# \*Human Germline Genetic Engineering\* Negative



## Advantage 1 - Ethics

### Its Ethical

#### Banning germline genetic editing is naïve and amounts to ‘biological nonsense’ – their ‘ethical concerns’ are unlikely to ever occur and mystify legitimate implementation benefits

Pinker 15 Pinker, Steven. Steven Pinker is professor of psychology at Harvard University and the author of 10 books, most recently "The Sense of Style: The Thinking Person's Guide to Writing in the 21st Century." “Experts Debate: Are We Playing with Fire When We Edit Human Genes?” STAT, 17 Nov. 2015, www.statnews.com/2015/11/17/gene-editing-embryo-crispr/#Mathews. Accessed 30 June 2022. //DRE

Germline editing should be treated like any other medical procedure, weighing benefits against harms. It should not be banned out of a nebulous terror about tampering with a sacrosanct entity called "the human germline" - a concept which is biological nonsense. We affect the genetic makeup of our offspring, and the species, every time we choose one sex partner over another. And each of us introduces dozens of mutations into our own germlines by exposing ourselves to everyday radiation and chemical mutagens. Genetic editing would be a droplet in the maelstrom of naturally churning genomes. What are the potential benefits? There are several scenarios in which germline editing could benefit parents who carry disease genes. It could be used when both parents are homozygous for the disease, when in vitro fertilization doesn't produce enough viable and unaffected embryos for preimplantation genetic diagnosis, or if future data shows that babies who undergo the procedure have compromised longevity or health. The principal harm of germline editing is the risk of producing a sick or deformed child. Frankly, I suspect that this risk will always be unacceptable, so most of this discussion is moot. But suppose safety could be ensured. Should we fear the prospect of parents genetically enhancing their babies, the outcome the prohibitionists dread? This is highly unlikely - a relic of the early 1990s, when people thought there was "a gene for" this or that talent. We now know that heritable psychological traits, such as intelligence and personality, are the product of hundreds or thousands of genes, each with a tiny effect. And many genes have multiple effects, some of them harmful, such as an increased risk of neurological disease or cancer. With each enhancement providing a trifling benefit and a non-negligible risk, and with the editing process itself imposing risks, it's unlikely that today's morbidly risk-averse helicopter parents will take a chance at enhancing a child. They won't even feed their babies genetically modified applesauce! Add these risks to the expense and tribulation of IVF compared to good old-fashioned sex, and one can conclude that widespread genetic enhancement is too unlikely a possibility to worry about.

#### Not unethical – all new technologies have unpredictable effects and we don’t ban them. Its key to advancement and innovation.

Savulescu, et.al. 2015 The moral imperative to continue gene editing research on human embryos Julian Savulescu, Jonathan Pugh, Thomas Douglas, Christopher Gyngell Protein Cell 2015, 6(7):476–479 DOI 10.1007/s13238-015-0184-y

However, some in the scientific community are calling a moratorium on gene editing research. Yet, they fail to give a sufficient justification for such a ban. In calling for a moratorium, Lanphier et al. (2015) state: In our view, genome editing in human embryos using current technologies could have unpredictable effects on future generations. This makes it dangerous and ethically unacceptable. Such research could be exploited for non-therapeutic modifications This reasoning is, however, inconsistent with widely accepted practices. Nearly all new technologies have unpredictable effects on future generations. Information technologies like the internet and mobile phones fundamentally change the way people interact and communicate with each other. Their effect on future generations is very hard to predict, and though they could be catastrophic (for example, through cyberterrorism), this does not mean on balance they should be banned. Their expected benefits outweigh their expected harms.

#### No valid legal human rights restriction on germline editing – ethical because right to health and to benefit from science.

Boggio and Yotova (2021). Gene editing of human embryos is not contrary to human rights law: A reply to Drabiak. Bioethics. doi:10.1111/bioe.12945

In a recent article in this journal, Katherine Drabiak argues that the genome editing of human embryos is contrary to fundamental human rights law.1 “Such practice,” Drabiak concludes, “would violate what we should recognize as a fundamental human right to inherit a genome without deliberate manipulation.” 2 Her argument is presented in the form of a critique of the analysis and conclusions reached by the Nuffield Council on Bioethics in its 2018 report Genome editing and human reproduction: Social and ethical issues3 and of the background paper, authored by Rumiana Yotova, on The regulation of genome editing and human reproduction under international law, EU law and comparative law. 4 Unfortunately, Drabiak's analysis mischaracterizes both the Nuffield Council's report and international human rights law that pertains to genome editing of human embryos. In this reply, we limit our critique to two main points. First, we challenge her methodological approach used to identify what constitutes “fundamental human rights law.” Her approach fails to include key human rights provisions in the International Covenant on Economic, Social and Cultural Rights, which include the right to health and the right to benefit from science. Second, we challenge the substantive standard invoked by Drabiak (a right to genetic integrity of a future person) and the implications of the concept of human dignity for informing how genome editing of human embryos can be regulated. After further analyzing Drabiak's argument and specifying what her argument does not prove, we conclude by reiterating the position taken by the Nuffield Council in 2018 and Yotova's background paper that: international law does not prohibit genome editing of human embryos and does not recognize a right to genetic integrity for future persons let alone inviolability as clearly evidenced in the text and preparatory works of the 1997 UNESCO Declaration on the Human Genome and Human Rights.5

#### Human germline gene editing would actually reduce the risk to a number of unwanted viable embryos.

Savulescu, et.al. 2015 The moral imperative to continue gene editing research on human embryos Julian Savulescu, Jonathan Pugh, Thomas Douglas, Christopher Gyngell Protein Cell 2015, 6(7):476–479 DOI 10.1007/s13238-015-0184-y

In fact, gene-editing technologies might ultimately lead to far fewer embryos being destroyed for reproductive purposes. Currently, if a carrier of a genetic disease wants to have a child that will not be affected by their parent’s condition, the carrier will often choose to undergo IVF and PGD in order to select a non-affected embryo. This practice often involves the creation, and eventual destruction of, a considerable number of surplus unwanted viable embryos. However, this practice would be rendered obsolete by the availability of safe and effective gene-editing technologies; if such technologies became available, carriers of genetic diseases would not have to produce large numbers of surplus embryos which would eventually be destroyed in order to ensure that they could have a child who was not affected by their parent’s genetic disease.

### Its ethical – A2 Mosaicism & Autonomy

#### New studies prove can do editing without genetic instability

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Gene editing and synthetic biology research are making strides in overcoming the problem of genetic instability. A study published in 2019 presented a new system, CRISPR-BEST. It created mutations in actinomycetes (bacteria that produce a wide variety of industrially and medically relevant compounds) without creating genetic instability and forcing them to rearrange and even delete large parts of their chromosomes.53 Synthetic biology is also increasingly embracing genetic instability rather than trying to suppress or compensate for it. With improved understanding, it is expected to design devices that incorporate genetic instability as a parameter.54 Such devices would be “a true frontier in biological engineering.”55

#### Genetic engineering necessary to preserve key aspects of our biology and is ethically justifiable

RUSSELL POWELL Boston University, Boston, Massachusetts 2015 In Genes We Trust: Germline Engineering, Eugenics, and the Future of the Human Genome, USA Journal of Medicine and Philosophy 40 (6):669-695 (2015) <https://philpapers.org/rec/POWIGW>

Whereas most of the philosophical literature on the ethics of genetic engineering, both skeptical and optimistic, has focused on its ability to enhance human nature and valued biological capacities (see e.g., Savulescu and Bostrom, 2009), my contention is that genetic intervention will be necessary merely to preserve them. The dynamic evolutionary environment may counsel against taking genetic engineering off the table, lest the technology proves useful in tackling unforeseen challenges that arise in the future—but this does not imply that we will need to embark on a genome-wide enterprise of germline modification in order to maintain valued elements of the biological status quo, or to avoid foreseeable reductions in human wellbeing. In this section, I argue that a large-scale program of genetic intervention will be necessary to achieve these goals, regardless of whether the environment changes in the ways contemplated earlier.8

### Its ethical – A2 Gene Drive

#### Human germline editing is an ethical imperative to sustain genetic health

RUSSELL POWELL Boston University, Boston, Massachusetts 2015 In Genes We Trust: Germline Engineering, Eugenics, and the Future of the Human Genome, USA Journal of Medicine and Philosophy 40 (6):669-695 (2015) <https://philpapers.org/rec/POWIGW>

In this article, I explore some of the evolutionary and social risks that attend the other side of the risk equation: namely, the undesirable consequences that are likely to flow from our failure to intervene in the human germline. I argue that even if we do not have moral reasons to genetically “enhance” our children relative to the current status quo of normality (for arguments that we do, see, e.g., Savulescu, 2001; Bostrom and Ord, 2006; Harris, 2007; Savulescu and Persson, 2008; Buchanan, 2011; Powell and Buchanan, 2011), germline intervention still emerges as a pro tanto moral imperative so long as we have good reason to sustain the levels of genetic health that we presently enjoy for future generations—a goal that should appeal to bioliberals, biomoderates, and bioconservatives alike. My aim is to show that merely preserving important genetic and phenotypic aspects of the human species—and perhaps even human dignity—will require that we overcome the remaining technical obstacles and make germline genetic therapies legal and widely available to healthcare consumers.

#### Takes thousands of years to evaluate changes of genetic code – and can’t change human nature.

Vera Lúcia Raposo 2019 Gene Editing, the Mystic Threat to Human Dignity Journal of Bioethical Inquiry Pty Ltd. 2019 https://link.springer.com/article/10.1007/s11673-019-09906-4

Based on this understanding, Jurgen Habermas (2006) asserted that when people change their genetic code they are altering their human nature and turning themselves into instruments. According to Habermas, our genetic code is the basis of our human nature, as if changing it would make us less human. Kass (2002), for instance, referred to losing one part of being human. This argument can be divided into two sub-arguments: a) genetic homogeneity can become a threat to the survival of the human species; and b) an overall ecological balance should be maintained, which depends on the existence of diverse species. Notwithstanding these assertions, it would take thousands of years and generations for one change to have repercussions for the genetic makeup of humanity as a whole. As McConnell (2010, 420) puts it: [T]here are more than six billion humans on the planet. Absent some kind of magic wand, it is initially difficult to see how any given genetic intervention could change human nature.

### Its ethical – A2 Human Dignity

#### Its ethical – germline editing isn’t contrary to dignity – modifying genomes happens in medical treatments and is consistent with international law.

Boggio and Yotova (2021). Gene editing of human embryos is not contrary to human rights law: A reply to Drabiak. Bioethics. doi:10.1111/bioe.12945

The second rebuttal concerns the argument that clinical interventions based on gene editing of human embryos are contrary to human dignity. The argument takes different forms: gene editing is seen as an alleged violation of human dignity because it (a) leads to considering some human lives (of those carrying good genes) better than others (of those carrying bad genes); (b) violates a purported right to genetic identity; and (c) compromises the human genome, whose unmodified form is allegedly a requisite of human dignity. Drabiak embraces the second and third forms of the argument. Taken to an extreme, the idea of this dignity being grounded on genetic identity or genetic inviolability leads to an indefensible conclusion: persons who have undergone cancer or other serious treatment, which modifies their genome, would have lost, or have suffered a violation of, their human dignity in the process. This conclusion is hard to defend on its face. More moderate accounts are not new to us and have been discussed in Yotova's background paper. After a thorough review of all international and regional instruments applicable to gene editing that mention human dignity, she concludes that “there is a trend of acknowledging that while embryos and foetuses are not generally recognised as holders of human rights, they are becoming increasingly recognised as having human dignity.” 46 The dignity‐ based argument is complex, and a lengthy analysis of this issue exceeds the scope of this paper. Here we want to focus on some critical aspects. First, while embryos may possess human dignity, they are generally not recognized as rightsholders. As Yotova points out, “legally speaking … human rights are protected only after birth, which puts germline editing outside of their temporal scope of protection.” 47 This is the case under international law and also in the majority of domestic laws. The European Court of Human Rights also acknowledged the lack of consensus in Europe about the nature and status of the embryo, rejecting the argument that they are a “person” with “a right to life.” 48 Second, the ICESCR acknowledges human dignity. Nonetheless, it recognizes the right to access treatment to enjoy the highest attainable standard of physical and mental health and the right to access clinical applications as benefits of scientific progress compatible with human dignity. These two rights are recognized without reservations. As we have seen, their recognition is not absolute, leaving it up to State Parties to limit the two rights to access provided it is done according to the parameters set in Article 4 of the ICESCR. A State Party may consider the interest of embryos to deserve consideration that trumps the right to access clinical applications of gene editing of human embryos. However, this is a State Party's prerogative, not a duty under the Covenant. Third, the concept of human dignity was considered and discussed extensively during the negotiations of the UNESCO Declaration on the Human Genome but never as an argument against germline interventions. Instead, it was linked to very different legal principles.

#### Human dignity is not based on a certain genetic code.

Vera Lúcia Raposo 2019 Gene Editing, the Mystic Threat to Human Dignity Journal of Bioethical Inquiry Pty Ltd. 2019 https://link.springer.com/article/10.1007/s11673-019-09906-4

To conclude that the existence of a non-manipulated genetic code is linked to human dignity, we would have to assume that human dignity is based on a certain genetic code, not any human genetic code but the one every person is born with. If that were true, any change to that code would carry a diminution of dignity. This conclusion is problematic because our genetic code changes during our lifetime. For instance, after a baby is born some fetal cells may be left behind in its mother’s body. They can travel to different organs and be absorbed into the mother’s tissues, changing her genetic composition,3 but no one would say that the mother is less worthy of dignity. In the case of blood transfusions, depending on the amount of white blood cells (the only ones that contain nuclear DNA), some DNA is transferred from the donor to the recipient, even in small amounts, and it can survive for days in his or her body,4 but this does not make the recipient less dignified during that transitory period. Furthermore, some diseases (such as cancer) can lead to acquired genetic mutations, creating the so-called genetic mosaics.5 In addition to being sick, do these people become undignified? The same happens in organ (Olszewski et al. 2005) and bone narrow donations.6 Both involve adding the donor’s DNA to extracts of tissues from the recipient, but none of these situations diminishes the recipient’s dignity. If the above thesis were true and if human dignity resided in a specific (human) genetic code, these examples would lead to the conclusion that some people lose their dignity during their lifetime due to changes (even if reduced and temporary) in their genomes, which obviously does not make any sense. Human dignity cannot be reduced to a certain genetic code, nor the human being reduced to genetic characteristics. This same idea is stated by article 2 of the UDHG: (a) Everyone has a right to respect for their dignity and for their rights regardless of their genetic characteristics. (b) That dignity makes it imperative not to reduce individuals to their genetic characteristics and to respect their uniqueness and diversity. If that is the case, there is no way that a change in the genetic features of a person will undermine his or her dignity.

Gene editing is ethical – does not clash with human dignity

Boggio and Yotova (2021). Gene editing of human embryos is not contrary to human rights law: A reply to Drabiak. Bioethics. doi:10.1111/bioe.12945

Implicit in this interpretation of Article 6 is the fact that the protection of human embryos is not absolute. In fact, quite to the contrary, the HRC states that providing safe abortions is a duty of States under certain circumstances. Although merely hypothetical at this point, clinical applications of gene editing could conceivably remedy non‐viability and alleviate the mental pain or suffering that comes from knowing that the fetus is or may be affected by certain genetic conditions. Here we are not arguing that these interventions will have to be made available to patients as a matter of duty. More modestly, we argue that gene editing of human embryos does not clash with the right of life as codified in Article 6 of the ICCPR. In fact, it may reinforce it.

#### Genetic engineering does not take away humanness

RUSSELL POWELL Boston University, Boston, Massachusetts 2015 In Genes We Trust: Germline Engineering, Eugenics, and the Future of the Human Genome, USA Journal of Medicine and Philosophy 40 (6):669-695 (2015) <https://philpapers.org/rec/POWIGW>

I will not take a stand here as to whether our given biological nature has intrinsic value or, if it does, how weighty that value might be. Indeed, there are serious problems with drawing any substantive bioethical conclusions from a conception of human nature (see Buchanan, 2009). Furthermore, authors will disagree over just how much of a departure from human biological nature is necessary to bring about the loss of intrinsic value associated with remaining “fundamentally human.” One might contend, for example, that much of human biological nature (as defined earlier) can be altered without altering fundamentally human characteristics. Attempting to distinguish putatively fundamental human characteristics from less fundamental ones raises a spate of philosophical difficulties that I will not address here. I will simply argue that if there is intrinsic value in retaining human biological nature or central features of “humanness,” then this gives us further reasons—conservative reasons—to actively promote human germline modification technologies, or at the very least to oppose prohibitions of germline intervention that are insensitive to risk-benefit analyses and which block the gathering of information necessary to make proper risk-benefit assessments.

#### Unaltered genetic heritage is not the only way to preserve human dignity

Vera Lúcia Raposo 2019 Gene Editing, the Mystic Threat to Human Dignity Journal of Bioethical Inquiry Pty Ltd. 2019 https://link.springer.com/article/10.1007/s11673-019-09906-4

The right to an unaltered genetic heritage cannot be taken as an absolute goal; the genetic code isn’t something divine and immutable. Even though detrimental traits are part of human heritage, there is no reason to keep them unmodified. Genetic immutability is not the only guide for genetic decisions or even the more beneficial to humankind. If this were so, we would be prevented from defending ourselves against the caprices of nature and biology based on a supposed duty to respect nature or BGod-given gifts.^ Surgical interventions, vaccinations, or even something as simple as taking an aspirin would be banned.

### Its ethical – A2 Eugenics

#### Human germline editing is not reminiscent of the type of eugenics we should be afraid of – potential for positivity and not harmful.

Vera Lúcia Raposo 2019 Gene Editing, the Mystic Threat to Human Dignity Journal of Bioethical Inquiry Pty Ltd. 2019 https://link.springer.com/article/10.1007/s11673-019-09906-4

Human enhancement, including enhancement for health-related purposes, is rejected by many under the accusation that it led to the Nazi horrors and to other procedures to eliminate the unfit. What these measures have in common is that they are all eugenic measures (Paor and Blanck 2016), but the mistake is to consider all eugenics as pernicious. The Nazi Holocaust and the sterilization of mentally impaired people represented the negative side of eugenics, characterized by discrimination, hierarchization of human life, and ultimately the killing of those perceived as weak in our species (Bachruch 2004; Finkelstein and Stuart 1996). Conversely, the kind of human enhancement that we pursue today by means of gene editing (and artificial reproductive treatments) aims to promote the well-being of the existing generations (somatic genetic interventions) and of future generations (germinal genetic interventions). The assimilation between these two scenarios, so different from each other, rest on a misunderstanding about eugenics as being necessarily harmful (Caplan et al. 1999). Eugenics has been vilified because of its abuses during the early 20th century, particularly Germany’s choice to murder people with perceived disabilities. But the origin of eugenics was simply a desire to increase the odds that a child would be born healthy. Today we consider such measures as prenatal care, eating sensibly during pregnancy, avoiding use of alcohol or other drugs, and choosing your partner carefully to be the minimum that the pregnant woman should do and that the healthcare system should offer. Yet these practices are the very basis of eugenics. (Root 2000, 873). It has become common to use eugenics as a kind of bogeyman and for every intervention with connotations of human improvement to be at risk of being banned. However, we should not be afraid of eugenics.

#### Germline gene editing enhances human dignity and isn’t eugenics – we have the capacity to resolve mass human suffering

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In light of this understanding, gene editing does not violate human dignity; on the contrary, it offers the individual more possibilities to assert his/her status as a human person and, therefore, to assert his/her dignity. The claim is unfounded that gene editing is a form of eugenics and therefore—ipso facto—repugnant. To be healthy, to live a life with less suffering, cannot be against human dignity. The accusation of eugenics has become commonplace—invoking the Nazi holocaust and the fear of gross violations of human rights. However, the fear of past mistakes cannot block genetic ameliorations that are able to relieve humanity from diseases that continue to kill so many people. Critics also invoke the immutability of the genetic code, as a kind of foundation of human dignity. Nevertheless, the preservation of humankind’s genetic pool cannot be more important than the other values and goals at stake here, such as eradicating the pathological features of people who are suffering. If the aim is to avoid human suffering in present and future generations, the hypothetical right to receive an unmodified genetic code (hypothetical because future generations do not have any rights) cannot prevail over the right to health. On the other hand, an immutable genome cannot be viewed as a condition sine qua non for the dignity of the person. Scientific reports have shown that a person’s genetic code changes throughout their existence, even if such changes are subtle and temporary. Certainly, these changes do not imply a diminution of an individual’s dignity. Another repeated argument pertains to the destruction of our intrinsic human nature. However, enhancement (becoming stronger and healthier) is natural to humanity; it is the defining note of the human species. Looking back in time, the story of humankind has been one of enhancement. We are always trying to supplant ourselves (Buchanan 2011). We cannot assume that human nature is something defined and fixed (Fenton 2006). On the contrary, we cannot avoid changing ourselves for the simple reason that we are human. Gene editing is just another way of being human.

