | Low coronary disease |
| ● APP | A673T/+ | Low Alzheimer's |
| ● GHR, GH | -/- | Low cancer |
| ● SLC30A8 | -/+ | Low T2 Diabetes |
| ● IFIH1 | E627X/+ | Low T1 Diabetes |

George M. Church, 2015



Stakeholders' perspectives

- The “experts”



“I think that human germline engineering is inevitable, and there will be basically no effective way to regulate or control the use of gene editing technology in human reproduction.”

Craig Venter, geneticist, biochemist & entrepreneur (2015)



- “(T)he speed and scope of technological development can be controlled. Many dangerous or ethically controversial technologies-weapons and nuclear power, ballistic missiles, biological and chemical warfare agents, replacement human body parts, and neuro pharmacological drugs-are subject to effective political control and thus cannot be freely developed or traded.”

Francis Fukuyama, American political scientist & political economist (2003)

Stakeholders' perspectives

Lay public

- 2016 survey of 520 Americans showed that 11% of the general public were in favor of legalizing intelligence enhancement through gene editing and that 14% thought the federal government should fund research on gene editing to improve “characteristics such as intelligence or physical traits such as athletic ability or appearance” (Blendon et al. 2016)
- 2015 Survey of 2002 Americans found that 46% of adults approved of genetic modification of babies to reduce the risk of serious diseases. The same survey found that 83% said genetic modification to make a baby smarter would be “taking medical advances too far.” (Pew Research Center, 2015)



Policy options

- **Concerns:** safety, equitable access, impact on human nature and human dignity
- **Policy landscape:** a variety of misaligned normative responses implemented at the national level

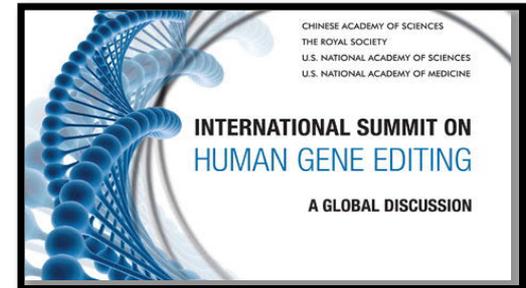


Araki & Ishii, *International Regulatory Landscape*, *Reprod Biol Endocrinol*. 2014; 12: 108



- Ban guidelines
- Ban legislation
- Restrictive
- Ambiguous

Policy options



- International Summit on Gene Editing, Dec. 3, 2015

"It would be irresponsible to proceed with any clinical use of germline editing unless and until (i) the relevant safety and efficacy issues have been resolved, based on appropriate understanding and balancing of risks, potential benefits, and alternatives, and (ii) there is broad societal consensus about the appropriateness of the proposed application. Moreover, any clinical use should proceed only under appropriate regulatory oversight."

Roadmap?

- Understand people's choices and preferences regarding the technology
- Legislate to prevent unsafe use of the technology
- Engage in a broad international dialogue over genetic enhancement
- Promote international policy harmonisation