### A2 Precautionary principle

#### Precautionary principle is pragmatically insufficient and results in self-interested ignorance and neglect of opportunity costs and risk probability comparisons

Sunstein 02 (The Paralyzing Principle BY CASS R. SUNSTEIN University of Chicago Karl N. Llewellyn Distinguished Professor of Jurisprudence at the University of Chicago. Cato Institute Winter 2002-2003; http://object.cato.org/sites/cato.org/files/serials/files/regulation/2002/12/v25n4-9.pdf)

PRECAUTIONS AND RATIONALITY But if the Precautionary Principle, taken in a strong form, is unhelpful, how can we account for its extraordinary influence, and indeed for the widespread belief that it can and should guide regulatory judgments? Undoubtedly, self-interested political actors invoke the principle strategically. For example, European farmers invoke the idea of precaution to stifle American competitors who are far more likely to rely on genetically modified crops. But apart from that point, I suggest that an understanding of human cognition provides some useful clues: Loss aversion People dislike losses far more than they like corresponding gains. The result is that out-of-pocket costs, or deteriorations from the status quo, seem much worse than opportunity costs, or benefits lost as a result of continuing the status quo. In the context of risks, people often tend to focus on the losses that are associated with some activity or hazard, and to disregard the gains that might be associated with that activity or hazard. A closely related point is that unfamiliar risks produce far more concern than familiar ones, even if the latter are sta tistically larger; the Precautionary Principle, in practice, is much affected by that fact. The myth of a benevolent nature Loss aversion is often accompanied by a mistaken belief that nature is essentially benign, leading people to think that safety and health are generally at risk only or mostly as a result of human intervention. A belief in the relative safety of nature and the relative risk of new technologies often informs the Precautionary Principle. Because natural processes are often dangerous and human interventions often promote safety, a commitment to nature can be life threatening. The availability heuristic It is well known that people focus on some risks simply because they are cognitive y “available,” whereas other risks are not. When the Precautionary Principle seems to require stringent controls on one risk, even though other risks are in the vicinity, the availability heuristic is a common reason. And when the availability heuristic is at work, certain hazards will stand out whether or not they are not statistically large. The hazards associated with heat waves, for example, receive little public attention, while the hazards associated with air travel are a significant source of public concern; one reason is that the latter hazards come readily to mind. That is a serious problem because the less salient risks, including those from heat waves and poor diet, can be the serious ones. Probability neglect People are sometimes prone to neglect the probability that a bad outcome will occur; they focus instead on the outcome itself. The Precautionary Principle often embodies a form of probability neglect. At least, that is the case when people invoke the principle to favor stringent controls on a low-probability risk and when the consequence of those very controls is to give rise to new risks of equal or greater probability. In the context of the sniper attacks in the Washington, D.C. area in October 2002, people were far more concerned, and took many more precautions, than the statistical realities warranted, in part because the high salience of the attacks led to a form of probability neglect. It is highly likely that some of those precautions, including those that involved extra driving, actually increased people’s risks. System neglect The Precautionary Principle often reflects a general neglect of the systemic effects of regulation. When a single problem is placed in view, it can be difficult to see the full consequences of legal interventions. Sometimes, the principle has the appearance of being workable only because a subset of the relevant effects is “on screen” — and hence there seems to be no need to take precautions against other possible adverse effects that do not register. I suggest that the Precautionary Principle seems appealing to many people in large part for the same reason.

#### Precautionary principle increases risks: diverts attention from more serious threats and ignores risk of inaction

Elizabeth Whelan 5/23/2000 (“Can Too Much Safety Be Hazardous?”) <http://www.acsh.org/healthissues/newsID.589/healthissue_detail.asp>

There are, however, at least two reasons why the precautionary principle itself, when applied in its extreme, is a hazard, both to our health and our high standard of living.¶ First, if we act on all the remote possibilities in identifying causes of human disease, we will have less time, less money and fewer general resources left to deal with the real public health problems which confront us. This does not mean that before we take prudent action to protect public health we have to dot every scientific “i” and cross every environmental “t”. It does mean that we should not let the distraction of purely hypothetical threats cause us to lose sight of the known or highly probable ones.¶ Second, the precautionary principle assumes that no detriment to health or the environment will result from the proposed new banning or chemical regulation. For example, what are the known health risks from the current regulated use of chlorine? None. How great are the benefits? Enormous. What new health risks wold we encounter if we were to ban chlorinated compounds because they “might” be harmful? Plenty.¶ Chlorine, for example, is the essential cornerstone of modern industrial chemistry. We need chlorine to disinfect our nation’s water supply, make the agricultural pesticides that enable us to have a food supply rich in cancer-fighting fruits and vegetables, and to produce lifesaving pharmaceuticals.¶ When we apply the precautionary principle and focus on hypothetical risks and ponder what actions we might take “just in case”, we leave the world of science and enter the realm of ideology. We allow ourselves to come under the spell of those who are motivated , for whatever reason, by a desire to return to what they perceive as a pre-industrial Garden of Eden.¶ These “what if” ideologues need to be reminded that wealth and industrial progress are associated with better, not worse health. Blanket applications of the precautionary principle ultimately would mean rejecting the modern technologies that have given us our enviable state of good health and longevity, and the freedom to enjoy it.¶ So what is to be done with those instances in which the risks are hypothetical and the costs of eliminating the technology substantial in terms of costs and lost human benefits? What should we do when confronted with the radical version of the precautionary principle? Go back to what Mom said: “When in doubt, throw it out”.¶

#### Precaution on genome editing bad – targeted gene modifications likely safe

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This analogy, they argue, relies on misconceived interpretations of evolutionary theory: we should resist the presumption that intentional genetic modification is likely to be more dangerous than “unintentional genetic modification”—that is, the process of mutation, inheritance, and selection that occurs whether we like it or not. It may be that random genetic changes are more likely to be deleterious than beneficial, but this is not necessarily true of targeted modifications designed with some understanding of their likely effects. Moreover, judgments about risk are not absolute but comparative: whether a likely consequence is better than or worse than the alternative. Precaution as a presumption against action assumes that the consequences of doing are probably going to be worse than not-doing. In the case of genome editing for serious disease, it is far from evident that this is so

### Yes War

#### 2000 years of empirical evidence go our way

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Forget Clausewitz, Sun Tzu, and Machiavelli. Put aside Mackinder, Mahan, and Spykman. Close the military academies and war colleges. Shut our overseas bases. Bring our troops home. Make dramatic cuts in the defense budget. The end of major war, and perhaps the end of war itself, is near, according to Tulane assistant professor Christopher Fettweis in his recent book, Dangerous Times? The International Politics of Great Power Peace. Fettweis is not the first intellectual, nor will he be the last, to proclaim the onset of perpetual peace. He is squarely in the tradition of Immanuel Kant, Herbert Spencer, and Norman Angell, to name just three. Indeed, in the book's introduction, Fettweis attempts to rehabilitate Angell's reputation for prophecy, which suffered a devastating blow when the Great War falsified his claim in The Great Illusion that economic interdependence had rendered great power war obsolete. Angell, Fettweis writes, was the first "prominent constructivist thinker of the twentieth century," and was not wrong—just ahead of his time (p. 5). Fettweis bases his theory or vision of the obsolescence of major war on the supposed linear progress of human nature, a major tenet of 20th-century liberalism that is rooted in the rationalist theories of the Enlightenment. "History," according to Fettweis, "seems to be unfolding as a line extending into the future—a halting, incomplete, inconsistent line perhaps, one with frequent temporary reversals, but a line nonetheless." The world is growing "more liberal and more reliant upon reason, logic, and science" (p. 217). We have heard this all before. Human nature can be perfected. Statesmen and leaders will be guided by reason and science. Such thinking influenced the visionaries of the French Revolution and produced 25 years of war among the great powers of Europe. Similar ideas influenced President Woodrow Wilson and his intellectual supporters who endeavored at Versailles to transform the horrors of World War I into a peace that would make that conflict "the war to end all wars." What followed were disarmament conferences, an international agreement to outlaw war, the rise of expansionist powers, appeasement by the democracies, and the most destructive war in human history. Ideas, which Fettweis claims will bring about the proliferation of peace, transformed Russia, Germany, and Japan into expansionist, totalitarian powers. Those same ideas led to the Gulag, the Holocaust, and the Rape of Nanking. So much for human progress. Fettweis knows all of this, but claims that since the end of the Cold War, the leaders and peoples of the major powers, except the United States, have accepted the idea that major war is unthinkable. His proof is that there has been no major war among the great powers for 20 years—a historical period that coincides with the American "unipolar" moment. This is very thin empirical evidence upon which to base a predictive theory of international relations. Fettweis criticizes the realist and neorealist schools of thought, claiming that their adherents focus too narrowly on the past behavior of states in the international system. In his view, realists place too great an emphasis on power. Ideas and norms instead of power, he claims, provide structure to the international system. Classical geopolitical theorists such as Halford Mackinder, Alfred Thayer Mahan, Nicholas Spykman, and Colin Gray are dismissed by Fettweis in less than two pages, despite the fact that their analyses of great power politics and conflict have long been considered sound and frequently prescient. Realists and classical geopoliticians have more than 2,000 years of empirical evidence to support their theories of how states and empires behave and how the international system works. Ideas are important, but power is the governing force in international politics, and geography is the most permanent factor in the analysis of power. Fettweis makes much of the fact that the countries of Western and Central Europe, which waged war against each other repeatedly for nearly 400 years, are at peace, and claims that there is little likelihood that they will ever again wage war against each other. Even if the latter assertion turns out to be true, that does not mean that the end of major war is in sight. Throughout history, some peoples and empires that previously waged war for one reason or another became pacific without producing worldwide perpetual peace: the Mongols, Saracens, Ottomans, Dutch, Venetians, and the Spanish Empire come immediately to mind. A Europe at peace does not translate to an Asia, Africa, and Middle East at peace. In a world in which major wars are obsolete, Fettweis believes the United States needs to adjust its grand strategy from vigorous internationalism to strategic restraint. His specific recommendations include the removal of all U.S. military forces from Europe; an end to our bilateral security guarantees to Japan and South Korea; an end to our alliance with Israel; an indifference to the balance of power on the Eurasian landmass; a law enforcement approach to terrorism; a drastic cut in military spending; a much smaller Navy; and the abolition of regional combatant commands.What Fettweis is proposing is effectively an end to what Walter Russell Mead calls "the maritime world order" that was established by Great Britain and maintained first by the British Empire and then by the United States. It is a world order that has defeated repeated challenges by potential hegemonic powers and resulted in an unprecedented spread of prosperity and freedom. But all of that, we are assured, is in the past. China poses no threat. The United States can safely withdraw from Eurasia. The power vacuum will remain unfilled. Fettweis needs a dose of humility. Sir Halford Mackinder, the greatest of all geopoliticians, was referring to visionaries and liberal idealists like Fettweis when he cautioned, "He would be a sanguine man . . . who would trust the future peace of the world to a change in the mentality of any nation." Most profoundly, General Douglas MacArthur, who knew a little bit more about war and international conflict than Fettweis, reminded the cadets at West Point in 1962 that "only the dead have seen the end of war."

#### Deterrence doesn’t explain peace – nuclear powers are still engaged in war, non-nuclear powers attacking stronger states

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A Nuclear Peace?¶ For “realist” scholars, the absence of war between the major powers during the Cold War years is best explained by the existence of a stable balance of power between East and West—in particular by the deterrence created by the mutual possession of nuclear arsenals with “second strike” capacities.¶ Kenneth Waltz, the leading proponent of the pacifying impact of nuclear weapons, has argued that, “Peace has become the privilege of states having nuclear weapons, while wars are fought by those who lack them.”[3]¶ But while nuclear arsenals undoubtedly induced a measure of caution in the behaviour of the superpowers and their allies towards each other, Waltz’ assertion is wrong for two reasons.¶ First, nuclear weapons states are not embroiled in fewer wars. Quite the contrary. Each of the four countries that have fought most international wars since the end of World War II—France, the United Kingdom, the United States, and Russia (USSR)—is a nuclear weapons state.¶ Second, since the end of World War II, non-nuclear states have repeatedly attacked nuclear weapons states. U.S. nuclear weapons did not deter China from attacking U.S. forces in the Korean War, nor North Vietnam from attacking South Vietnam and U.S. forces in the 1960s. Israeli nuclear weapons did not dissuade Egypt from attacking Israel in 1973. British nuclear weapons did not deter Argentina from invading the Falkland Islands in 1982, and the Soviet nuclear arsenal did not deter the mujahedeen from waging war against the Soviet army in Afghanistan in the 1980s—nor did they prevent a Soviet defeat.

#### Nuclear war leads to extinction and even if it doesn’t our impact still outweighs

Starr 15 (Steven - the director of the University of Missouri’s Clinical Laboratory Science Program, “Nuclear War, Nuclear Winter, and Human Extinction,” *Federation of American Scientists*, https://fas.org/pir-pubs/nuclear-war-nuclear-winter-and-human-extinction/)

While it is impossible to precisely predict all the human impacts that would result from a nuclear winter, it is relatively simple to predict those which would be most profound. That is, a nuclear winter would cause most humans and large animals to die from nuclear famine in a mass extinction event similar to the one that wiped out the dinosaurs. Following the detonation (in conflict) of US and/or Russian launch-ready strategic nuclear weapons, nuclear firestorms would burn simultaneously over a total land surface area of many thousands or tens of thousands of square miles. These mass fires, many of which would rage over large cities and industrial areas, would release many tens of millions of tons of black carbon soot and smoke (up to 180 million tons, according to peer-reviewed studies), which would rise rapidly above cloud level and into the stratosphere. [For an explanation of the calculation of smoke emissions, see Atmospheric effects & societal consequences of regional scale nuclear conflicts.] The scientists who completed the most recent peer-reviewed studies on nuclear winter discovered that the sunlight would heat the smoke, producing a self-lofting effect that would not only aid the rise of the smoke into the stratosphere (above cloud level, where it could not be rained out), but act to keep the smoke in the stratosphere for 10 years or more. The longevity of the smoke layer would act to greatly increase the severity of its effects upon the biosphere. Once in the stratosphere, the smoke (predicted to be produced by a range of strategic nuclear wars) would rapidly engulf the Earth and form a dense stratospheric smoke layer. The smoke from a war fought with strategic nuclear weapons would quickly prevent up to 70% of sunlight from reaching the surface of the Northern Hemisphere and 35% of sunlight from reaching the surface of the Southern Hemisphere. Such an enormous loss of warming sunlight would produce Ice Age weather conditions on Earth in a matter of weeks. For a period of 1-3 years following the war, temperatures would fall below freezing every day in the central agricultural zones of North America and Eurasia. [For an explanation of nuclear winter, see Nuclear winter revisited with a modern climate model and current nuclear arsenals: Still catastrophic consequences.] Nuclear winter would cause average global surface temperatures to become colder than they were at the height of the last Ice Age. Such extreme cold would eliminate growing seasons for many years, probably for a decade or longer. Can you imagine a winter that lasts for ten years? The results of such a scenario are obvious. Temperatures would be much too cold to grow food, and they would remain this way long enough to cause most humans and animals to starve to death. Global nuclear famine would ensue in a setting in which the infrastructure of the combatant nations has been totally destroyed, resulting in massive amounts of chemical and radioactive toxins being released into the biosphere. We don’t need a sophisticated study to tell us that no food and Ice Age temperatures for a decade would kill most people and animals on the planet. Would the few remaining survivors be able to survive in a radioactive, toxic environment?

### A2 Ableism

#### Germline editing itself is not bad---taking social models of disabilities into account solves the harms many fear

Solveig Magnus Reindal, 4-1-2000, Reindal works at Oslo University in Norway, "Disability, gene therapy and eugenics", Journal of Medical Ethics, https://jme.bmj.com/content/26/2/89, 6-29-2022, //ms

Introduction In the article, “Is gene therapy a form of eugenics?” Harris discusses disability and the production of “fine” children and how this should be achieved. He also criticises people who argue that a predisposition to being impaired will be used as a basis for discrimination against disabled people. Harris builds his critique on what he calls “The moral continuum” and his understanding of disability. He argues that “there is in short no moral difference between attempts to cure dysfunction and attempts to enhance function where the enhancement protects life or health”.[2](https://jme.bmj.com/content/26/2/89#ref-2) He does not distinguish between gene therapy on the germ line and gene therapy on the somatic line. In his view there is in theory no moral difference between the two practices. Harris does not agree with disabled people who argue that gene therapy is a form of eugenics and that discrimination against them as a group is tantamount to devaluing them as persons. He argues that to decide not to keep a “disabled neonate” alive no more constitutes an attack on the disabled than does curing disability, and that to prefer to remove disability where we can is not to prefer non-disabled individuals as persons.[3](https://jme.bmj.com/content/26/2/89#ref-3) The wrongs that practising eugenics may involve are, according to Harris: the assumption that those who are genetically weak[4](https://jme.bmj.com/content/26/2/89#ref-4) should be discouraged from reproducing or are less morally important than other persons, and that compulsory measures to prevent them reproducing might be defensible. But this is not what Harris advocates: “It is not that the genetically weak should be discouraged from reproducing but that everyone should be discouraged from reproducing children who will be significantly harmed by their genetic constitution. Indeed, gene therapy offers the prospect of enabling the genetically weak to produce and give birth to the genetically strong . . . . It might thus, as we have just noted, enable individuals with genetic defects to be sure of having healthy rather than harmed children and thus liberate them from the terrible dilemma of whether or not to risk having children with genetic defects”.[5](https://jme.bmj.com/content/26/2/89#ref-5) Consequently, Harris argues that there is nothing morally wrong per se in practising eugenics,[6](https://jme.bmj.com/content/26/2/89#ref-6) but that there is a wrong practice. The wrong practice occurs in the moment when a majority, a collective, argues that it is defensible to discourage and/or prevent a minority which is “genetically weak” from reproducing. Thus, morally right eugenics does not deny the “genetically weak” reproduction; it only prohibits or prevents the “genetically weak” from giving birth naturally. Furthermore, according to Harris, it is morally wrong to produce children “who will be significantly harmed by their genetic constitution”. In Harris's view eugenics is not wrong and it is a matter of indifference whether we call it eugenics or not: “call it what you will, eugenics or not, we ought to be in favour of it”.[2](https://jme.bmj.com/content/26/2/89#ref-2) In the following I will examine how Harris understands the moral continuum and disability. The moral continuum In arguing for the moral continuum Harris uses a hypothetical example of a woman who has five eggs fertilised in vitro, and who wishes to use some of these embryos to become pregnant. Normal practice at an IVF clinic would be to insert two embryos or at most three. Harris asks us to consider the following: “If preimplantation screening had revealed two of the embryos to possess disabilities of one sort of another, would it be right to implant the two embryos with disability rather than the others? Would it be right to choose the implantation embryos randomly? Could it be defensible for a doctor to override the wishes of the mother and implant the disabled embryos rather than the healthy ones - would we applaud her for so doing? The answer that I expect to all these rhetorical questions will be obvious. It depends however on accepting that disability is somehow disabling and therefore undesirable”.[7](https://jme.bmj.com/content/26/2/89#ref-7) Whether this is a moral continuum depends, according to Harris, on accepting that disability is somehow disabling and therefore undesirable. Harris asks us whether it could be defensible for a doctor to override the wishes of the mother and implant the disabled embryos rather than the healthy ones? However, it is not obvious that the mother's wish in all circumstances is what Harris presumes. There could be situations where the mother wished to implant the impaired embryos, or there could be a situation where all the embryos showed signs, at preimplantation screening, of some impairment and the mother still wanted to implant them. Thus, we need to distinguish, on the one hand, whether a mother's or couple's decision is morally justified and, on the other hand, whether the doctor is justified in overriding it. Let us consider the following hypothetical examples. Achondroplasia Example A: A couple, both of whom have the diagnosis achondroplasia, consider having children. As their house and all other facilities, their car and summer cabin, are adjusted to their situation they will have to do major alterations in order to bring up a child of “normal” height. They have only managed to pay some of the costs of these adjustments and cannot see how they can afford to make new alterations in a couple of years. In these circumstances they decide to go to an IVF clinic and ask for a preimplantation screening for achondroplasia. The result of the screening is that three of the five embryos have the gene for achondroplasia. The couple decide they would like to implant the achondroplasia embryos. Is it defensible for a doctor to override the wishes of the couple and implant the embryos without achondroplasia rather than those with achondroplasia? Example B: A couple with congenital deafness consider having children. For both of them sign language is their first language, because their parents were also deaf. As both speak and lip read the hearing language very poorly they will not be able to communicate with their child through speech. Facilities in the house are adjusted to their situation and most of their friends use sign language. Considering these circumstances they opt for the IVF method of becoming pregnant and as the preimplantation screening shows two embryos of five with the gene for congenital deafness they choose to implant these. Again, is it defensible for a doctor to override the wishes of the couple and implant the three embryos without the gene for congenital deafness? Underlying presupposition Example C: A couple come for a second attempt at in vitro fertilisation. They decide that this will be their final attempt. Last time the woman had a miscarriage. This time a preimplantation screening shows that all the embryos have some sign of impairment. However, the couple want to try to implant the embryos despite supposed impairments and the risk of a miscarriage. Is it defensible for a doctor to override the wishes of the couple and not implant any of the embryos because of presumed impairments? If Harris considers the offspring of the couples with the diagnoses of achondroplasia and congenital deafness to be examples of “children who will be significantly harmed by their genetic constitution”, I suppose he would answer that it is morally wrong to implant the embryos with the impairments under these circumstances and that the parents' decision is not morally justifiable. The right thing to do for the doctor in examples A and B would thus be to override the wishes of the two couples, if he or she were convinced that it was morally wrong to produce “children who will be significantly harmed by their genetic constitution”. In Harris's terminology the doctor would not be involved in a wrong eugenic practice because he or she is enabling the genetically weak to reproduce and give birth to the genetically strong. However, what about example C, is this couple's wish morally justifiable? I suppose their wish is not justifiable according to Harris if “disability” is undesirable under all circumstances. Again, we might presume that the doctor overrides the couple's wish with reference to the embryos assumed impairments. The underlying presupposition for the doctor's decision might have been that even though it is better to produce “unhealthy” children than to produce no children at all this is provided that the “unhealthiness” does not make their lives not worth living. Let us suppose that the doctor views the embryos' “unhealthiness” to be of such a kind that their lives would not be worth living. After the births couples A and B realise that the doctor has overridden their wishes and decide to sue the doctor on the grounds that she or he has acted negligently in respect of their wishes. The couple in example C sue the doctor for negligent action and a loss of a potential child. The other two couples charge full economic compensation for the changes that have to be made in order to raise the children, and try to sue the doctor by bringing “wrongful life” cases. However, according to Heyd[8](https://jme.bmj.com/content/26/2/89#ref-8) wrongful life cases are at most, victimless crimes: “And in that respect, even if we cannot, for logical reasons, grant legal standing to the child in its claim for compensation, should not the negligent doctor be held responsible for the wrong and be liable to (criminal) punishment? Putting aside the parents' claim, a wrong was done in the world even if no individual can be identified as its victim”.[9](https://jme.bmj.com/content/26/2/89#ref-9) The problem with these “wrongful life” cases in comparison to other “wrongful life” cases, for instance where “wrongful life” is claimed because of being born with achondroplasia, deafness etc, is that one cannot claim that a wrong was done in the world without acknowledging thereby that “disability” is undesirable under any circumstances. This will also be the case with the couple in example C, where the doctor's overriding decision might have prevented a child being born with, for example, achondroplasia, deafness etc. If the judges follow Harris's view that “disability” is, under any circumstances, undesirable, the couples will not be given any compensation or approval. However, if the judges hold that respect for parental autonomy should be given more weight than preventing the birth of an impaired child, the doctor could be charged for having violated parental autonomy. Examples A, B and C raise the question of parental autonomy where impairments are stated. The practice of genetic engineering (or treatment) challenges parental autonomy on several levels: first, there is the possibility of resisting genetic engineering, suggested because of supposed “genetic disorders”; second, there is the possibility of agreeing to enhance “genetic disorders” through gene therapy, and third there is the possibility of demanding genetic engineering according to aesthetic standards, intellectual abilities and so forth (“utopian eugenics”). All these examples of how parental autonomy may be exercised raise the issue of normality. While resisting genetic engineering (or treatment) suggests a widening of diversities, the exercise of parental autonomy in relation to genetic engineering of “genetic disorders”and “utopian eugenics” increases tendencies to adopt narrow notions of normality and can provide opportunities to stigmatise and exclude people. This is what disabled people fear will be the result of genetic technology. In Harris's thinking there is a presupposition that “disability” is undesirable under any circumstances, otherwise there would be no motive to try to cure or obviate “disability” in health care more generally.[7](https://jme.bmj.com/content/26/2/89#ref-7) The crucial question to be asked then is what is “disability”? What is disability? Harris argues that we know pretty clearly what we mean by disability. According to him, a disability is a physical or mental condition we have a strong preference not to be in ourselves. What is more important, he argues that it is a condition,which is in some sense a “harmed condition”.[10](https://jme.bmj.com/content/26/2/89#ref-10) According to Harris, a disability or incapacity is disabling in some sense, and it is a harm to those who suffer it. The “harmed condition” can be a result of someone knowingly disabling another individual or leaving the individual disabled when the disability could be removed.[11](https://jme.bmj.com/content/26/2/89#ref-11) An example of knowingly disabling an individual is provided, according to Harris, by the case of a pregnant woman who knows that something will have a bad effect on her fetus, knows she could remove the bad effect by a simple dietary adjustment, and who fails to make that adjustment. Harris further defines disability as a disabling condition relative to active and passive intervention, that is, he defines disability as a function of people's choices caused by an action or refraining from an action. It is a condition within the individual caused by earlier choices made by parents or professionals before, during or after pregnancy. Harris argues that his definition avoids certain obvious pitfalls: “First it does not define disability in terms of any conception of normalcy. Secondly it does not depend on post hoc ratification by the subject of the condition - it is not a prediction about how the subject of the condition will feel”.[11](https://jme.bmj.com/content/26/2/89#ref-11) The second element is especially important for Harris as his definition can thus be used for the potentially self-conscious: gametes, embryos, fetuses and neonates and for people who are temporarily unconscious; it is a definition which does not wait upon subsequent ratification by the person concerned. However, one pitfall Harris does not avoid is to regard disability as an individual problem, a condition within the subject. This understanding of disability is, within contemporary disability studies, familiar as the medical model, where disability is seen as a product of biological determinism or personal tragedy. This individual, or medical, model sees disablement as a medical problem, which affects only a small proportion of the population. Recent studies in Britain, however, conclude that four out of every ten adult women and men have a longstanding illness or disability. Other studies show that internationally there are around 50 million disabled people in Europe and approximately 500 million worldwide.[12](https://jme.bmj.com/content/26/2/89#ref-12) Disability is far from merely being a medical problem that can be “cured”, on the contrary it is mainly a cultural and sociopolitical problem. The medical notion of disability, seeing disability as a cause of a limitation within the individual, cannot account for the fact that not all people with losses, diseases, illnesses etc experience disablement. If it were that impairment, some functional difficulties of any kind, were tantamount to identifying someone as a disabled person then the medical notion of disability would have to be utterly comprehensive, exhaustive, in order to account for an understanding of what disability is. Research studies A comparison of three research studies carried out in Norway showed that the number of disabled people decreased when a commonsense definition of disability was used as a starting point. When the definition of disability was based on self-report and common sense, the estimate of disabled people was 15 per cent. However, when criteria-based definitions were the starting point, 35 and 40-50 per cent of the population were categorised as disabled.[13](https://jme.bmj.com/content/26/2/89#ref-13) These people were considered disabled because of certain impairments. If the medical notion of disability is correct, stating disability as a condition within the subject, which is disabling in some sense, then having impairments and the experience of disablement, should coalesce. In Harris's definition of disability “how the subject of the condition will feel” is left out. Harris leaves it out because decisions about whether individuals will come into existence have to be taken before we can know how they will feel and therefore we have to decide on some “objective” basis. However, as shown above the issue of identity is a challenge to definitions that adhere to a purely medical perspective of disability. Although Harris regards the cause of disability as relative to active or passive intervention, his understanding of disability comprises a causal link between having a certain condition in the individual and being disabled. Hence, anatomy is seen as destiny. As already mentioned, disability studies show that there is a distinction between having an impairment and being disabled. Because of this distinction, researchers have argued for a division between a certain condition in the individual and disablement.[14](https://jme.bmj.com/content/26/2/89#ref-14) To deny that there is a necessary causal link between a certain condition in the individual and disablement does not imply that researchers defending a social model deny that there are such things as impairments. On the contrary, impairment simply means that aspects of a person's body do not function or they function with difficulty.[15](https://jme.bmj.com/content/26/2/89#ref-15) What they insist on is that whether an impairment results in disablement is conditional on other things than merely the impairment itself. They acknowledge the fact that individuals might regard their impairment as positive, neutral or negative, and that this might differ according to time and place. Hence, they favour a social model of disability where the basis of disability is located in social conditions. Advocates for the social model maintain that disability is a sociopolitical construction, a product of organisation and culture rather than a personal limitation due to a person's impairment, where agency and structure are intricately knit together. Such a view implies that social barriers, norms and values, rather than impairments, should be analysed in determining quality of life. Debates in genethics on quality of life often rest on an individual model of disability, hence low quality of life is attributed to an impairment of some kind and associated with “personal tragedy”. However, it is not unusual for disabled people to report that their lives have changed for the better following disablement.[16](https://jme.bmj.com/content/26/2/89#ref-16) Of course the social models do not deny that impairments can affect quality of life but they deny a priori assumptions, on which, for example, the practice of fetal screening for abortion and infanticide for babies with significant impairments, rests. ‘Curing disability’ and discrimination The main discrimination that results from the creation and construction of disability is that various institutions refuse to give up individual models of disability. The very idea of “curing” disability is the core element in the discrimination of disabled people because the “curing ideal” resides in conformity and normalcy. The presupposition of the “curing” ideal makes the removal of disadvantage contingent upon the removal or “overcoming” of impairment: in other words, full participation in society is found through cure or fortitude.[17](https://jme.bmj.com/content/26/2/89#ref-17) To challenge the unacceptable features of the medical model does not imply that disabled people do not need, or see, at specific points in their lives, the necessity of medical support. However, what is being challenged are the social conditions and relations in which such encounters take place, the enveloping of disabled people's identity in medical terms. It is important that their voices are heard and that they have much more effective participation in decisions which affect them.[18](https://jme.bmj.com/content/26/2/89#ref-18) A consequence of the medical model, in that it deals only with impairment, is that resources are directed into impairment-related research and intervention, whereas scant resources are channelled into social change for the inclusion of people with impairments. Cornes[19](https://jme.bmj.com/content/26/2/89#ref-19) found that in relation to impairment new technology is widespread, well established and well funded compared with technology that could lessen disabling barriers. Another example is research within gene therapy that strives to “cure disability”, while ignoring the social and cultural factors that make not walking, hearing, seeing etc into a problem. There is little public questioning of the distribution of the funds between these two approaches. The main reason this has not been an issue for discussion is the persistence of an individual model of disability in the culture and the social structures. Advocates for the “curing” ideal will argue that we cannot assume that society is obliged to undertake changing the world for disabled people so as to render them not disabled in all cases, rather than eliminating the impairment, especially where doing that is cheaper.[20](https://jme.bmj.com/content/26/2/89#ref-20) Such a view rests on the assumption that impairments are primarily a result of genetic predisposition and biological determinism. Thus, impairments can be avoided and eliminated through abortion, sterilisation, and infanticide or cured through somatic and germ line therapy. This view underestimates the prevalence of disablement, which is increasing, especially in wealthier, developed societies due to a combination of an aging population and medical interventions which prolong life. Research in Britain showed that four per cent of those aged 16-64 suffered from some impairment compared to 28% of the population over the age of 65.[21](https://jme.bmj.com/content/26/2/89#ref-21) The insistence on individual models of disability within social structures means seeing the “impairment” exclusively as the problem and will render the aging population ever more disabled as the principle behind service provision will continue to neglect disabling barriers. Approaches of the individual model to the study of aging have been criticised for failing to take account of external and structural factors, which influence people's experience of aging.[22](https://jme.bmj.com/content/26/2/89#ref-22) Another aspect such a view disregards is the creating of impairments through physical abuse, industrial accidents, unsafe environments, environmental pollution, stress and exhaustion, war and violence.[23](https://jme.bmj.com/content/26/2/89#ref-23) To continue to persist with individual models of disability, equating the problem of disability to impairments and individual conditions, is itself a discrimination against disabled people. Historically, the right to define has been an instrument of power in relation to minority groups and in the oppression of, and discrimination against, people. Conceivably, it is not a coincidence that the majority of non-disabled people use an individual model of disability, whereas disabled researchers use a social model of disability. Non-disabled people's insistence on the right to define who is disabled or what disability is, would in itself constitute discrimination against disabled people if the understanding that disabled people themselves have of disability is ignored in, for instance, academic discussions. Let us now return to Harris's position. If it is correct that Harris's definition of disability stems from an individual view of disability, then his argument for claiming that gene therapy is not a form of eugenics and discrimination against the disabled as a group, would also rest on this presupposition. If discussions on gene therapy use individual models of disability, dominated by biological understandings as a point of departure, disabled people will experience these discussions as eugenics in disguise and hence as discrimination against them. This is because biological determinist understandings were the underlying presupposition in the eugenic policies that, for example, were at the root of sterilisation laws introduced in several countries in the 1930s.[24](https://jme.bmj.com/content/26/2/89#ref-24) Accordingly, in order to have a sincere ethical debate on gene therapy comprehension demands not just biology and rational reasoning but the methodologies of the social sciences as well. Hence, the perspectives and empirical evidence gained from disability studies should eventually be considered and not ignored in philosophical research into bioethics. Conclusion Individual models of disability and especially the “medical model” are inadequate as models for explaining the phenomenon of disability. They adhere to a causal understanding of the interplay between impairment and disablement. As long as ethical thinking within gene therapy adheres to a “medical model” of disability, individual differences as impairments will be regarded as essential attributes which are given moral status. The medical model of disability leads to value judgments by the unimpaired in so far as they view an impairment as meaning that a person has such poor quality of life that that life is judged, by the unimpaired, to be not worth living. These erroneous judgments will only be avoided if social models of disability are taken into account and the views of individuals with those impairments are sought and heard.

#### No solvency - exposing disability oppression does not lead to change in perception or attitude

Donoghue 2003 (Christopher, Fordham University, Challenging the authority of the medical definition of disability: an analysis of the resistance to the social constructionist paradigm, Disability & Society 18.2)

**In an effort to debunk the entrenched authority of the medical model, a social constructionist paradigm has been adopted** by many disability theorists and activists. They have suggested that society normally creates a negative social identity for people with disabilities (Gergen, 1985; Fine & Asch, 1988; Scotch, 1988; Brzuzy, 1997). **Through the construction of this identity, which is typically characterised by deviant or abnormal behaviour, the non-disabled majority is granted a legitimate means to exclude and isolate people with disabilities**. As removed members of society, their contributions are often discredited and their successes are treated as aberrations. Likewise, the expectations of people with disabilities are chronically low, and there is an ever-present suggestion that their lives are not necessarily worth living. This identity has been argued to derive from the medical model, which defines a disability as a deficiency that restricts one’s ability to perform normal life activities. By adopting the social constructionist viewpoint, theorists and activists have contended that society has created disability by choosing not to remove structural constraints that would enable more people to participate and gain access to social resources. **The social constructionist approach was an effective ideological rejoinder to the established medical model**. Yet the question of how to convince the non-disabled majority that society has disabled certain individuals has not been adequately resolved. The **activists** attempted to adopt the social constructionist theory as a basis for a minority group model of disability. They would **use this model to support a plea for action to people with disabilities as a mechanism to overcome the oppression being inflicted upon them by the non-disabled majority**. While it is clear that such a transformation of the definition of disability among academics and disability activists has clearly taken hold, **the disability movement appears to have achieved only limited success in changing the views of the non-disabled majority**. By accepting the reward of civil rights protection without insisting that the medical model be publicly dismantled, the hopes of the disability activists to change the views of the broader public may have been sacrificed. The willingness to make this concession may have stemmed from **the belief among social constructionist theorists that society will change its perception of disability if it is merely demonstrated that the prior notion has been made unjustly**. From a structural point of view, **it would seem to take much more to convince a dominant group in society that it needs to redistribute power and access to its treasured resources.** **The more desirable arrangement to the non-disabled majority is one that maintains the superiority of people with ‘normal’ abilities**. **As a result, the disabled are typically described as dysfunctional and are often perceived to be incapable of understanding the world in the same way that ‘normal’ people do.** Although **social constructionists** argue that such judgements regarding how people should be able to think or act are subjective notions that stem from dominant social ideologies, they may be said to **underestimate the extent to which those ideologies are created and legitimated by the non-disabled majority because they best serve their interests.**

The affirmative essentializes the experiences of the disabled and the non-disabled and their perspectives on germline gene editing

Humphrey, Faculty of Applied Social Sciences, The Open University UK, 2k (Jill C., Disability & Society, Vol. IS, No. I, “Researching Disability Politics, Or, Some Problems with the Social Model in Practice”, Proquest, p. 64-65)

In academic texts, the social model begins with an appreciation of the individual and collective experiences of disabled people (e.g. Swain a al, 1993). It goes on to elaborate the nature of a disabling society in terms of the physical environment, the political economy, the welfare state and sedimented stereotypes (e.g. Barnes et ah, 1999). Finally, it endorses a critical or emancipatory paradigm of research (e.g. Barnes & Mercer 1997a). This analysis lends itself to a recognition of the array of diverse experiences of disabling barriers; a realistic appraisal of the need for broader political coalitions to combat entrenched structural inequalities and cultural oppressions; and an openness about the potential for non-disabled people to contribute to critical theory and research. In activist discourses, the emphasis is upon the fact that it is non-disabled people who have engineered the physical environment, dominated the political economy, managed welfare services, controlled research agendas, recycled pejorative labels and images, and translated these into eugenics policies. This analysis lends itself to a dichotomy between non-disabled and disabled people which becomes coterminous with the dichotomy between oppressors and oppressed; and this tightens the boundaries around the disabled identity, the disabled people's movement and disability research. Whilst this hermeneutic closure is designed to ward off incursions and, therefore, oppressions from non-disabled people, it may also have some unfortunate consequences. I would like to illustrate these consequences by drawing upon a research project involving the four self-organised groups (SOGs) for women, black people, disabled members, and lesbian and gay members in UNISON (see Humphrey, 1998, 1999). Material drawn directly from conversations and observations in the disabled members' group is supplemented by interview transcripts with members of the lesbian and gay group, my own personal experiences of and reflections upon disability and discrimination, and recent developments in various social movements and critical research texts. The rest of the article depicts three problematic consequences of the social model in practice and redirects them back to the social model as critical questions which need to be addressed by its proponents. First, there are questions of disability identity where a kind of 'purism' has been cultivated from the inside of the disability community. Here, it can be demonstrated that some people with certain types of impairments have not been welcomed into the disabled members1 group in UNISON, which means that the disability community is not yet inclusive, and that its membership has been skewed in a particular direction. Second, there are questions of disability politics where a kind of 'separatism' has been instituted. Whilst the UNISON constitution allows for separatism to be supplemented by both coalitions and transformations, these have been slow to materialise in practice, and the dearth of such checks and balances in the wider disabled peoples\* movement implies that the danger of developing a specific kind of disability ghetto is more acute. Third, there are questions of disability research where a kind of 'provisional-ism1 is suspended over the role of researchers. The most obvious dilemmas arise for the non-disabled researcher as would-be ally, but it is becoming clear that disabled academics can also be placed in a dilemmatic position, and it is doubtful whether any researcher can practise their craft to their own standards of excellence when operating under the provisos placed upon them by political campaigners.

The ableism arguments lock in certain notions of difference – turns the aff

Roberts, Baylor University, Masters thesis in Communication, 7 (Jeff, *The Rhetorical Structure of Disability: Bridging the Gap Between What is ‘Spoken’ and What is ‘Said’ with Song - Over-Signifying with Personhood Against the Backdrop of Disease-Centric Discourse,* [http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=37&ved=0CGkQFjAGOB4&url=http%3A%2F%2Fbeardocs.baylor.edu%2Fxmlui%2Fbitstream%2Fhandle%2F2104%2F5086%2FJeff\_Roberts\_Masters.pdf%3Fsequence%3D1&ei=hUL3T52RN4SlrQH1j6iLCQ&usg=AFQjCNHd4PB3kECHEjVxxEx07R2Oqb2EBg](http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=37&ved=0CGkQFjAGOB4&url=http%3A%2F%2Fbeardocs.baylor.edu%2Fxmlui%2Fbitstream%2Fhandle%2F2104%2F5086%2FJeff_Roberts_Masters.pdf%3Fsequence%3D1&ei=hUL3T52RN4SlrQH1j6iLCQ&usg=AFQjCNHd4PB3kECHEjVxxEx) , Pg.7-8)

Founding action towards people with disabilities upon notions of difference, placing a primacy on difference particularly in the context of incorporation, domestication, and acceptance of such difference, dooms the struggle for equality to failure. “Over recent centuries all forms of violent otherness have been incorporated, willingly or under threat of force, into a discourse of difference which simultaneously implies inclusion and exclusion, recognition and discrimination (Baudrillard, 1993, p. 129).” Once the Native American “savage” became “accepted” under U.S. law as “human,” or rather a different type of human, it was not long until viral hatred forced new boundaries of difference to be erected, and segregation of such difference to be enacted in the form of the reservation. Where the “savage” or “monster” is never understood, or assimilated, remaining radically exotic to the oppressive guise of society, when “accepted” by society on the basis of “difference” viral racism allows only two options for the future: assimilation or extermination (Baudrillard, 1993). Similarly, modern medicine has facilitated society with an understanding of disability, allowing it to accept the “different” or “disabled” person under law as “human,” more specifically a “disabled human” in which is different from “normal” individuals, but none the less similar. “Madness, once its exclusionary status had been revoked, was caught up in the far subtler toils of psychology (Baudrillard, 1993, p. 129).” As soon as society began to understand and consequently attempt to “accept” the “monster” other, the other traded its quality of foreign “monsterness” for qualities of “feebleness,” with the social acceptance of the others difference, the “monster” soon became the “mongoloid.” “Difference” annihilated the subaltern subject by making all that was foreign and radically exotic within easy reach of societal understanding. With a compassion rooted in pity, and fear founded upon difference, society became locked into a mode of interaction with disability, and the individuals’ disability located itself within, which mandated oppression in the spirit of viral hatred.

#### No solvency - disrupting the inequitable social constructions of people with disabilities is insufficient and leaves the disabled people excluded

Dewsbury et al 4 Guy, Lancaster Univ, Karen Clarke, Lancaster Univ, Dave Randalll, Manchester Metropolitan Univ, Mark Rouncefield Lancaster, Ian Sommerville, Lancaster, The anti-social model of disability, Disability & Society, 19.2 March

We do not share all **these concerns** as they **apply to the social model of disability**, for we are not menaced by constructionism, nor do we wish to promote one variety of truth claim over another. We are concerned specifically with how this helps. The constructionist focus, we feel, has altered our perspective on expertise such that **where we had previously unquestioningly accepted the professional expertise of medical practitioners, we now equally unquestioningly accept the expertise of the sociologist who wishes to undermine it.** **The social constructionist**, that is, **provides professional explanation by revealing the hidden nature of the social world in and through a number of typical steps.** These include: 1. **Showing that definitions** of a given concept **are shifting**, especially historically. Many social constructionist studies draw attention to the ways in which explanations that were accepted as matters of fact were embedded in the ideologies or discourses of the time and can now be clearly seen as absurd or wrong. 2. **Deriving from this that ‘things could be otherwise’** insofar as new and ‘constructionist’ models can be used contrastively with models that have preceded them, including models that still have a currency. 3. **Arguing that in some way this challenges the ‘social reality’** of the concept in question. 4. **Suggesting that this challenge to the social reality of any given social fact has important political consequences** and that the social constructionist is pivotal in the realization of these consequences. We think **there may be problems here**, mainly with steps 3 and 4. As Hacking (1999) has convincingly shown the validity and importance of challenges to social reality depend very much on what kind of challenge they are. Equally, we will suggest that **the apparent political importance of the constructionist position is largely rhetorical**. This is not to understate its importance, for rhetoric is a powerful force, but **it does not assist us with our ‘what to do next’ problem**. In explicating the various ways in which disability is a social construct the Social Model highlights the social features of what, on first consideration, might appear as a purely physical problem. As Humphrey argues: ‘… the social model harbours a number of virtues in redefining disability in terms of a disabling environment, repositioning disabled people as citizens with rights, and reconfiguring the responsibilities for creating, sustaining and overcoming disablism’ (Humphrey, 2000, p. 63). Again, there are self-evident, political, advantages in adopting this position. As Hacking suggests, ‘it **can still be liberating suddenly to realize that something is constructed and is not part of the nature of things**, of people, or human society’ (Hacking, 1999, p. 35). **However, the metaphor has grown tired, if not tiresome, and in the matter of what we call ‘practical politics’**, **that is the quite ordinary business of making-do, managing, coping** (and obviously everyone ‘makes do’, not just disabled people) **that might inform the design-related questions we want to ask, it is for the most part empty.** In order to pursue this theme, **we need to examine the sense in which the ‘social model’ can be seen as ‘radical’**, **for as with so many similar avowals there is less to this than meets the eye**. **Despite the supposedly ‘radical’ nature and claims of the social model of disability it clearly engages in the ordinary business of sociology** and, as Button (1991) suggests, **any radical claims are readily absorbed into everyday sociological debate.** **That is, radical political commitments are not radical sociologies**—**they are,** from within a sociological perspective**, unremarkable**. Radical causes are the very stuff of conventional sociology, conducted along conventional lines. Even, for example, **the argument that some current sociological approaches propagate a ‘disablist’ view of society that legitimates the treatment of disabled people, whilst simultaneously obscuring their real position within society is but a pale imitation of earlier, similar, Feminist and Marxist arguments. The application of the idea may be new but the idea itself, and the argument presented, is not.**

## Advantage 2 – Economic inequality

#### Germline editing is ethically justifiable – can solve economic equality concerns with enhanced access.

DANIEL J. MALKIN attorney practicing in intellectual property law. 2021 GERMLINE EDITING USING CRISPR: WHY A MORATORIUM IS NOT THE SOLUTION, 55 Fam. L.Q. 69

Using CRISPR to repair germline mutations that cause serious congenital single-gene diseases is ethically justifiable. Such a use poses even fewer ethical barriers than does IVF generally, which is minimally regulated. Therefore, the COA erred in forbidding the FDA to even consider clinical germline editing applications.

For certain applications, modifying severe single-gene diseases in the germline using CRISPR would satisfy the FDA's benefit-risk analysis. For example, where both parents will pass on the Huntington's disease mutation to their children, CRISPR may be the only potential treatment to eliminate the mutation. Evidence also shows that public opinion strongly supports such use for CRISPR to address serious medical conditions or diseases. While equal access to the therapy poses an ethical concern, the answer is to enhance access, rather than to reject treatments that could eliminate serious physical or mental impairments that would substantially limit a child's major life activities. Finally, fears of a new eugenics movement should be allayed if the FDA authorizes germline editing licenses only for therapies targeting severe single-gene diseases.

#### Inequality doesn’t cause gridlock and stagnation.

Nolan 19 – Brian, Professor of Social Policy and Director, Equity Employment and Growth Research Programme, University of Oxford. “Why We Can’t Just Blame Rising Inequality For The Growth Of Populism Around The World”, The Conservation, https://theconversation.com/why-we-cant-just-blame-rising-inequality-for-the-growth-of-populism-around-the-world-120951, 08-13-2019

The idea is now commonplace that income inequality is inexorably on the rise. The US experience in particular has become central to a new grand narrative prominent in public debate and taken to apply across rich countries: globalisation and technological change have polarised society into a small elite with highly paid, secure jobs on one side, and on the other side are growing numbers of people, including an increasingly “squeezed” middle class, in insecure, poorly-paid work.

This growing inequality is held responsible for a wide range of social and political ills. Not least the erosion of solidarity, social trust and faith in democratic institutions. And, politically, it caused the election of Donald Trump, the UK’s Brexit vote, and the broad rise of populism seen as threatening democracy.

This “grand narrative” undoubtedly captures important aspects of the US experience. But it does not represent the whole picture. And as far as other rich countries are concerned, examining the evidence highlights the diversity of their experiences over recent decades. As I’ve found in my research, this story is more often than not a poor fit for various countries around the world.

Different experiences

Household surveys show that income inequality has risen significantly since the 1980s in about two-thirds of the rich countries of the OECD – leaving one-third where it has not. The following graph shows what has happened to the Gini coefficient, the most commonly-used indicator of income inequality. Inequality did not rise everywhere and, where it did, the scale of that increase varied widely. Countries such as the UK and Sweden did see inequality go up as sharply as the US. But for others the increase was often much more modest and even decreased for some.

Inequality rose decade by decade in the US, but the UK’s increase was mostly concentrated in the Thatcher years of the 1980s, Sweden’s in the 1990s, and these contained “episodes”, rather than continuous rises, are also common elsewhere. Tax data show pre-tax income shares at the very top increasing in many countries, but again this varies widely across countries.

When it comes to ordinary living standards, middle class income growth has been even more varied. The next chart shows that middle incomes have stagnated in purchasing power terms since the early 1980s in Japan and Italy, as well as the US, and grown only modestly in Germany. But these are the poorest performers.

The UK, for example, saw substantial income growth around the middle from the late 1980s up to the mid-2000s, in sharp contrast to its lack of growth since then. Countries such as Australia, Belgium, Canada, Denmark, Finland and Sweden also saw periods of quite strong growth.

Crucially, across rich countries the relationship between inequality and middle income growth is weak – throwing into question the link that gets made between the so-called squeezed middle and populism. Middle incomes have generally lagged behind growth in GDP per head but again to widely varying extents, and rising income inequality is only one factor. Knowing what happened to inequality in a given country would have been of little help in predicting whether growth in middle incomes was strong or weak.

Not just the economy

The extent to which rising inequality and stagnating living standards over decades have driven the recent rise in populism across the rich countries is also open to question. Yes, the white working class population whose livelihoods have been hurt through decades of manufacturing decline provided the core constituency supporting Trump for president. But economic dysfunction combines with cultural and demographic factors in a way that makes them very hard to disentangle.

The fact that support for populist parties has risen in countries where inequality has been fairly stable over time (such as Austria and France), as well as ones where inequality has risen, and in countries where income growth has been quite robust (such as Poland), as well as ones where median incomes have stagnated (such as Hungary), illustrates the complexity of the factors at work.

#### No risk from economic inequality – effects are exaggerated and its declining.

Phil Gramm and John Early March 23 2021 Wall Street Journal, “Incredible Shrinking Income Inequality,” <https://www.wsj.com/articles/incredible-shrinking-income-inequality-11616517284>

Twice over the past 50 years, the Census Bureau has significantly changed how it collects and records income statistics. In 1993 and 2013 the Census Bureau changed its methods in an effort to collect better information from high-income households. These changes created two major discontinuities and distorted the time-series so that the change in measured income inequality in those years was as much as 15 times the average annual change found for the entire 50-year period. At the time, the Census Bureau explained in detail what it had done. It also explained the limitations the changes imposed on the use of its income-inequality measure to look at changes over extended periods. In subsequent use of the data by the Census Bureau and others, however, those warnings have been neglected. The simple solution would have been to isolate the distortions caused solely by the changes in data-collection techniques and adjusted the previous years’ measures to reflect the effect of the changes. We made these adjustments and they are shown in the nearby figure. The blue line is the actual reported Census Bureau measurement of income inequality. The yellow line eliminates the effects of the 1993 and 2013 discontinuities caused solely by changes in measurement technique. The black line shows income inequality when the value of all transfer payments received is counted as income, income is reduced by taxes paid, and the two technical corrections are made. Lo and behold—income inequality is lower than it was 50 years ago. The raging debate over income inequality in America calls to mind the old Will Rogers adage: “It ain’t what you don’t know that gets you into trouble. It is what you do know that ain’t so.” We are debating the alleged injustice of a supposedly growing social problem when—for all the reasons outlined above—that problem isn’t growing, it’s shrinking. Those who want to transform the greatest economic system in the history of the world ought to get their facts straight first.

#### The best empirical evidence disproves the inequality-crisis-cooperation link

Bordo 12 – Michael D, Professor of Economics and Director of the Center for Monetary and Financial History at Rutgers University, PhD from the University of Chicago, and Christopher M. Meissner, professor of economics at UC Davis, PhD in Economics from UC Berkeley. “Does Inequality Lead to a Financial Crisis?”, National Bureau of Economic Research, NBER Working Paper No. 17896, <https://www.nber.org/system/files/working_papers/w17896/w17896.pdf>, 03-xx-2012

The recent financial crisis in the U.S. has been attributed to a rise in inequality by several authors. In his 2010 book, Fault Lines, Raghuram Rajan argued that rising inequality in the past three decades led to political pressure for redistribution that eventually came in the form of subsidized housing finance. Political pressure was exerted so that low income households who otherwise would not have qualified received improved access to mortgage finance. The resulting lending boom created a massive run-up in housing prices which reversed in 2007 and led to the banking crisis of 2008.¶ Along these lines, Kumhof and Rancière (2011) study the links between inequality, credit and crises complementing the Rajan hypothesis with a DSGE model. In this model, rising inequality and stagnant incomes in the lower deciles lead workers to borrow to maintain their consumption growth. As these households become increasingly indebted, they continue to borrow more to maintain their consumption. This increases leverage, and eventually a shock to the economy leads to a financial crisis. They posit that their story holds both for the 1920s stock market boom in the US and the run up to the 2008 crisis. The focus on income inequality by Kumhof and Rancière and Rajan is a novel approach to understanding macroeconomic outcomes prior to the recent financial crisis, and to the Great Depression. The theme deserves further empirical scrutiny from other time periods and countries.¶ There is reason to wonder about the generality of this new view since income inequality rarely plays a significant role in the large literature on financial instability and credit booms. Mendoza and Terrones (2008) study the experience of a large number of advanced and emerging economies since the 1960s finding that current account deficits, strong economic growth and fixed exchange rates accompanied credit booms. Borio and White (2003) have also elaborated a view of pro-cyclical financial systems. Periods of expected low and stable inflation, strong economic growth and liberalized finance can give rise to complacency amongst borrowers, lenders and regulators. Endogenous market forces that might normally “rein in” these imbalances seem to be absent. Massive buildups in credit lead to financial instability in this case. Income inequality plays no active role in generating the boom-bust outcome in these contributions. ¶ In this paper, we present new empirical evidence on whether rising inequality has any explanatory power in accounting for credit booms and financial crises. Rather than limiting the focus to inequality as the Rajan/Kumhof/Rancière (RKR) frameworks do, we control for more traditional determinants of the credit cycle. Different from these authors, we also bring evidence from a much larger sample than the two unique periods in US economic history that are the focus of RKR. Our sample is a panel of 14 mainly advanced countries from 1920 to 2008 covering a wide variety of boom-bust episodes and financial crises.¶ We find very little evidence linking credit booms and financial crises to rising inequality. Instead, the two key determinants of credit booms are the upswing of the business cycle or economic expansion and low interest rates. This is very much consistent with a broader literature on credit cycles. While inequality often ticks upwards in the expansionary phase of the business cycle, this factor does not appear to be a significant determinant of credit growth once we condition on other macroeconomic aggregates. Neither is income concentration a good predictor of the financial crises that often follow above average growth in credit. The anecdotal evidence from several historical credit booms finds little support for the inequality/crisis hypothesis.

### Warming defense

#### Extinction from warming requires 12 degrees, far greater than their internal link, and intervening actors will solve before then

Sebastian **Farquhar 17** leads the Global Priorities Project (GPP) at the Centre for Effective Altruism, et al., 2017, “Existential Risk: Diplomacy and Governance,” https://www.fhi.ox.ac.uk/wp-content/uploads/Existential-Risks-2017-01-23.pdf

The most likely levels of global warming are very unlikely to cause human extinction.15 The existential risks of climate change instead stem from tail risk climate change – the low probability of extreme levels of warming – and interaction with other sources of risk. It is impossible to say with confidence at what point global warming would become severe enough to pose an existential threat. Research has suggested that warming of 11-12°C would render most of the planet uninhabitable,16 and would completely devastate agriculture.17 This would pose an extreme threat to human civilisation as we know it.18 Warming of around 7°C or more could potentially produce conflict and instability on such a scale that the indirect effects could be an existential risk, although it is extremely uncertain how likely such scenarios are.19 Moreover, the timescales over which such changes might happen could mean that humanity is able to adapt enough to avoid extinction in even very extreme scenarios. The probability of these levels of warming depends on eventual greenhouse gas concentrations. According to some experts, unless strong action is taken soon by major emitters, it is likely that we will pursue a medium-high emissions pathway.20 If we do, the chance of extreme warming is highly uncertain but appears non-negligible. Current concentrations of greenhouse gases are higher than they have been for hundreds of thousands of years,21 which means that there are significant unknown unknowns about how the climate system will respond. Particularly concerning is the risk of positive feedback loops, such as the release of vast amounts of methane from melting of the arctic permafrost, which would cause rapid and disastrous warming.22 The economists Gernot Wagner and Martin Weitzman have used IPCC figures (which do not include modelling of feedback loops such as those from melting permafrost) to estimate that if we continue to pursue a medium-high emissions pathway, the probability of eventual warming of 6°C is around 10%,23 and of 10°C is around 3%.24 These estimates are of course highly uncertain. It is likely that the world will take action against climate change once it begins to impose large costs on human society, long before there is warming of 10°C. Unfortunately, there is significant inertia in the climate system: there is a 25 to 50 year lag between CO2 emissions and eventual warming,25 and it is expected that 40% of the peak concentration of CO2 will remain in the atmosphere 1,000 years after the peak is reached.26 Consequently, it is impossible to reduce temperatures quickly by reducing CO2 emissions. If the world does start to face costly warming, the international community will therefore face strong incentives to find other ways to reduce global temperatures.

#### Climate change is inevitable – even ending emissions won’t solve

Zing Tsjeng, 19, 2-27-2019, executive editor and the author of the Forgotten Women book series, "The Climate Change Paper So Depressing It's Sending People to Therapy", [https://www.vice.com/en\_us/article/vbwpdb/the-climate-change-paper-so-depressing-its-sending-people-to-therapy], AVD

"Deep Adaptation" is quite unlike any other academic paper. There's the language ("we are about to play Russian Roulette with the entire human race with already two bullets loaded"). There's the flashes of dark humor ("I was only partly joking earlier when I questioned why I was even writing this paper"). But most of all, there's the stark conclusions that it draws about the future. Chiefly, that it's too late to stop climate change from devastating our world—and that "climate-induced societal collapse is now inevitable in the near term." How near? About a decade. Professor Jem Bendell, a sustainability academic at the University of Cumbria, wrote the paper after taking a sabbatical at the end of 2017 to review and understand the latest climate science "properly—not sitting on the fence anymore," as he puts it on the phone to me. What he found terrified him. "The evidence before us suggests that we are set for disruptive and uncontrollable levels of climate change, bringing starvation, destruction, migration, disease, and war," he writes in the paper. "Our norms of behavior—that we call our 'civilization'—may also degrade." "It is time," he adds, "we consider the implications of it being too late to avert a global environmental catastrophe in the lifetimes of people alive today." Even a schmuck like me is familiar with some of the evidence Bendell sets out to prove his point. You only needed to step outside during the record-breaking heatwave last year to acknowledge that 17 of the 18 hottest years on the planet have occurred since 2000. Scientists already believe we are soon on course for an ice-free Arctic, which will only accelerate global warming. Back in 2017, even Fox News reported scientists' warnings that the Earth's sixth mass extinction was underway. Erik Buitenhuis, a senior researcher at the Tyndall Centre for Climate Change Research, tells me that Bendell's conclusions may sound extreme, but he agrees with the report's overall assessment. "I think societal collapse is indeed inevitable," he says, though adds that "the process is likely to take decades to centuries." The important thing, Buitenhuis says, is to realize that the negative effects of climate change have already been with us for some time: "Further gradual deterioration looks much more likely to me than a disaster within the next ten years that will be big enough that, after that, everybody will agree the status quo is doomed." "Jem's paper is in the main well-researched and supported by relatively mainstream climate science," says Professor Rupert Read, chair of the Green House think-tank and a philosophy academic at the University of East Anglia. "That's why I'm with him on the fundamentals. And more and more people are." Read's key disagreement with Bendell is his belief that we still have time to snatch victory from the jaws of defeat, saying, "I think it's hubris to think that we know the future." But that doesn't mean Bendell's premise is wrong: "The way I see it, deep adaptation is insurance against the possibility—or rather, the probability—of some kind of collapse," says Read. "'Deep Adaptation' is saying, 'What do we need to do if collapse is something we need to realistically plan for?'" When I speak to Bendell, he tells me he thinks of "Deep Adaptation" as more of an ethical and philosophical framework, rather than a prophecy about the future of the planet. "The longer we refuse to talk about climate change as already here and screwing with our way of life—because we don't want to think like that because it's too frightening or will somehow demotivate people—the less time we have to reduce harm," he says with deliberation. What does he mean by harm? "Starvation is the first one," he answers, pointing to lowering harvests of grain in Europe in 2018 due to drought that saw the EU reap 6 million tons less wheat. "In the scientific community at the moment, the appropriate thing is to say that 2018 was an anomaly. However, if you look at what's been happening over the last few years, it isn't an anomaly. There's a possibility that 2018 is the new best case scenario." That means, in Bendell's view, that governments need to start planning emergency responses to climate change, including growing and stockpiling food. He minces his words even less in his paper: "When I say starvation, destruction, migration, disease, and war, I mean in your own life. With the power down, soon you won't have water coming out of your tap. You will depend on your neighbors for food and some warmth. You will become malnourished. You won't know whether to stay or go. You will fear being violently killed before starving to death." Should people start building bunkers and buying bulletproof vests? "There's no way of getting through this unless we try together," he says. "We need to help people stay fed and watered where they live already to reduce disruption and reduce civil unrest as much as we can." Of the Silicon Valley financiers prepping for the apocalypse in New Zealand, he says: "Once money doesn't matter anymore and the armed guards are trying to feed their starving children, what do you think they'll do? The billionaires doing that are just deluded." Bendell wasn't always this gloomy about the state of the world. He once worked for WWF, one of the biggest environmental charities in the world, and in 2012 founded the Institute for Leadership and Sustainability (IFLAS) at the University of Cumbria. The World Economic Forum named him a Young Global Leader for his work. So how did he end up writing a paper that determined that civilization—and environmental sustainability as we currently understand it—is doomed? "Since the age of 15, I've been an environmentalist," he tells me. "I've given my life professionally and personally. I'm a workaholic, and it was all about sustainability." Once he sat down with the data, however, he realized that his field was quickly becoming irrelevant in the face of oncoming climate catastrophe. "It would mean not getting super excited about the expansion of your recycling program in a major multinational," he says. "It's a completely different paradigm of what we should be looking at." What he didn’t expect was for the paper to take off online. "It was aimed at those people in my professional community and why we're in denial," he says. "When I put it out there, I didn’t expect 15-year-olds in schools in Indonesia to be reading it with their teachers." He says that "Deep Adaptation" has been downloaded over 110,000 times since it was released by IFLAS as an occasional paper. "Someone in the alternative economics and bitcoin crowd told me, 'Oh, everyone's talking about deep adaptation in London at all the dinner parties,'" he laughs. Researchers from the Institute for Public Policy Research (IPPR), an established progressive think-tank, consulted Bendell's paper in the process of writing its new report, "This is a crisis: Facing up to the age of environmental breakdown." Laurie Laybourn-Langton, its lead author, told me via email: "I appreciated the frankness of the report in facing up to issues that so many in research and policy communities seem unwilling to. We don't subscribe to the view that social collapse is inevitable, however." He explains: "This is partly because it's so hard to predict the outcomes of the complex and uncertain process of environmental shocks interacting with social and economic systems. We simply don't know. That said, they shouldn’t be disregarded as a potential outcome, and so we are calling for greater levels of preparedness to these shocks." Not everyone was so taken with the paper. Bendell submitted it to a well-respected academic journal for publication, with little success. Sustainability Accounting, Management and Policy Journal (SAMPJ) told me that the paper was in need of "major revisions" before it would be ready for publication. Bendell ended up publishing it through IFLAS and his blog. "The academic process is such that I took that as an effective rejection," he explains, saying that the reviewers wanted him to fundamentally alter his conclusions. "I couldn't completely rewrite the paper to say that I don't think collapse is inevitable. It was asking for a different paper." Emerald, the scholarly publisher that owns SAMPJ, says it takes issue with how Bendell frames its reception of its paper on his blog: "the study on collapse they thought you should not read—yet." A spokesperson told me: "The decision was arrived at based on the merit of the submitted article and the double blind peer review process integral to academia and the advancement of knowledge. SAMPJ, and [editor Carol Adams] are proud members of the Committee on Publication Ethics (COPE) and adhere to the highest ethical standards in publishing. We see no evidence that the decision of Major Revision was politically motivated. "Emerald requested the author correct their blog post to reflect the facts. This request was unfortunately ignored. The post continues to imply the paper was rejected because it was deemed too controversial. The paper was not rejected, and was given a Major Revision due to the rigorous standards of the scholarly output of the journal." Bendell says he did reply to Emerald's request to amend his blog post—but only if they would consider telling him the decisions of those who reviewed his paper. (Under the double blind peer review, reviewers' decisions are anonymous.) "That title can be read in a number of ways," he says. "It is a paper that the reviewers didn't want you to read. They didn't want it published." Climate gloom and doom is nothing new—doomsday preppers have been stockpiling their freeze-dried food rations for decades now. But Bendell's paper appears to have hit a unique nerve, especially given that the average scientific paper is estimated to be read by only three or so people. Rupert Read tells me that he was sent it simultaneously by three other academics when it was published. But it hasn’t trended on Twitter. It hasn't been pushed by a celebrity. It was briefly mentioned in a Bloomberg Businessweek article, but that's it. "Deep Adaptation" is that unique social phenomenon: an academic paper that has gone viral through word of mouth. Nathan Savelli, a 31-year-old high school life coach from Hamilton, Canada, was recommended the paper by a local environmental activist. Reading it sent him spiraling into depression. "I guess in some ways it felt like I was diagnosed with a terminal illness," he tells me. "If I'm being honest, it was a mix of heartbreaking sadness and extreme anger." Savelli felt so low that he sought help from a climate grief support group organized by 350.org, the global grassroots climate movement. "I had attended counseling in the past for other issues, but never a group session, and thought it might be something helpful for me," he tells me. Did it help? "I'm not sure I'd say it alleviated my grief, but it was definitely comforting to be around people who understood what I was feeling." And therein lies the problem with "Deep Adaptation:" if you accept that the paper is entirely correct in its prediction of collapse, how do you move on with your life? How do you even get out of bed in the morning? "I'm aware of what difficult emotions it triggers," Bendell acknowledges. "I do believe that if you’ve come across this [paper], then absolutely some grief and despair is very natural. Why isn't that OK? We all die in the end. Life is about impermanence." On his blog, he lists several sources for psychological support, including several groups on Facebook and LinkedIn that discuss collapse and offer help to those struggling to come to terms with the conclusions of his paper. But, Bendell adds, reading the paper has been "transformative" for some. "People find a new boldness about living life on their own terms—actually connecting to their heart's desire. How do they wish to live, and why don't they live that way now rather than postponing it?" In one case, it even helped prompt one high-ranking academic to quit her job and the city. In December of 2017, Dr. Alison Green left her post as the pro vice-chancellor of Arden University. She had read the IPCC report warning that the world is nowhere near averting global temperature increases, as well as the 1,656-page National Climate Assessment on how climate change is now dramatically affecting our lives—and then she read Bendell's paper.

## Advantage 3 – Bioterrorism

### 1NC---No CRISPR Bioterror

#### Risk of bioterror from CRISPR is crying wolf – its too complex and no empirics

Kathleen M. Vogel And Sonia Ben Ouagrham-Gormley, 18, (Kathleen M. Vogel And Sonia Ben Ouagrham-Gormley, 10-23-2018, Cambridge Core, Anticipating emerging biotechnology threats, https://www.cambridge.org/core/journals/politics-and-the-life-sciences/article/anticipating-emerging-biotechnology-threats/CCBB40DBD2BCE6CECDE9F2ACB71588CE, 6-27-2022) SCade

These developments prompted policymakers and security analysts to begin pondering the security implications of CRISPR and evaluate its potential use for bioweapons developments. CRISPR scientists have themselves advanced several scenarios for bioterrorism, including the use of gene drives to create more lethal or infectious pathogens. Some scientists have argued that the expertise required to develop gene drives can be acquired relatively easily and that an amateur scientist could set up a lab in his garage and develop a gene drive undetected. Additional questions that have been raised include the following: Could CRISPR be used to introduce antibiotic resistance into a bioweapons agent? Will CRISPR allow the development of chimeric bioweapons — weapons that cause the symptoms of one disease but ravage the body with a different, undetected disease? Echoing these concerns, Director of National Intelligence James Clapper included gene editing in his 2016 worldwide threat assessment report to Congress. Clapper warned, “Given the broad distribution, low cost, and accelerated pace of development of this dual-use technology, its deliberate or unintentional misuse might lead to far-reaching economic and national security implications.” In the fall of 2016, the President’s Council of Advisors on Science and Technology called for a new biodefense strategy that would address emerging biotechnology threats like CRISPR that open up new possibilities for misuse. 22 At the international level, United Nations entities are also struggling with how to regulate and anticipate nefarious international developments in gene-editing technologies. 23 To date, however, most policy and public discussions about CRISPR have focused on the technology — how it will drive new kinds of security threats — as if it existed in a vacuum. This kind of technological determinism — the belief that technology is the primary driver of history and contemporary life — has underpinned many popular narratives regarding American technological innovation since the Industrial Revolution. This way of understanding technology, however, oversimplifies what it takes, and how long it takes, to develop, use, and diffuse technology for beneficial or nefarious applications. Technology never develops and diffuses in isolation — it is always shaped by a variety of social forces — and understanding the complex interconnecting set of push-pull factors on technology is important to getting threat assessments right. Since the 1980s, there have a variety of actors “crying wolf” 4 engineering techniques for harm. Yet we have little empirical data over the past 30 years that show a specific state or terrorist group using any of these new biotechnological innovations to create biological weapons. And, even those who are known to have dabbled in applying genetic engineering to produce bioweapons (e.g., the Soviet Union) encountered a series of technological, social, political, organizational, and economic hurdles that prevented the development of viable weapons. Thus, existing data suggest a very mixed picture on the ability of individuals, groups, or countries to use new biotechnologies for harm. What the existing data do make clear, however, is that it is not just access to, or emergence of, science and technology that leads to a threat but how a variety of social, economic, organizational, and political factors shape the development and use of science and technology. This latter point is left out of existing dystopian bio-imaginaries, but it is critical to assess the threat posed by CRISPR or any emerging biotechnology.

### 1NC---Anti-CRISPR tech

#### Anti-CRISPR technology is becoming more prevalent now

Antonio Regalado, 19, (Antonio Regalado, 5-2-2019, MIT Technology Review, The search for the kryptonite that can stop CRISPR, https://www.technologyreview.com/2019/05/02/65813/the-search-for-the-kryptonite-that-can-stop-crispr/, 6-28-2022) SCade

Anti-CRISPR By the time Doudna drafted her proposal to DARPA, other scientists already had one big clue for how to stop CRISPR. In the ancient struggle between bacteria and the viruses called phage that infect them, phage had developed their own antidotes to CRISPR. In fact, their genomes, it’s been found, harbor the ability to produce what is essentially CRISPR kryptonite—small proteins exquisitely tuned by evolution to disable the gene-editing tool. Scientists call these molecules “anti-CRISPRs.” The first anti-CRISPRs were discovered in 2013 by a student at the University of Toronto named Joseph Bondy-Denomy. “It was serendipity. We stumbled onto the fact that some phages seemed to be resistant to CRISPR. When we put the phage into a cell, the bacteria couldn’t protect itself,” says Bondy-Denomy, now a professor at the University of California, San Francisco. He quickly zeroed in on one of the virus’s 50 or so genes as the reason. “We thought, wow, maybe this is turning off CRISPR.” The number of labs studying such defenses is smaller than the number working with CRISPR. But anti-CRISPR is becoming a booming field in its own right. More than 40 anti-CRISPR proteins have already been found, many by Doudna’s lab. Other teams are having early success locating conventional chemicals that can inhibit CRISPR as well. Today, Amit Choudhary of Harvard Medical School, in Boston, also with funding from DARPA, reported he had found two drugs that prevent gene-editing when mixed with human cells. “The hallmark of any powerful technology is control,” says Choudhary. “It’s that simple.” Researchers like Bondy-Denomy believe anti-CRISPRs could have a role in improving future gene-editing treatments, by giving researchers more precise control. For instance, a team in Germany recently showed if they combined CRISPR and anti-CRISPR, they could create an editor that will change DNA only in liver cells, not neurons or muscle. Another application being studied is whether anti-CRISPR could create a safeguard against “gene drives.” The Bill & Melinda Gates Foundation is backing the development of a CRISPR tool that will spread though wild mosquitoes, causing their populations to crash, with the idea of preventing malaria. Others want to develop such gene drives in mice, so they can eradicate the rodents from islands without using poison. But what if these experiments go haywire and lead to an extinction? Researchers think they can create organisms with anti-CRISPR programmed into their genomes so they’re immune. In an initial proof of principle, scientists in Kansas last year engineered yeast cells with anti-CRISPR to resist a gene drive. “If some North Korean lab comes at you with a gene drive to wipe out an economically important crop, you could have a transgenic crop that [is resistant]. That is the drawing board scenario,” says Erik Sontheimer of the University of Massachusetts Medical School.

#### Anti-CRISPR tech safeguards against any potential bioterror threat and famines

Antonio Regalado, 19, (Antonio Regalado, 5-2-2019, MIT Technology Review, The search for the kryptonite that can stop CRISPR, https://www.technologyreview.com/2019/05/02/65813/the-search-for-the-kryptonite-that-can-stop-crispr/, 6-28-2022) SCade

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### 1NC---No BioWeapons

#### No synthetic pathogens

Wimmer 18 – Eckard, Professor at Stony Brook University. “Synthetic Biology, Dual Use Research, and Possibilities for Control”, Defence against Bioterrorism, pg. 7-11, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7123342/>, 03-23-2018

Listed below are some constraints that show how in the US **the development of dangerous infectious agents**, referred to as “**select agents**”, **is** controlled – perhaps misuse even **prevented** – **through** **technical and administrative hurdles**:

I. **Re-creating** **an already existing dangerous virus for malicious intent is a** **complex** scientific **endeavor**. (i) **It requires considerable** scientific **knowledge** and experience **and, more importantly, considerable financial support. That support usually comes from government and private agencies** (NIH, NAF, etc.), organizations **that carefully screen at multiple levels all applications for funding of ALL biological research**. (ii) **It requires an** **environment** **suitable for experimenting with dangerous infectious agents** (**containment** **facilities**). **Any work in containment facilities is also carefully regulated.**

II. **Genetic engineering** to synthesize or modify organisms **relies on chemical synthesis of DNA. Synthesizing DNA is automated and carried out with sophisticated, expensive instruments**. **The major problem** of DNA synthesis, however, **is that the product is** **not error-free. Any** **single mistake** in the sequence of small DNA segments (30–60 nucleotides) or large segments (>500 nucleotides) **can** **ruin the experiment. Companies have developed strategies to produce and deliver error free, synthetic DNA, which investigators can order electronically** from vendors, such as Integrated DNA Technologies (US), GenScript (US) or GeneArt (Germany). **This offers a** superb and **easy way to** **control** experimental **procedures** **carried out in any laboratory**: the **companies** will **automatically scan ordered sequences** in extensive data banks **to monitor relationship to sequences of a** **select agent. If so, the order will be** **stalled** until sufficient evidence has been provided by the investigator that she/he is carrying out experiments approved by the authorities. The entire complex issue of protecting society from the misuse of select agents has been discussed in two outstanding studies [11, 12].

III. **Engineering a virus such that it will be** **more** **harmful** (more contagious, more pathogenic) **is generally difficult because, in principle, viruses have evolved to proliferating maximally in their natural environment. That is, genetic manipulations of a virus often lead to loss of fitness that, in turn, is unwanted in the bioterrorist agent.**

### 2NC---No BioWeapons

#### No bio or chemical weapon threat

Revill 17 – Dr. James, Research Fellow with the Harvard Sussex Program at SPRU. “Past as Prologue? The Risk of Adoption of Chemical and Biological Weapons by Non-State Actors in the EU”, Cambridge, pg. 626-642, <https://www.cambridge.org/core/journals/european-journal-of-risk-regulation/article/past-as-prologue-the-risk-of-adoption-of-chemical-and-biological-weapons-by-nonstate-actors-in-the-eu/6B824CDE0E25FD86AC3D0BD07822A743>, 09-29-2017

The second factor is “the perceived complexity of the innovation in terms of adoption and use”.40 This is important in the innovation literature, as Rogers remarked, “**[t]he complexity of an innovation,** as perceived by members of a social system, **is negatively related to its rate of adoption**”.41 Several **scholars of terrorist innovation have also highlighted the issue of complexity**;42 or, as Cragin et al have stated, “[h]ow simple or complex a technology appears affects perceptions of how risky it will be to adopt.”43

**In most cases terrorist groups appear to have largely opted for the simplest pathway towards the achievement of their goals and** **the weapons used tend to be vernacular, functional devices drawing on local and readily-available materials, rather than sophisticated, “baroque” technologies**. This is certainly the case with IEDs, the history of which is characterised largely by incremental innovations – although nevertheless frequently effective ones – with many means of delivery recycled from the past.44 Complexity can therefore be seen as important in the adoption of technology by terrorists generally, but is perhaps particularly acute in the case of CBW technology.

Some CBW can be relatively simple: “chlorine-augmented, vehicle-borne IEDs,” as employed by Al-Qaeda in Iraq (AQI) from 2006 to 2007 are not sophisticated weapons.45 Attacks on chemical production facilities, an apparent tactic of Serbian forces in the early to mid-1990s,46 employed relatively simple technologies – specifically explosives – with toxicity a secondary by-product. Direct contamination of food,47 drink48 or healthcare products49 does not require particularly sophisticated technology for the purposes of delivery – although may require some considerable skill to culture and scale-up a biological agent – and has been a common approach in European CBW incidents.50 Similarly, the contamination of water systems, something familiar to Europe,51 can also be relatively easily attempted. However, in most cases such methods of dissemination have generated results that are far short of the “mass destruction” that CBW are associated with, although this does not mean such a possibility can be ignored by those working on public health preparedness.

Although some relatively simple approaches could cause significant harm, **mass casualty attacks still require considerable expertise, something particularly acute in the context of biological weapons**.52 **The most effective route to weaponising biology is arguably** through the process of **aerosolising agents**, something recognised mid-way through the last century as opening up the theoretical possibility of using biological weapons on a gigantic scale.53

However, **realising such theoretical potential is difficult and it took states decades to develop more predictable biological weapon**s,54 **and even then such weapons were acutely vulnerable to environmental factors**.55 **For non-state groups such complexity has proven a significant barrier to CBW development**. By means of an example, **one of the best-resourced biological weapons programs**, that of **Aum Shinrikyo, failed variously because the group acquired the wrong strain, contaminated fermenters and were faced with insurmountable production and dissemination difficulties**.56 **There are of course exceptions, such as the 2001 anthrax Letter Attacks** in the US. However, **if one accepts the conclusions of the FBI that this sophisticated attack** with aerosolised anthrax in the US postal system **was perpetrated by a US biodefence researcher, Dr** Bruce **Ivins,**57 **it is an exception that proves the rule**.

**To circumvent** the difficulties with **aerosolisation, arguably one could use human-to-human transmissible** biological agents as part of a suicide bioterror operation. There are good reasons for concern over how crude suicide bioterrorists could employ such a tactic. **However, the use of highly contagious agents is also poorly predictable and would have to deal with social factors, such as the “spatial contact process among individuals”**, which can spell “out the difference between large-scale epidemics and abortive ones”.58

**The counter to this argument is the growing access to data and the changing human geography of the life sciences**. Some 83% of European households reportedly **are online, effectively allowing access to what is a growing body of available data on CBW, including so-called bioterrorist “recipes” and “blueprints**” that are available in both mainstream scientific as well as more subversive literatures online. It is also clear that there is a changing human geography in European life sciences (for peaceful purposes), with the emergence of 30 DIY-bio groups located in Europe59 and some 80 European teams in the international Genetically Engineered Machines (IGEM) competition in 2016.60 **This is compounded by reports that groups such as Daesh have deliberately sought to recruit foreign fighters “including some with degrees in physics, chemistry, and computer science**, who experts believe have the ability to manufacture lethal weapons from raw substances”.61

Whilst it would be unwise to ignore such developments, **there is a need for caution in looking at the extent to which new technologies and geographies will facilitate the adoption of chemical and biological weapons** by groups seeking to target European countries. First, **data is not information, and information is not knowledge, let alone the tacit knowledge required for CBW**.62 In many cases **a degree of determination and dedication will be required merely to separate online fantasy from fact and identify operationally useful information** (of relevance to the European context) from nonsense (or information pertinent to contexts other than Europe). Second, with new technologies there is the potential for such tools to enable some, but certainly not all, actors, and **even then new technologies bring new challenges. CRISPR, gene editing technology** is currently seen as a particular source of promise and peril, **which purportedly enables “even largely untrained people to manipulate the very essence of life**”.63 As much may be technically true, **yet “untrained people” would nonetheless require some guidance in identifying suitable areas of genetic structures to manipulate**. Moreover, **CRISPR would only get aspiring weaponeers so far, with the process of culturing, scaling-up and weaponisation still requiring considerable attention and interdisciplinary skills, typically generated through “large interdisciplinary teams of scientists, engineers, and technicians**”,64 **in order to be effective**.

Indeed, **for all the progress in science and technology, biological weapons are still not used, in part, because of the complexity of such weapons**; and the chemical weapons that are used today are largely the same as the chemical weapons of 100 years ago. As Robinson noted “It remains the case today that, in the design of CBW, increasingly severe technological constraint sets in as the mass-destruction end of the spectrum is approached: **the greater and more assured the area-effectiveness sought for the weapon, the greater the practical difficulties of achieving** it”.65

#### No engineered bioweapons – can’t reliably engineer pathogen characteristics – tradeoffs mean the more virulent a pathogen, the less effective it is

Lentzos et al. 14 – Flippa, a Senior Lecturer in Science & International Security at the Department of War Studies and Co-Director of the Centre for Science and Security Studies (CSSS) at King’s College London. Catherine Jefferson, researcher in the Department of Social Science, Health, and Medicine at King’s College London. Claire Morris, a senior research fellow in the Department of Social Science, Health, and Medicine at King’s College London. “The myths (and realities) of synthetic bioweapons”, Bulletin of Atomic Scientists, <https://thebulletin.org/2014/09/the-myths-and-realities-of-synthetic-bioweapons/>, 09-18-2014

**Even experts** **have a hard time enhancing disease pathogens**. **Some** observers **have** also **expressed concerns that synthetic biology could be used to enhance the virulence** or increase the transmissibility **of known pathogens**, creating novel threat agents.

**Mousepox and bird flu** (H5N1) experiments **are frequently cited** to demonstrate how dangerous new pathogens could be designed. But assessments of this threat tend to overlook a salient fact: **In both these experiments**, **the researchers did not actually design the pathogens**. With respect to H5N1, researchers had indeed been trying to design an air-transmissible virus variant for some time, without success. The ferret experiment was set up as an alternative approach, to see whether natural mutations could generate an air-transmissible variant. **The researchers had no influence on the specific mutations induced**. In the mousepox experiment, researchers inserted the gene for interleukin-4 into the mousepox virus to induce infertility in mice and serve as an infectious contraceptive for pest control. The result—that the altered virus was lethal to mice—was unanticipated by the researchers. In other words, it was not planned.

Moreover, some of **the key lessons that came out of the extensive Soviet program to weaponize biological agents involve the** **trade-offs between improving characteristics that are “desired” in the context of a bioweapons program**—such as virulence—**and diminishing other equally “desired” characteristics**, **such as transmissibility or stability**. **Pleiotropic effects**—that is, **when a single gene affects more than one characteristic**—**and genetic instability are common in microorganisms**. While it is too simple to say that **increased transmissibility will** always **be associated with reduced virulence**, this is often the case **for strains produced in laboratories**.

### 1NC---Solvency Deficit

#### The aff card concedes that increasing biotech research results in ways to defend from bioterror

1AC Barry Pavel and Vikram Venkatram , 21, (Barry Pavel, Barry Pavel is the senior vice president and director of the Scowcroft Center for Strategy and Security at the Atlantic Council. Prior to joining the Atlantic Council, Barry Pavel was a career member of the Senior Executive Service in the Officer of the Under Secretary of Defense for Policy for almost eighteen years. From October 2008 to July 2010, he served as the special assistant to the President and senior director for defense policy and strategy on the National Security Council (NSC) staff, serving both President George W. Bush and President Barack Obama. Prior to this, Pavel was the chief of staff and principal deputy assistant secretary of defense for special operations/low-intensity conflict and interdependent capabilities. From October 1993 to November 2006, Pavel also led or contributed to a broad range of defense strategy and planning initiatives for both the Clinton and George W. Bush administrations. In this capacity, Pavel supported post-9/11 deterrence policy (including deterrence of terrorist networks and regional nuclear powers); strategies for reducing ungoverned areas; and a long-range planning construct that accounts for trends and “strategic shocks” that could significantly change Department of Defense’s role in national security. Vikram Venkatram is a Young Global Professional in the Scowcroft Center for Strategy and Security, Forward Defense at the Atlantic Council. He is a recent graduate of Georgetown University’s School of Foreign Service, where he studied Science, Technology, and International Affairs with a minor in Biology. He is also currently a second-year graduate student in Georgetown’s Security Studies Program. Originally from San Jose, California, his main interests lie in biosecurity issues, ranging from pandemic preparedness to emerging biotechnology to environmental security to bioethics., 9-7-2021, Atlantic Council, Facing the future of bioterrorism, https://www.atlanticcouncil.org/commentary/article/facing-the-future-of-bioterrorism/, 7-1-2022) SCade

Given the broad scope and scale of this growing threat, the United States should take a series of actions to mitigate the risks, without unduly stunting the growth of the biotechnology field. To date, bioterrorist attacks have been low-risk, high-impact events. While they have been extremely rare, their frequency will only increase as will their ramifications. However, overregulating the spread of biotechnological tools could stunt innovation and the profound potential of this increasingly important sector. Furthermore, existing methods of preventing bioterrorism may no longer be effective. The government could previously monitor the purchase of expensive and dangerous biotechnology tools and the laboratories that owned them in large quantities. This is no longer possible to the same degree when such tools are increasingly cheap, widespread, and usable in a garage. The FBI is currently attempting to address this risk by building relationships with the iGEM community and with life scientists so that they can report suspicious behavior. These efforts should continue, but are wildly insufficient, since some bioterrorists may have minimal contact with the larger community of biologists and biology hobbyists. The release of a bioweapon by a terrorist, if left unchecked, could spread throughout the globe, just as a naturally occurring pandemic would. Thus, one major step that the United States should take is to establish improved responses to disease outbreaks, particularly learning from COVID-19. This should include building a larger stockpile of PPE and establishing a set of clear step-by-step actions to be taken in the event of an attack. Building resilience in this fashion will not prevent bioterrorism, but it will mitigate its effects, and may slightly disincentivize utilizing bioweapons to cause terror. Beyond this, the United States should secure its laboratories and the data within, as terrorists could leverage that knowledge to build bioweapons. For example, new technology allows pathogens to be synthesized from the data describing their genetic sequences. In a recent controversial study, scientists published a methodology that would allow horsepox virus, a virus very similar to one that causes smallpox, to be synthesized. This research was conducted with a noble goal: understanding how the horsepox virus could be used as a potential treatment for cancer. However, it had significant dual-use implications. Research like this should not be banned outright, but the United States should establish norms to evaluate whether it is worth the risk before such research is conducted, and then ensure that it is conducted and the results published in the most secure ways. Replicability is an important part of science, but the general public should not be able to replicate the most dangerous experiments. Where building resilience would reduce the impact of a bioterror incident, restricting access to dual-use methodologies will reduce the likelihood of one occurring in the first place. Finally, enforcing domestic standards is not enough. Pathogens spread across borders, and the spillover effects of even a targeted bioterrorist attack could kill many unintended victims. Thus, the United States must work with other countries to protect against the bioterrorist threat, monitor the emergence of new viruses and bacteria that could be leveraged for a bioweapon, limit access to the most dangerous pathogens (and data associated with those), and build global response networks in the event of an attack. Importantly, this collaboration should emphasize working with allies, but should also include adversaries: if China or Russia remain unregulated, an attack within their borders would still affect the United States and its allies. Emerging biotechnology will result in new medicines and medical techniques, a greater understanding of how pathogens function and spread (and thus a better understanding of how to combat them), a healthier populace, innovative new capabilities that could transform daily life, and greater engagement with the biological sciences. While ensuring that these benefits are maintained, the United States and its allies and partners must take logical steps to protect themselves from the worst-case scenarios. The risk of bioterrorism is growing, and the United States must be prepared to face the future.

## Solvency

### Bans fail

#### Even international bans will fail – at best they can deal with states – no matter how effective there will be private / rogue gaps.

Scott J. Schweikart, Global Regulation of Germline Genome Editing: Ethical Considerations and Application of International Human Rights Law, 43 Loy. L.A. Int'l & Comp. L. Rev. 279 (2021). Available at: https://digitalcommons.lmu.edu/ilr/vol43/iss3/6

Lastly, it is important to remember that any global governance structure that comes from a treaty or declaration is only intended to bind or influence individual nation-states, assuming that parties to such treaties would use their own national legal framework to enforce relevant matters in their jurisdiction. However, the relevant matters that national governments generally tackle are not always easily enforceable or identifiable in this rapidly changing world of bio-medical advancements. For example, there is already a growing movement of DIY-Bio or “bio-hackers,” who are buying CRISPR kits and are doing genetic modifications at home, outside of the knowledge or purview of any government agency or regulatory authority.95 Under such circumstances, even if a government follows international human rights law to regulate germline genome editing, it may only have influence over the traditional users of biomedical technology, i.e., corporations and university medical centers. No matter how effective any form of international oversight may be, gaps will remain in policing the ethical practice of germline genome editing

#### Ban fails – never been broad social consensus, and a benchmark for use is totally unrealistic.

Susan Scutti, CNN Updated 1803 GMT (0203 HKT) March 13, 2019 Proposal for global moratorium on editing of inherited DNA is met with criticism https://edition.cnn.com/2019/03/13/health/inherited-dna-editing-moratorium-study/index.html

[Sarah Norcross,](https://www.progress.org.uk/sarahnorcross) director of the Progress Educational Trust, a nonprofit promoting public understanding of reproductive and genetic science, told the Science Media Centre that a new moratorium "is neither necessary nor useful." A moratorium would not have deterred Jiankui, said Norcross, who also had no role in the commentary. She added that he "acted secretively and in breach of a clear scientific consensus that germline genome editing should not be used in the clinic at this time." Even more, she believes that his practices were "scientifically and ethically unsound in so many different ways, that they would have been wrong regardless of whether or not they involved germline genome editing." Her nonprofit, which frequently organizes public events, has found "that people do not worry specifically about changing the germline," she said. "They are more concerned with whether or not specific applications of genome editing are medically warranted." O'Neill was skeptical for yet another reason: "There has never been a broad societal consensus about anything in any country, not even the allocation of human rights, so expecting this as a benchmark for clinical adoption of germline therapy is unrealistic."

#### Easy for CRISPR technology to be used outside of laboratories – no way a ban can solve.

Krizia Rivera 2020 Genetic Engineering, Lack of Regulation in the United States of America and its Potentially Problematic Applications <https://scholarship.shu.edu/cgi/viewcontent.cgi?article=2092&context=student_scholarship>

The CRISPR-Cas9 system (hereinafter CRISPR for short) is unique in that, not only is it cheaper than other genetic engineering technologies, but in comparison, is easier to use and is more precise . According to the University of California, Berkeley, anyone can make tens of thousands of precisely guided probes covering an organism’s entire genome for less than $100 in supplies49 . These developments lend themselves to widespread accessibility, it’s use is no longer limited to a lab, schoolchildren are using it in their classrooms50 and you can even buy a DIY kit online for $150. These key features make CRISPR the most popular system on the market52. It has become so popular that it has been dubbed “the rock star tool of biology53 ” by the American Association for the Advancement of Science, even boasting an annual fan convention called CRISPRcon54. In 2015 CRISPR was named Science’s Breakthrough of the Year55 . Despite its popularity, many scientists remain wary of ethical dilemmas and practical dangers, even by Jennifer Doudna, one of its own co-inventors. Doudna described in her book, A Crack in Creation: The New Power to Control Evolution, that the early years after publishing her work, she had a reoccurring a nightmare of Hitler coming up to her with pig-like features wanting to learn about CRISPR56 . Dawn Sinclair Shapira, filmmaker of “The State of Eugenics,” says, “in the wrong hands could become a tool of oppression57.” There are two major debates58: (a) germline editing versus somatic editing and (b) therapy versus enhancement. I will discuss these in turn.

#### Bans don’t solve, at best they maintain the squo and at worst cause confusion

“A case against a moratorium on germline gene editing” G Owen **Schaefer**. March 20th, 20**19**  is a philosopher by training, specializing in applied ethics. He has published a variety of topics in that area, including research ethics, food ethics, human enhancement, and in vitro fertilizationhttps://theconversation.com/a-case-against-a-moratorium-on-germline-gene-editing-113827 Accessed 6/29/22 T.T

Should researchers put the brakes on genetically engineering babies? Leading scientists and ethicists recently [called for a moratorium](https://doi.org/10.1038/d41586-019-00726-5) on clinical applications of [germline gene editing](https://theconversation.com/editing-genes-shouldnt-be-too-scary-unless-they-are-the-ones-that-get-passed-to-future-generations-113627): inheritable alterations to the DNA of embryos to improve kids’ health or other features – or just “gene editing,” for short. This declaration was prompted in part by the birth last year of the [first gene-edited babies](https://www.apnews.com/4997bb7aa36c45449b488e19ac83e86d) in China. The birth was [roundly condemned](https://www.nature.com/articles/d41586-018-07545-0) by experts and [may result](https://www.scmp.com/news/china/science/article/2182964/china-confirms-gene-edited-babies-blames-scientist-he-jiankui) in charges against He Jiankui, the [lead scientist involved](https://theconversation.com/us/topics/he-jiankui-63070). The call for a moratorium is grounded in two main concerns. Its supporters assert, first, that the risks of gene editing are simply too uncertain and potentially large to proceed. Secondly, the deeply controversial nature and potential social impact of altering human DNA means researchers need “[broad societal consensus](http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=12032015a)” before proceeding. The authors suggest a five-year pause to wait for more scientific progress and public dialogue. At that point, the authors propose, societies may choose to begin a path forward for gene editing, if risks are deemed acceptable and the process is fully transparent Already, [over 30 countries](https://doi.org/10.1186/1477-7827-12-108) prohibit this sort of gene editing, either by [law, regulation or enforceable guidelines](https://doi.org/10.1126/science.aad6778). For this reason, it was quite easy for the director of the U.S. National Institutes of Health to [endorse the proposed moratorium](https://www.nih.gov/about-nih/who-we-are/nih-director/statements/nih-supports-international-moratorium-clinical-application-germline-editing) – the NIH, the [largest public funder of biomedical research in the world](https://www.nih.gov/about-nih/what-we-do/impact-nih-research/our-society), is already prohibited by law from funding clinical applications of gene editing. So a moratorium is at best redundant in those nations, perpetuating the status quo. **It is also liable to cause confusion**. If a country or scientific body announces a moratorium as recommended, this could misleadingly imply that germline editing was previously permitted and unregulated. **It could also suggest that some countries’ bans will expire in five years, when currently none has a time-limited prohibition.**

### Its safe / works

#### Not unsafe – viable experiments have been done according to safety guideline and it will only get better as it advances.

Savulescu, et.al. 2015 The moral imperative to continue gene editing research on human embryos Julian Savulescu, Jonathan Pugh, Thomas Douglas, Christopher Gyngell Protein Cell 2015, 6(7):476–479 DOI 10.1007/s13238-015-0184-y

The clearest ethical concerns regarding current gene editing techniques is that they are unsafe. The study by Huang and co-authors showed that current gene editing techniques can lead to a large number of off-target mutations. This could cause significant defects and disabilities in any individuals born as the result of the research. While some research suggests there are ways to edit genes that greatly reduce the number of off-target mutations (Iyer et al., 2015), it would be highly unethical to bring modified human embryos to term unless we were very confident that the technique could be used safely. The risk would simply not be justified by any potential benefits. However this doesn’t justify a moratorium on gene editing research. There is already global agreement that no experiments should be conducted where there is a high risk of harm to the participant, and a low chance of benefit. There is already a moratorium on unsafe research and we don’t need a further moratorium on unsafe gene editing research. It is possible to do this research so that the risk is reasonable to any future child resulting from the future use of such techniques therapeutically. As the study by Huang and co-authors shows, much research on gene editing can be conducted now that satisfies global safety guidelines. This research was carried out using tripronuclear (3PN) zygotes, which have one oocyte nucleus and two sperm nuclei. Polyspermic zygotes such as these occur naturally in ∼2%–5% of zygotes during in vitro fertilization (IVF) clinical trials. Crucially, these zygotes invariably fail to develop normally in vivo (Munné and Cohen, 1998), so they are not considered to be viable for implantation. They will never produce a live baby. Since trialling the CRISPR system in these zygotes had no chance of resulting in a live birth, it is unclear how the study could harm or wrong anyone directly. In fact, this research is important precisely because it increases our understanding about some of the risks involved in targeting humans with current gene editing techniques. One of the stated aims of the research was to determine the frequency of off-target effects when CRISPR is used in human embryos. This type of research is important for increasing our understanding of the types of challenges involved in advancing gene editing techniques to the point where they can be used therapeutically.

#### Germline editing in humans work and have been successful – the tech has diffused around the globe

Yelena Biberman Dr. Biberman is an associate professor of political science at Skidmore College, a fellow at West Point’s Modern War Institute, and a nonresident senior fellow at the Atlantic Council’s South Asia Center The Technologies and International Politics of Genetic Warfare STRATEGIC STUDIES QUARTERLY → FALL 2021 https://www.airuniversity.af.edu/Portals/10/SSQ/documents/Volume-15\_Issue-3/Biberman.pdf

In 2015, CRISPR (clustered regularly interspaced short palindromic repeats) ushered a “huge revolution” in gene editing by “effectively democratiz[ing] the technology so that everyone is using it.”33 It is now allowing researchers to cheaply and quickly change the DNA of almost any organism, including human.34 The CRISPR technique relies on a class of enzymes (called “Cas” for “CRISPR-associated,” Cas9 in particular) that uses a guide RNA molecule to pinpoint its target DNA that then edits the DNA to disrupt genes or to insert desired sequences. Researchers typically need to order only the RNA fragment, as the other components can be bought off the shelf. The total cost of gene editing is as little as $30, and the technique is even taught in middle-school science classes.35 CRISPR’s affordability, availability, and ease of use increase the prospects of its misuse “not only by a malicious actor but also through accident.”36 Technologies such as CRISPR are, as the US intelligence community’s 2016 worldwide threat assessment put it, “almost always dual-use” and “diffuse rapidly around the globe.”37 And research is gradually overcoming its technical limitations. In 2015, the first human embryos were genetically engineered using CRISPR.38 Efficiency was low, some cells were altered while others were not within the same embryo, and “off-target” mutations were observed. However, in just two years, these problems were largely overcome. Scientists repaired a severe disease-causing mutation by successfully editing genes in human embryos. In the ensuing embryos, all cells were mutation-free, and there was no evidence of off-target mutations.39

#### Genome editing happens naturally & embryos resilient

**O'Neill**, H.C. (20**20**). Quals: Professor School of Biochemistry and Molecular Biology, The Australian National University, Canberra, ACT, Australia. Clinical Germline Genome Editing: *When Will* Good *be* Good Enough? *Perspectives in Biology and Medicine* *63*(1), 101-110. [doi:10.1353/pbm.2020.0008](http://doi.org/10.1353/pbm.2020.0008). /nfs

CRISPR-mediated editing is rightly being scrutinized for its ability to alter DNA in unintended ways, but natural cellular events such as innate recombination and increased age can result in similar alterations. We now have the tools to investigate the genome with interminable ability and increasing accuracy, but consideration must be given to the inherent dynamic nature of DNA. While the uses and applications of CRISPR and genome editing are endless, they are limited by nature’s laws and nature’s flaws. Work on human embryos has shown that not only are embryos distinct and elusive, but they are also robust and resilient to human interventions.

### Disease turn

#### Human germline gene editing will benefit millions by resolving disease burdens – its an ethical necessity.

Savulescu, et.al. 2015 The moral imperative to continue gene editing research on human embryos Julian Savulescu, Jonathan Pugh, Thomas Douglas, Christopher Gyngell Protein Cell 2015, 6(7):476–479 DOI 10.1007/s13238-015-0184-y

Gene editing technologies have enormous potential as a therapeutic tool in the fight against disease. Roughly 6% of all births have a serious birth defect, which is genetic or partly genetic in origin (Christianson et al., 2006). Advanced and precise gene editing techniques could virtually eradicate genetic birth defects, thereby benefiting nearly 8 million children every year. In addition 35% of all deaths are due to chronic diseases, such as cancer and diabetes, in those under 70.1 Gene editing could significantly lower this disease burden thereby benefiting billions of people around the world over time. To intentionally refrain from engaging in life-saving research is to be morally responsible for the foreseeable, avoidable deaths of those who could have benefitted (Singer, 1993). Research into gene-editing is not an option, it is a moral necessity.

#### Germline editing is safe and improving all the time. It is key to innovating new cures to hereditary disease. The plan stops that – turns case

Li, et al. 19 Li, Yanni, et al. Key Laboratory for Major Obstetric Diseases of Guangdong Province, Center of Reproductive Medicine, The Third Affiliated Hospital of Guangzhou Medical University, Guangzhou. “Human Germline Editing: Insights to Future Clinical Treatment of Diseases.” Protein & Cell, vol. 10, no. 7, July 2019, pp. 470–475, www.ncbi.nlm.nih.gov/pmc/articles/PMC6588666/, 10.1007/s13238-018-0594-8. Accessed 30 June 2022. //DRE

Last year, the first attempt to genetically modify human embryos in the United States was reported and sparked a huge debate (Ma et al., 2017). Although the first human germline modification was only performed two years ago, the study showed that rapid advances in technology has allowed the rate of off-target effects and mosaicism to be reduced considerably (Liang et al., 2015). Recently, Vertex and CRISPR therapeutics collaborated and developed CTX001, the first CRISPR/Cas9-based therapy, targeting patients with β-thalassemia and have begun phase 1/2 clinical trials. With policies and technologies regarding genome editing both developing rapidly, explorations into the possibility of clinical gene editing for hundreds of hereditary diseases are starting to become achievable. Here, we address the progress of human embryo editing technologies so far and its promise and risks in advancing therapy for hereditary diseases. Researchers have utilized genome editing techniques to modify genetic sequences in somatic cells and germline cells to conduct basic research on gene function or disease treatment. Genetic modifications to a somatic cell are generally non-heritable as they do not contribute to gametes. However, researchers have utilized tetraploid complementation to produce genetically modified offspring from modified mouse and rat pluripotent stem cells (Eggan et al., 2002; Li et al., 2017c). On the other hand, genetic editing to an organism’s germ cells is more universally applicable and will result in the natural inheritance of the modified genome in its offspring. As current genome editing technology often introduces off-target effects such as chromosomal translocations or insertion-deletions (indels) resulting in undesired loss or gain of functions of genes, which is a safety concern when dealing with the human germline (Corrigan-Curay et al., 2015), the potential of genome editing to overcome genetic diseases is therefore held back by the risk of creating more genetic complications or even irreversibly altering the human germline through nondescript mutations. Genome editing research is rather commonplace nowadays, with CRISPR/Cas9-mediated genome modification being at the forefront since its first adaptation into eukaryotic cells (Abrahimi et al., 2015; Cao et al., 2016; Cong et al., 2013; Hsu et al., 2014; Iyer et al., 2018; Li et al., 2017b; Mali et al., 2013; Nelson et al., 2016; Noel et al., 2018; Sato et al., 2015; Savic et al., 2018; Schwank et al., 2013; Shalem et al., 2014; Shen et al., 2014; Slaymaker et al., 2016; Wu et al., 2013). The diverse amounts of ex vivo and in vivo experiments conducted have resulted in the genome editing protocol to be significantly improved in the last 5 years. Today, nuclease delivery into cells for genome editing can be either in the form of RNA or protein for enhanced kinetics of action and nuclease turnover, while also preventing integration of exogenous DNA into the host genome (Abou-El-Enein et al., 2017). Efficient and precise gene correction for mutations takes advantage of the cell cycle, relying on the homology-directed repair (HDR) pathway which functions in the late S–G2 phase (Chapman et al., 2012; Heyer et al., 2010). In the recent year, germline editing has become a hot topic in scientific research. CRISPR/Cas9 microinjections into mouse zygotes have been shown to correct disease associated mutations, producing healthy adult animals (Wang et al., 2013; Wu et al., 2013). Likewise, CRISPR/Cas9 and TALEN have both effectively generated germline mutations in fertilized monkey embryos (Liu et al., 2014; Niu et al., 2014). With numerous successes in both somatic and germline genome editing in animal models, researchers have started to consider the possibility of translating the protocol to edit the human genome for clinical purposes (Cornu et al., 2017). For the first time, US National Academy of Sciences and National Academy of Medicine relaxed stance on modification of germline in February 2015 followed by the first reports of gene editing in human embryos. Tripronuclear (3PN) zygotes which were discarded from clinics were used by a group in China to attempt CRISPR/Cas9-mediated gene editing of human endogenous β-globin gene (HBB). They found that the efficiency of single-stranded oligonucleotides (ssODNs) mediated HDR was low and successfully edited embryos exhibited mosaicism i.e., only a portion of the cells were successfully modified, while the remaining cells remained as wild type (Liang et al., 2015). In addition, whole-exome sequencing revealed off-target mutations in these 3PN embryos. Moreover, the researchers identified that although the endogenous delta-globin gene (HBD), a HBB homolog, also functions as a template to compete with ssODNs for HDR repair, majority of the double-stranded breaks (DSBs) caused by Cas9 were repaired through the unideal error-prone non-homologous end joining (NHEJ) pathway.

#### Germline editing is what is necessary to eliminate genes that causes diseases – especially those with significant genetic difficulties.

Melanie Hess -2020 A Call for an International Governance Framework for Human Germline Gene Editing 95 Notre Dame Law Review 1369 https://scholarship.law.nd.edu/cgi/viewcontent.cgi?article=4899&context=ndlr

Germline editing could eliminate genes that cause disease, which could positively affect the treatment of illnesses. Somatic gene editing has proven its potential to be a tool for disease treatment and prevention: in 2015, gene therapies were already being used to treat eye disease, and further trials demonstrate that this type of gene editing may be effective in treating certain blood disorders.39 With regard to germline editing, screening embryos and using in vitro fertilization is an existing method of avoiding genetically inherited diseases like Huntington’s. However, germline editing could potentially completely eliminate these diseases and allow couples who would otherwise fear passing these characteristics to their offspring to parent children genetically related to them.40

#### Germline genetic editing allows for disease prevention

Tetsuyaishii Ishii, 01-xx-2017,Tetsuya Ishii, Professor, Hokkaido University

Tetsuya Ishii, PhD, professor of Office of Health and Safety, Hokkaido University. In 2002, he joined Japan Science and Technology Agency (JST) and worked as a program officer. In 2005, he completed the international program officer training program in U.S. NIH. "Reproductive medicine involving genome editing: clinical uncertainties and embryological needs," No Publication, <https://www.sciencedirect.com/science/article/pii/S1472648316305491>

Assisted reproductive techniques are practised with prior consent by parents. However, widely accepted assisted reproductive techniques such as IVF involve no intentional genetic intervention. Therefore, under what conditions does parental consent justify the germline genetic intervention from the viewpoint of a child's welfare? Consider the UK regulatory framework on mitochondrial transfer ([HFEA, 2015](https://www.sciencedirect.com/science/article/pii/S1472648316305491#bib0160)). Such intervention is deemed legal provided the germline modification focuses mtDNA (not nuclear DNA) and intends to prevent the maternal transmission of ‘serious’ mitochondrial disease to offspring. This is employed when a mother carries the risk of transmitting the disease to the child. Its practice is limited to serious conditions among various forms of mitochondrial disease. Similarly, disease prevention via germline genome editing might be accepted in some countries. Notably, in the International Summit on Human Gene Editing, mitochondrial disease was addressed as a candidate for germline genome editing ([NASEM, 2015](https://www.sciencedirect.com/science/article/pii/S1472648316305491#bib0170)). Interestingly, the elimination of pathogenic mtDNA using mito TALEN (mitochondria-targeted nucleases to selectively reduce mtDNA haplotypes) requires no oocyte donation, which is indispensable for mitochondrial donation in the UK ([Reddy et al., 2015](https://www.sciencedirect.com/science/article/pii/S1472648316305491#bib0100)). Aside from cases of serious mitochondrial disease, the use of germline genome editing seems compelling in cases of definite inheritance of a serious or life-threating autosomal genetic disorder where preimplantation genetic diagnosis (PGD) is inapplicable, such as autosomal dominant diseases in which one or both parents is homozygous (e.g. Huntington disease) or autosomal recessive diseases where both parents are homozygous (e.g. cystic fibrosis) ([Ishii, 2015b](https://www.sciencedirect.com/science/article/pii/S1472648316305491#bib0055)). At least four reports have demonstrated that genome editing-mediated gene correction and the recovery of phenotypes are feasible in mouse and rat experiments ([Ishii, 2015a](https://www.sciencedirect.com/science/article/pii/S1472648316305491#bib0050)). In such rare cases, the benefits of genome editing for a prospective child is likely to exceed the risks, such as the failure of disease prevention and off-target mutations ([Ishii, 2015a](https://www.sciencedirect.com/science/article/pii/S1472648316305491#bib0050), [Ishii, 2015b](https://www.sciencedirect.com/science/article/pii/S1472648316305491#bib0055)). Therefore, parental consent for germline genome editing might be justifiable.

#### CRISPR technology was vital to defense against COVID-19

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In 2020, the United States turned to CRISPR to battle the SARSCoV-2 coronavirus causing the COVID-19 disease. The Food and Drug Administration granted its first “emergency-use” approval for a coronavirus test involving CRISPR, selected for its ability to detect (and signal with fluorescent glow) SARS-CoV-2 genetic material from a nose, mouth, or throat swab in about an hour.40

### Germline leadership turn

#### China is attempting to take the lead on germline engineering in order to establish Chinese tech hegemony

Brent M. Eastwood, 17, (Brent M. Eastwood, Brent M. Eastwood, PhD is the Founder and CEO of GovBrain Inc that predicts world events using machine learning, artificial intelligence, natural language processing, and data science. He is a former military officer and award-winning economic forecaster. Brent has founded and led companies in sectors such as biometrics and immersive video. He is also a Professorial Lecturer at The George Washington University’s Elliott School of International Affairs., 7-13-2017, Atlantic Council, Gene-Editing in China: Beneficial Science or Emerging Military Threat?, https://www.atlanticcouncil.org/blogs/futuresource/gene-editing-in-china-beneficial-science-or-emerging-military-threat/, 7-1-2022) SCade

Gene Editing as an International Security Threat

In an Atlantic Council panel on gene editing in September 2016, Dr.Dr. Pierre Noel, a professor at the Mayo Clinic and a non-resident fellow at the Brent Scowcroft Center on International Security, agreed the technique could be a threat. “It’s possible that in the future, as the technology becomes more sophisticated, countries may be able to implement gene-editing technology to design…super soldiers…with great muscle force and strength.” The main concern about gene-editing and its potential danger is the ease of obtaining “CRISPR toolkits for less than $50.” In May of this year, the web site Futurism chronicled how organizations organizations routinely distribute the kits around the world. Addgene, a nonprofit DNA molecule repository in Cambridge, Massachusetts, has sent “thousands of CRISPR toolkits to researchers in more than 80 countries,” according to Futurism. One of those countries is China. Chinese researchers use Addgene frequently. They have made over 10,000 requests for CRISPR plasmids (separated DNA molecules) and hundreds of deposits of plasmids in the Addgene repository. The organization also has a distributor in Beijing. Russian researchers work with Addgene too and the nonprofit helps scientists navigate Russian customs. Addgene, to its credit, has numerous safeguards in place to ensure that its products are used for legitimate science. Researchers must show evidence that they are working in academia or in other valid research laboratories. Addgene also does not ship to “Cuba, Iran, North Korea, Sudan, and Syria.” While Russian scientists from the Skolkovo Institute of Science and Technology (Skoltech) have shown modest success conducting CRISPR experiments testing bacterial immunity, it is China that has become a global leader. This month, Chinese researchers at a biotech firm in Beijing announced they cloned a dog using gene editing. Genome experts believe that China is either ahead of the United States in CRISPR breakthroughs or is closely behind. In April, China began using CRISPR techniques on a human with cancer. Is Chinese CRISPR Research for Military or Civilian Use? There is so much gene-editing research being conducted in China it is difficult to pinpoint the primary sources. It is also not easy to discern whether the research in China has civilian, military, or defense applications. The secretive Academy of Military Medical Sciences and the Third Military Medical University are the most likely defense labs. These DARPA-like institutions handle medical studies for the People’s Liberation Army and both are feverishly pumping out CRISPR research. Chinese military scientists are using the technique to produce proteins of human blood called albumin in baby pigs. Military researchers are improving CRISPR gene splicing with their own innovative light-induced editing systems. Other studies focus on improving cancer drug resistance. The Chinese military is also investigating removing Hepatitis-B virus DNA with CRISPR. The main civilian CRISPR laboratories appear to be affiliated with Chinese Academy of Sciences, particularly its Institute of Neuroscience at the Shanghai Institutes for Biological Sciences. These centers alone have dozens of labs with at least 50 scientists who could be working on gene editing at any given time. And that estimated number is just in neuroscience. That does not count all the Chinese CRISPR researchers who are toiling in human bioscience or animal biology. These civilian scientists are speeding through experiments with monkeys and mice. But more worrisome are this year’s Chinese CRISPR breakthroughs in human embryos. The United States has banned CRISPR techniques conducted on human embryos. American Biotechnology Firms Could Be Unwittingly Helping China China has leapt forward in CRISPR research mostly because of significant government funding. Gene editing has likely been given a high priority by the People’s Liberation Army. Another factor in Chinese scientific development could be the growth of the American biotech sector that is dedicated to gene-editing. Some U.S. firms consider China a huge export market for CRISPR technology. At least four of these U.S. companies have some connection to China. CRISPR Therapeutics in Cambridge, Massachusetts, has developed its own proprietary gene-editing platform. It has raised $89 million in venture funding. The firm announced in June that it has received a Chinese patent for its CRISPR/Cas 9 Genome Editing system. GeneCopoeia, in Rockville, Maryland, sells numerous CRISPR tools. The firm has a Chinese product distributor at the Guangzhou Science Park. GenScript in Piscataway, New Jersey, has an office in Nanjing, Jiangsu Province. It recently announced in March it is working with a genetic science foundation to “engage and expand the synthetic biology research community in China.” GENEWIZ, with its headquarters in New Jersey, has numerous services in genome editing and engineering, including the field of synthetic biology. GENEWIZ has worked with the National Key Laboratory of Biotherapy of Sichuan University in China to synthesize Zika virus key genes. I am in no way claiming that these non-profit and for-profit entities are doing anything improper, unethical, or unlawful. There is a high demand for CRISPR products and services in China, and these organizations are simply meeting that demand in a free market system. There have been a handful of Congressional hearings on CRISPR, but it does not appear any have focused on export controls for foreign military use. Meanwhile, China is clearly pursuing dual-use genetic engineering technology. Beijing likely plans on becoming the undisputed global leader in gene editing for its military and civilian medical and scientific communities. As Burrows has said, the speed of the technological advances in this field is astonishing, and future growth will continue to be difficult to track and analyze. The CRISPR tool kits are cheap and easy to get. Each day more scientists around the world are obtaining various services and products that help them splice genes. The development of Chinese “super soldiers” is probably a long way off, but these concerns should be taken seriously and monitored closely. It is plausible that the People’s Liberation Army would be interested in improving soldier survivability and CRISPR has that potential to someday improve human performance on the battlefield. And don’t forget Russia. The Russians may lag behind the Americans and Chinese in gene-editing research, but Vladimir Putin is always looking for a new military edge.

#### Hegemony is empirically the most stable system and deters all conflict – decline causes transition wars

Robert Kagan, 17, 2-7-2017, Backing Into World War III, https://foreignpolicy.com/2017/02/06/backing-into-world-war-iii-russia-china-trump-obama/, Robert Kagan, Ph.D. in American History from American University, M.P.P. in Government from Harvard University, AVD

Think of two significant trend lines in the world today. One is the increasing ambition and activism of the two great revisionist powers, Russia and China. The other is the declining confidence, capacity, and will of the democratic world, and especially of the United States, to maintain the dominant position it has held in the international system since 1945. As those two lines move closer, as the declining will and capacity of the United States and its allies to maintain the present world order meet the increasing desire and capacity of the revisionist powers to change it, we will reach the moment at which the existing order collapses and the world descends into a phase of brutal anarchy, as it has three times in the past two centuries. The cost of that descent, in lives and treasure, in lost freedoms and lost hope, will be staggering. Americans tend to take the fundamental stability of the international order for granted, even while complaining about the burden the United States carries in preserving that stability. History shows that world orders do collapse, however, and when they do it is often unexpected, rapid, and violent. The late 18th century was the high point of the Enlightenment in Europe, before the continent fell suddenly into the abyss of the Napoleonic Wars. In the first decade of the 20th century, the world’s smartest minds predicted an end to great-power conflict as revolutions in communication and transportation knit economies and people closer together. The most devastating war in history came four years later. The apparent calm of the postwar 1920s became the crisis-ridden 1930s and then another world war. Where exactly we are in this classic scenario today, how close the trend lines are to that intersection point is, as always, impossible to know. Are we three years away from a global crisis, or 15? That we are somewhere on that path, however, is unmistakable. And while it is too soon to know what effect Donald Trump’s presidency will have on these trends, early signs suggest that the new administration is more likely to hasten us toward crisis than slow or reverse these trends. The further accommodation of Russia can only embolden Vladimir Putin, and the tough talk with China will likely lead Beijing to test the new administration’s resolve militarily. Whether the president is ready for such a confrontation is entirely unclear. For the moment, he seems not to have thought much about the future ramifications of his rhetoric and his actions. China and Russia are classic revisionist powers. Although both have never enjoyed greater security from foreign powers than they do today — Russia from its traditional enemies to the west, China from its traditional enemy in the east — they are dissatisfied with the current global configuration of power. Both seek to restore the hegemonic dominance they once enjoyed in their respective regions. For China, that means dominance of East Asia, with countries like Japan, South Korea, and the nations of Southeast Asia both acquiescing to Beijing’s will and acting in conformity with China’s strategic, economic, and political preferences. That includes American influence withdrawn to the eastern Pacific, behind the Hawaiian Islands. For Russia, it means hegemonic influence in Central and Eastern Europe and Central Asia, which Moscow has traditionally regarded as either part of its empire or part of its sphere of influence. Both Beijing and Moscow seek to redress what they regard as an unfair distribution of power, influence, and honor in the U.S.-led postwar global order. As autocracies, both feel threatened by the dominant democratic powers in the international system and by the democracies on their borders. Both regard the United States as the principal obstacle to their ambitions, and therefore both seek to weaken the American-led international security order that stands in the way of their achieving what they regard as their rightful destinies. It was good while it lasted Until fairly recently, Russia and China have faced considerable, almost insuperable, obstacles in achieving their objectives. The chief obstacle has been the power and coherence of the international order itself and its principal promoter and defender. The American-led system of political and military alliances, especially in the two critical regions of Europe and East Asia, has presented China and Russia with what Dean Acheson once referred to as “situations of strength” that have required them to pursue their ambitions cautiously and, since the end of the Cold War, to defer serious efforts to disrupt the international system. The system has checked their ambitions in both positive and negative ways. During the era of American primacy, China and Russia have participated in and for the most part been beneficiaries of the open international economic system the United States created and helps sustain; so long as that system functions, they have had more to gain by playing in it than by challenging and overturning it. The political and strategic aspects of the order, however, have worked to their detriment. The growth and vibrancy of democratic government in the two decades following the collapse of Soviet communism posed a continual threat to the ability of rulers in Beijing and Moscow to maintain control, and since the end of the Cold War they have regarded every advance of democratic institutions — especially the geographical advance of liberal democracies close to their borders — as an existential threat. That’s for good reason: Autocratic powers since the days of Klemens von Metternich have always feared the contagion of liberalism. The mere existence of democracies on their borders, the global free flow of information they cannot control, the dangerous connection between free market capitalism and political freedom — all pose a threat to rulers who depend on keeping restive forces in their own countries in check. The continual challenge to the legitimacy of their rule posed by the U.S.-supported democratic order has therefore naturally made them hostile both to that order and to the United States. But, until recently, a preponderance of domestic and international forces has dissuaded them from confronting the order directly. Chinese rulers have had to worry about what an unsuccessful confrontation with the United States might do to their legitimacy at home. Even Putin has pushed only against open doors, as in Syria, where the United States responded passively to his probes. He has been more cautious when confronted by even marginal U.S. and European opposition, as in Ukraine. The greatest check on Chinese and Russian ambitions has been the military and economic power of the United States and its allies in Europe and Asia. China, although increasingly powerful, has had to contemplate facing the combined military and economic strength of the world’s superpower and some very formidable regional powers linked by alliance or common strategic interest — including Japan, India, and South Korea, as well as smaller but still potent nations like Vietnam and Australia. Russia has had to face the United States and its NATO allies. When united, these U.S.-led alliances present a daunting challenge to a revisionist power that can call on few allies of its own for assistance. Even were the Chinese to score an early victory in a conflict, such as the military subjection of Taiwan or a naval battle in the South or East China Sea, they would have to contend over time with the combined industrial productive capacities of some of the world’s richest and most technologically advanced nations and the likely cutoff of access to foreign markets on which their own economy depends. A weaker Russia, with its depleted population and oil- and gas-dependent economy, would face an even greater challenge. For decades, the strong global position enjoyed by the United States and its allies has discouraged any serious challenge. So long as the United States was perceived as a dependable ally, Chinese and Russian leaders feared that aggressive moves would backfire and possibly bring their regimes down. This is what the political scientist William Wohlforth once described as the inherent stability of the unipolar order: As dissatisfied regional powers sought to challenge the status quo, their alarmed neighbors turned to the distant American superpower to contain their ambitions. And it worked. The United States stepped up, and Russia and China largely backed down — or were preempted before acting at all. Faced with these obstacles, the best option for the two revisionist great powers has always been to hope for or, if possible, engineer a weakening of the U.S.-supported world order from within, either by separating the United States from its allies or by raising doubts about the U.S. commitment and thereby encouraging would-be allies and partners to forgo the strategic protection of the liberal world order and seek accommodation with its challengers. The present system has therefore depended not only on American power but on coherence and unity at the heart of the democratic world. The United States has had to play its part as the principal guarantor of the order, especially in the military and strategic realm, but the order’s ideological and economic core — the democracies of Europe and East Asia and the Pacific — has also had to remain relatively healthy and confident.

## 2NC Germline turn

### 2NC---Heg Impact

#### Unipolarity is sustainable and creates a structural disincentive for great power war and escalation – power vacuums causes cascade prolif and extinction

Hal Brands 15. On the faculty at the Sanford School of Public Policy at Duke University The Elliott School of International Affairs The Washington Quarterly Summer 2015 38:2 pp. 7–28

The fundamental reason is that both U.S. influence and international stability are thoroughly interwoven with a robust U.S. forward presence. Regarding influence, the protection that Washington has afforded its allies has equally afforded the United States great sway over those allies’ policies.43 During the Cold War and after, for instance, the United States has used the influence provided by its security posture to veto allies’ pursuit of nuclear weapons, to obtain more advantageous terms in financial and trade agreements, and even to affect the composition of allied nations’ governments.44 More broadly, it has used its alliances as vehicles for shaping political, security, and economic agendas in key regions and bilateral relationships, thus giving the United States an outsized voice on a range of important issues. To be clear, this influence has never been as pervasive as U.S. officials might like, or as some observers might imagine. But by any reasonable standard of comparison, it has nonetheless been remarkable. One can tell a similar story about the relative stability of the post-war order. As even some leading offshore balancers have acknowledged, the lack of conflict in regions like Europe in recent decades is not something that has occurred naturally. It has occurred because the “American pacifier” has suppressed precisely the dynamics that previously fostered geopolitical turmoil. That pacifier has limited arms races and security competitions by providing the protection that allows other countries to under-build their militaries. It has soothed historical rivalries by affording a climate of security in which powerful countries like Germany and Japan could be revived economically and reintegrated into thriving and fairly cooperative regional orders. It has induced caution in the behavior of allies and adversaries alike, deterring aggression and dissuading other destabilizing behavior. As John Mearsheimer has noted, the United States “effectively acts as a night watchman,” lending order to an otherwise disorderly and anarchical environment.45 What would happen if Washington backed away from this role? The most logical answer is that both U.S. influence and global stability would suffer. With respect to influence, the United States would effectively be surrendering the most powerful bargaining chip it has traditionally wielded in dealing with friends and allies, and jeopardizing the position of leadership it has used to shape bilateral and regional agendas for decades. The consequences would seem no less damaging where stability is concerned. As offshore balancers have argued, it may be that U.S. retrenchment would force local powers to spend more on defense, while perhaps assuaging certain points of friction with countries that feel threatened or encircled by U.S. presence. But it equally stands to reason that removing the American pacifier would liberate the more destabilizing influences that U.S. policy had previously stifled. Long-dormant security competitions might reawaken as countries armed themselves more vigorously; historical antagonisms between old rivals might reemerge in the absence of a robust U.S. presence and the reassurance it provides. Moreover, countries that seek to revise existing regional orders in their favor—think Russia in Europe, or China in Asia—might indeed applaud U.S. retrenchment, but they might just as plausibly feel empowered to more assertively press their interests. If the United States has been a kind of Leviathan in key regions, Mearsheimer acknowledges, then “take away that Leviathan and there is likely to be big trouble.”46 Scanning the global horizon today, one can easily see where such trouble might arise. In Europe, a revisionist Russia is already destabilizing its neighbors and contesting the post-Cold War settlement in the region. In the Gulf and broader Middle East, the threat of Iranian ascendancy has stoked region-wide tensions manifesting in proxy wars and hints of an incipient arms race, even as that region also contends with a severe threat to its stability in the form of the Islamic State. In East Asia, a rising China is challenging the regional status quo in numerous ways, sounding alarms among its neighbors—many of whom also have historical grievances against each other. In these circumstances, removing the American pacifier would likely yield not low-cost stability, but increased conflict and upheaval. That conflict and upheaval, in turn, would be quite damaging to U.S. interests even if it did not result in the nightmare scenario of a hostile power dominating a key region. It is hard to imagine, for instance, that increased instability and acrimony would produce the robust multilateral cooperation necessary to deal with transnational threats from pandemics to piracy. More problematic still might be the economic consequences. As scholars like Michael Mandelbaum have argued, the enormous progress toward global prosperity and integration that has occurred since World War II (and now the Cold War) has come in the climate of relative stability and security provided largely by the United States.47 One simply cannot confidently predict that this progress would endure amid escalating geopolitical competition in regions of enormous importance to the world economy. Perhaps the greatest risk that a strategy of offshore balancing would run, of course, is that a key region might not be able to maintain its own balance following U.S. retrenchment. That prospect might have seemed far-fetched in the early post-Cold War era, and it remains unlikely in the immediate future. But in East Asia particularly, the rise and growing assertiveness of China has highlighted the medium- to long-term danger that a hostile power could in fact gain regional primacy. If China’s economy continues to grow rapidly, and if Beijing continues to increase military spending by 10 percent or more each year, then its neighbors will ultimately face grave challenges in containing Chinese power even if they join forces in that endeavor. This possibility, ironically, is one to which leading advocates of retrenchment have been attuned. “The United States will have to play a key role in countering China,” Mearshimer writes, “because its Asian neighbors are not strong enough to do it by themselves.”48 If this is true, however, then offshore balancing becomes a dangerous and potentially self-defeating strategy. As mentioned above, it could lead countries like Japan and South Korea to seek nuclear weapons, thereby stoking arms races and elevating regional tensions. Alternatively, and perhaps more worryingly, it might encourage the scenario that offshore balancers seek to avoid, by easing China’s ascent to regional hegemony. As Robert Gilpin has written, “Retrenchment by its very nature is an indication of relative weakness and declining power, and thus retrenchment can have a deteriorating effect on relations with allies and rivals.”49 In East Asia today, U.S. allies rely on U.S. reassurance to navigate increasingly fraught relationships with a more assertive China precisely because they understand that they will have great trouble balancing Beijing on their own. A significant U.S. retrenchment might therefore tempt these countries to acquiesce to, or bandwagon with, a rising China if they felt that prospects for successful resistance were diminishing as the United States retreated.50 In the same vein, retrenchment would compromise alliance relationships, basing agreements, and other assets that might help Washington check Chinese power in the first place—and that would allow the United States to surge additional forces into theater in a crisis. In sum, if one expects that Asian countries will be unable to counter China themselves, then reducing U.S. influence and leverage in the region is a curious policy. Offshore balancing might promise to preserve a stable and advantageous environment while reducing U.S. burdens. But upon closer analysis, the probable outcomes of the strategy seem more perilous and destabilizing than its proponents acknowledge.

### 2NC---Germline Extensions

#### Germline engineering is the next arms race – it is the sole thing that will disrupt the global balance of power – the US losing the race means a US loss of heg

Heslop and Macintyre, 19, (David James Heslop Chandini Raina Macintyre, 2-14-2019, Global Biosecurity, Germ Line Genome Editing And The Emerging Struggle For Supremacy In The Chemical, Biological And Radiological (Cbr) Balance Of Power., https://jglobalbiosecurity.com/article/10.31646/gbio.18/, 7-1-2022) SCade

An emerging genetic warfare arms race

The potential advantages and drawbacks of germ line genome editing to future military capability and operations has not yet been rigorously explored. Nevertheless, genome editing opens the door to the deliberate conception and selective modification of cohorts of individuals for the express purpose of building superior military capability. Certain countries prohibit such an enterprise from being undertaken. However, as seen in the case of He in Shenzhen, this activity can be undertaken through to completion in jurisdictions with intact regulatory frameworks (2). He’s work has signalled a successful “proof of concept” to industry, military organisations and government agencies, and has opened a vista of Genetic Warfare to allies and enemies alike. Irrespective of the social and moral fallout of this momentous announcement, this technique is now a potential pathway to achieving future military or strategic aims that could result in irrevocable change to humanity. Historically, similar situations – the Battleship arms race in Europe in the late 1800s and the missile gap between US and USSR during the cold war - have resulted in great power arms races, destabilised the balance of power, and led to conflict and suffering (13-16). One example of the willingness to exploit available biotechnology for gain is the illicit use of erythropoietin and other stimulating agents (to induce biological changes in the human body) and other performance-enhancing drugs to enhance performance in competitive sport, which appears to occur in all countries despite being banned (17). The governance requirement around this has necessitated a World Anti-doping Authority, with very little effect on the competitive race to enhance performance (18). It seems likely that once the gates are open to create enhanced human beings, a race will begin, either covertly or overtly. The He experiment also raises questions about whether the engineered babies or other similarly designed babies will then be tested for their resistance to the disease they were designed to overcome, and the ethics of using human infants for such experimentation. If an arms race occurs, in the drive for rapid progress, this is very likely to be a consequence. The concept of genetic modification for population goals is not new. More broadly, it has featured regularly in narratives and philosophical discourse on the future of humanity – adapt and evolve to survive – and recent discourse about risks of and accelerating evolution towards homo superior (19). However, the temptation to use He’s now proven techniques to achieve homo superior immediately, in the context of great power rivalry and realpolitik, may be too great and now is likely unavoidable. Historical parallels abound – most concerningly that started by the development of the atomic bomb and demonstrated by the Trinity test series, and subsequent arms races and real or perceived capability gaps marking the cold war (20). Is He’s work the Trinity Test of genetic warfare, and will an arms race evolve to address perceptions of a genetic warfare capability gap? Genetic engineering offers numerous potential military capability advantages but its use would require significant distortions to the historical and ethical norms of the raising, training and sustainment of armed forces (21, 22), and provide a new source of combatants to armed conflict with parallels to the use of paid mercenaries by great powers in recent centuries (23). Germ line modification for military purposes would necessitate the selective raising of genetically modified cohorts of individuals destined to fill the ranks of future armed forces from birth – the creation of a genetically modified military caste within the unmodified mass of humanity. This has been attempted earlier through selective breeding programs, such as the Lebensborn program of the Nazi SS (24-26) that attempted to increase the numbers of Aryan offspring. Prior to He’s work the possibility of this transpiring was theoretical – considered to be at least a number of major advances distant, undesirable as more acceptable genetic therapeutic options were available, and ethically proscribed. It is instructive, now that the pathway to germ line modification has been opened, to explore what military capabilities could be achieved through this methodology. Targets for germ line modification for friendly forces Germ line modification for military purposes would likely be turned towards addressing factors that would offer advantages in conflict where human personnel currently introduce limitations. Alteration or augmentation of the pseudocholinesterase gene (27), which is important for protection against exposure to organophosphate compounds such as nerve agents, could be germ line modified to augment expression or improve performance, thus rendering individuals highly resistant or invulnerable to intoxication. Similar modifications could be made to the target proteins of various plant and bacterial toxins (e.g. ricin, abrin, staphylococcal enterotoxin B, botulinum neurotoxin), or manipulation of the vulnerabilities or protective capacities of the resilience and adaptability of individuals in dimensions bypassing historical evolutionary pressures (28). Strength, resilience to environmental stressors such as acute radiation exposure, reduced need for nutrition, and physical stamina could be optimised. For example, germ line modification could be used to selectively introduce high performance haemoglobin or upstream modulators of haematological system parameters. Introduced prior to conception from sequences taken from superior examples of human resilience and strength, such changes would then become part of the individuals’ genome indistinguishable to the discarded wild-type sequences (29). Cognition, attention, tolerance to pain, creativity and potentially more desirable personality traits are all possible future targets for engineering (30, 31). Finally, the creation of human-other hybrids or introduction of non-natural sequences for technological purposes (e.g. integrated Mind-Machine interface) are potential future avenues for capability exploitation (32, 33). Targets for germ line modification against enemy forces The potential for this technology to also be used for harm against enemies must not be neglected. It is possible through this technology to insert “sleeper” mechanisms within the genome of a target population, activated through exposure to otherwise innocuous events and causing deleterious effects. This might include subtle modifications of populations for resilience to environmental stressors, decreased resistance to infection or disturbances to immunity, and cognitive or behavioural effects. Equally, this could include development of novel characteristics in organisms or humans, or exploitation of characteristics of both materiel and unmodified personnel, to achieve military aims (34). In the strategic domain, ecological weaknesses could be introduced to a population - caused by gradual reductions in genetic diversity or introduction of lower performance genes, into a population leading to changed ability to adapt to environmental change, stress, changed fertility and survival - risks already identified in human and non-human modification alike (35). The primary concern is the almost limitless ability of actors to interfere with others using methods and techniques difficult to identify, prove or counter. Given that human ambition, greed and competition remains strongly conserved in the population, it would appear inevitable that most of the negative scenarios possible with genomic editing are likely, or have already, begun to play out. Implications The recent calls for a moratorium (35, 36) highlight the significant concern in the scientific, security and wider community that germ line editing has stimulated. However, we are already in the post-editing era where not only are the practical techniques for achieving germ line modification now clear, but new research horizons will open. In all domains of society – commercial, military, social – this technology opens up areas of individual and population competitions and tensions that have been recognised as at best destabilising, and at worst likely to result in mass suffering and destruction that is unpredictable. Furthermore, CRISPR Cas9 technology still has problems, with unintended DNA changes that can lead to unexpected consequences including cancer and other diseases (36). In the military domain, the logic of strategic balance of power dictates likely emergence of genetic warfare arms race, with some form of involvement of all major powers (37). This situation further complicates an already sensitive global balance of power, introducing uncertainties into strategic calculus with possible severe negative implications. He Jiankui’s work could be seen as the “Trinity Test” of an era of Genetic Warfare, and not only of germ line modification. However, the implications of this may be more profound, far reaching, and impactful than the recent nuclear escalations for humanity.

#### Reject their authors – media makes fantastical exaggerations. If the US doesn’t do research, somebody else WILL and force the US to act – that’s worse – turns case

Mathews 15 Mathews, Debra. Debra Mathews, PhD, is assistant director for science programs at the Johns Hopkins Berman Institute of Bioethics. “Experts Debate: Are We Playing with Fire When We Edit Human Genes?” STAT, 17 Nov. 2015, www.statnews.com/2015/11/17/gene-editing-embryo-crispr/#Mathews. Accessed 30 June 2022. //DRE

Fantastic and unrealistic fears inspired by science fiction often get all the attention in popular culture, while the very real potential benefits or risks of genetic research go unexplored and undiscussed. That is ethically problematic. Research on germline editing to gain fundamental knowledge about the nature of the human genome and early embryonic development is important and ethically permissible. We can learn much from this kind of research even if it isn't applied to human reproduction. If we later want to consider genome editing for reproductive use, then this initial basic research will be essential. That said, concerns over modifying the human germline are justified and deserve careful attention. I am part of the Hinton Group, a collaborative of international, interdisciplinary scholars, policymakers, journals, and funders focused on stem cells, ethics, and the law. In a September statement on human germline genetic modification, we said that there may be morally acceptable uses of this technology in human reproduction "given all safety, efficacy and governance needs are met." Before that happens, however, substantial societal discussion and debate will be needed. Regardless of what we decide to do in the United States, germline gene editing for reproductive purposes will be done somewhere around the world. We can have this difficult but deeply important conversation now and make proactive decisions about how to harness this science to achieve the benefits we care most about, or we can wait until the decisions are made for us by others and we are forced to react. I believe that we need to engage the public, policymakers, and broader scientific community to weigh the potential benefits and harms of human genome editing for research and human health instead of stopping all discussion, debate, and research. ‌

#### China is pushing germline editing research – won’t stop – and other countries are following.

WESLEY W. CHEN June 30 2019 HUMAN GERMLINE GENE EDITING: ENGINEERING AN UNSTOPPABLE TRAIN https://mylaw2.usc.edu/why/students/orgs/ilj/assets/docs/28-2-Chen.pdf

No country is pushing human germline gene editing research harder than China. It is fitting that the country that first broke the glass door on gene editing in human embryos would be leading the way for the controversial field. Human germline editing research has been able to thrive in China in part because of how ethical research laws are (or better yet) not enforced. For example, in 2015, when China reported the first case of human germline editing, its Guidelines on Human Assisted Reproductive Technologies stated that “using human egg plasma and nuclear transfer technology for the purpose of reproduction, and manipulation of the genes in human gametes, zygotes or embryos for the purposes of reproduction are prohibited.” 99 However, the 2015 study was likely able to proceed because such administrative research guidelines are considered “soft law” and not thoroughly enforced.100 Today, any Chinese university or hospital can freely conduct clinical trials for gene editing technology with approval from their own ethics commissions and do not require approval by China’s federal government.101 Interestingly, it also seems that China is equally willing to support gene editing research for fixing disorders as opposed to human augmentation. For example, while one Chinese study gene edited embryos to correct the mutation for β-thalassemia,102 another Chinese study enhanced an embryo to give it genetic resistance against HIV.103 With other countries following China’s lead, one wonders whether it is inevitable that the United States will eventually join the fray.

#### Russia will pursue germline editing of humans – they are willing to act outside of the rules based international order.

Margaret E. Kosal Pages 389-408 | Published online: 15 Sep 2021 The Nonproliferation Review Volume 27, 2020 - Issue 4-6: Chemical and Biological Warfare CRISPR and new genetic-engineering techniques: emerging challenges to strategic stability and nonproliferation doi.org/10.1080/10736700.2020.1879464 https://www.tandfonline.com/doi/full/10.1080/10736700.2020.1879464

Exemplifying the twenty-first-century reality that no scientific research is unique to any single nation, a Russian scientist announced in June 2019 that he was pursuing similar gene-editing experiments and intended to use CRISPR for germline editing of humans.[61](https://www.tandfonline.com/doi/full/10.1080/10736700.2020.1879464) Russia has recently thumbed its nose at international norms with the use of unscheduled, military-grade nerve agents against a former intelligence officer, Sergei Skripal, and his daughter, Yulia, living in the United Kingdom.[62](https://www.tandfonline.com/doi/full/10.1080/10736700.2020.1879464) More recently, the Russian domestic dissident Alexei Navalny was poisoned with a Novichok-type organophosphate poison.[63](https://www.tandfonline.com/doi/full/10.1080/10736700.2020.1879464) In an incident that is less well known, three Russians were initially charged with attempting to poison a Bulgarian businessman with contacts in Russia and two others in May 2015.[64](https://www.tandfonline.com/doi/full/10.1080/10736700.2020.1879464) If Russia is pursuing broader efforts to erode the post-World War II rules-based international order,[65](https://www.tandfonline.com/doi/full/10.1080/10736700.2020.1879464) of which the Skripal case arguably is an exemplar, the Russian scientists’ announcement could be an indication of that. Among other alternatives, this could be a case of an individual scientist sending up a test balloon to see how the Russian government responds. Critically, the demonstrated interest in using CRISPR gene-editing techniques for a variety of human applications is ongoing and not limited to any single nation-state.

#### Russia is moving forward w/gene engineering

TASS, 9-1-2021, "Russia to support genetic engineering studies, Putin says", https://tass.com/society/1332539, 6-28-2022, //ms

VLADIVOSTOK, September 1. /TASS/. Creating artificial barriers to the development of genetic engineering is pointless, so Russia will support research in this sphere, Russian President Vladimir Putin said at a back-to-school gathering on Wednesday to mark the occasion of the Day of Knowledge during his visit to Russia’s Far East. "With the help of genetic engineering, it is possible, actually, to shape the quality of future biological objects. This is a very demanding task. The outcome, if humankind goes down this path, is hard to predict, so we have to bear this in mind. There are scientific and moral considerations. [This is] a very important issue," the head of state emphasized. "However, it is fully obvious that its development will continue one way or another. And it makes no sense to put up artificial barriers," he asserted. The president cited as examples the invention of gunpowder and nuclear energy that ended up belonging to all of humanity. "Mankind should formulate shared criteria for work in this direction, make a decision and ensure that these decisions are well-considered, scientifically valid and will be implemented," Putin said. "Nowadays, there is probably nothing more interesting than this. So, we will support this research without any doubt," he concluded. Putin’s meeting with schoolchildren was held within the framework of the New Knowledge educational marathon.

### A2: Germline not a threat

#### Yes germline can harm enemy forces

Heslop and Macintyre, 19, (David James Heslop and Chandini Raina Macintyre, David is Associate Professor at the School of Public Health and Community Medicine at UNSW, and retains significant military responsibilities as Senior Medical Adviser for CBRNE to Special Operations Headquarters Australia and to Australian Defence Force (ADF) joint senior leadership. I am a practicing vocationally registered General Practitioner, a Fellow of Occupational and Environmental Medicine with RACP, and a fellowship candidate for the Academy of Wilderness Medicine.I have extensive experience in the conception, design, planning, delivery and operations of health support systems and capability in remote and austere contexts; incorporating the management of exotic or novel hazards and risks. Extensive actual experience in planning for and management of major disasters, mass casualty and multiple casualty situations. I also have extensive overseas and domestic operational experience in command, personnel management, force protection, health protection systems, resilient systems design and test and evaluation. Direct responsibility and experience with leading deployable expeditionary medical support. I am regularly consulted and participate in the development and review of national and international clinical and operational CBRNE policy and doctrine. I am additionally a peer reviewer for the journals Military Medicine (AMSUS) and Journal and Military and Veterans Health (AMMA). I also continue to conduct CBRNE medical, and general medical education and ADF GP Registar training within my military capacity, along with civilian instruction of the Major Incident Medical Management System (MIMMS) framework with MIMMS Australia., 2-14-2019, Global Biosecurity, Germ Line Genome Editing And The Emerging Struggle For Supremacy In The Chemical, Biological And Radiological (Cbr) Balance Of Power., https://jglobalbiosecurity.com/article/10.31646/gbio.18/, 7-1-2022) SCade

Targets for germ line modification against enemy forces

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#### Germline can help create stronger friendly forces

Heslop and Macintyre, 19, (David James Heslop Chandini Raina Macintyre, 2-14-2019, Global Biosecurity, Germ Line Genome Editing And The Emerging Struggle For Supremacy In The Chemical, Biological And Radiological (Cbr) Balance Of Power., https://jglobalbiosecurity.com/article/10.31646/gbio.18/, 7-1-2022) SCade

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## Off case

### Links – Politics

#### Democrats support germline genetic engineering

Lev **Facher**, 6-18-20**19**, (Lev Facher is a Washington correspondent for STAT, reporting on the politics of health and science. Since joining STAT in 2016, he has written extensively about the federal government’s response to the Covid-19 pandemic, the opioid crisis, and the pharmaceutical industry’s influence on Capitol Hill.) "Why Democrats reopened the debate about germline gene editing", STAT, https://www.statnews.com/2019/06/18/democrats-reopened-debate-about-germline-editing/ lilw-msdi2022

WASHINGTON — A rogue Chinese scientist stunned the world last year when he announced the birth of genetically modified twin girls, prompting widespread outcry from the broader scientific community and calls for a “global moratorium” on editing human embryos that result in births. Yet months later, **Democrats on Capitol Hill surprised many science policy experts when they attempted to roll back a** related, **4-year-**old **ban on altering the DNA of embryos intended for pregnancies.** To many health policy experts here, and research advocates across the country, the timing — just months after the biggest genome editing scandal in world history — was inexplicable. Several Republicans criticized the proposal by playing up concerns of “maverick bioengineers” operating with little oversight and without ethical norms. And while some scientists supported the effort, others expressed open confusion, in particular at the breadth of the change Democrats sought. Within weeks of proposing to eliminate their plan, Democrats largely backed off. But **their sudden effort to reverse what seemed to some like a basic ethical protection** **serves as a case study in how** Washington regulates science — and **the immense influence lawmakers, regardless of their scientific expertise, often wield over federal research.** “In terms of ‘Why now,’ it does seem odd given there is so much international conversation in the scientific community about how to limit germline editing,” said Remy Brim, a scientist and former Democratic Capitol Hill aide who works at the D.C. lobbying firm BGR. The United States has banned germline editing with the aim of starting a pregnancy since 2015, the result of bipartisan opposition to the practice and preemptive scientific concern about the implications of the gene-editing technology CRISPR. Republicans in particular have supported the ban due to conscience concerns similar to those surrounding the use of fetal tissue in research and using federal funds for abortion — some argue that germline genome editing requires the creation of human embryos that will eventually be discarded. **When Democrats took control of the House** **of Representatives in last year’s midterm elections, they saw an opening to repeal a measure that many felt was overly restrictive.** As the House Appropriations Committee considered the spending package that funds the Food and Drug Administration, lawmakers excluded the brief provision that has banned the consideration of certain genome-editing trials — a change that would have essentially lifted the ban, if the law had passed. **Republicans quickly criticized the change**, calling it hasty and ill-advised — even specifically citing China’s “CRISPR babies” scandal, in which He Jiankui drew worldwide criticism for using the technique to alter the genes of twin girls.

#### Democrats don’t support a full ban on genetic engineering

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**A House committee** on Tuesday **restored** to **pending** legislation a **ban on altering the genomes of human embryos** intended for pregnancies, despite calls from some scientists to lift the ban and allow the Food and Drug Administration to review applications for new technologies. Lifting the prohibition could have opened the door to clinical trials of babies being made with genetic material from three people or with genomes that had been changed in ways that would be passed on to future generations. The ban has been attached to bills that fund the Food and Drug Administration in the form of an amendment, or rider, since December 2015. But last month, a subcommittee of the House Appropriations Committee dropped the ban from the legislation. At a hearing Tuesday, supporters of the ban framed it as a necessary barrier to prevent experiments like the one announced last year in which a Chinese scientist created the world’s first gene-edited babies with the technology CRISPR. The work drew worldwide condemnation for skirting ethical and regulatory guidelines and for using scientific tools that were not yet ready to be used in people. “The ethics hadn’t caught up with the science, and… the science has not caught up with the science,” said Rep. Robert Aderholt (R-Ala.), who introduced the rider in 2015 and again at Tuesday’s hearing. He said that for now, genetically editing embryos had “too many unknowns, too many unintended consequences.” The rider blocks the Food and Drug Administration from considering clinical trial applications “in which a human embryo is intentionally created or modified to include a heritable genetic modification.” Scientists and ethicists who advocated for dropping it argued that doing so would simply allow the FDA to review research requests, as it does any other innovative therapy. Some **Democratic lawmakers** who had **appeared supportive of dropping the ban** earlier — **and** who had **criticized the inclusion of the ban in 2015 without debate** — said **they felt it was time for Congress to debate the underlying** ethical and **scientific issues.** But they said that should be done separately from the appropriations process. **The chairwoman of the committee,** **Democrat Nita Lowey** **of New York**, **said she “reluctantly supported” returning the ban** to the bill. **She acknowledged** that editing embryonic DNA had some **potential risks, but added that it could cure and prevent genetic disease**. “We have a moral obligation to allow advances in science so that fewer parents have to watch a child die,” she said. Some scientists had called on Congress to modify the legislation to allow so-called three-parent embryos but maintain the ban on the direct editing of embryonic DNA. The three-parent technology, more precisely called mitochondrial replacement therapy, or MRT, has the potential to prevent severe diseases that result from abnormal mitochondria, energy-producing cellular structures. It involves transferring the nucleus of an unfertilized egg with defective mitochondria into one with healthy mitochondria and then fertilizing it via IVF. Because mitochondria have a small bit of their own DNA, the resulting embryo has genes from three people. The technology is being studied in some countries, including Britain, as a way to halt the inheritance of genetic diseases that stem from the DNA in the mitochondria. Rep. Sanford Bishop Jr. (D-Ga.), who chaired the subcommittee that approved the bill without the ban last month, said he wanted Congress to discuss allowing MRT, “but today is not that time, and this appropriations committee markup is not that place.” He supported adding the ban back to the bill. **The committee approved the amendment to reinsert the ban** on a voice vote, but **one Democrat** who **voted against it** was Rep. **Debbie Wasserman** **Schultz** of Florida. She **carries a variant of the BRCA2 gene that raises her risk of** certain **cancers** **(she was diagnosed with breast cancer in 2007) and said her children would have to get tested to see if they carried the mutation. “If we ever have an opportunity when they have children or when they decide to have a family, to have research advanced to a point where you could have their genetic material, when combined with their partner, altered so that that mutation could be cut off in our family tree and that risk of death and massive health care implications could be eliminated, that’s incredibly important,” she said.**

### Links – Business Confidence / Innovation

#### Restrictions on germline genetic editing would crush business confidence – venture capitalist are hugely invested.

Brian Gormley, 3-10-2022, Brian Gormley is a Special Writer covering life sciences for Dow Jones VentureWire. He joined Dow Jones in 2004."Venture Investment in Crispr Gene Editing Spurs Innovation, Hunt for IP," WSJ, <https://www.wsj.com/articles/venture-investment-in-crispr-gene-editing-spurs-innovation-hunt-for-ip-11646910000>

Increasing venture-capital investment in gene-editing technology is fueling a rush to secure intellectual property in a sector that promises to spur advances across several areas of biotechnology.Technology known as Crispr enables researchers to make precise changes, or edits, to the genetic code, which could lead to therapies for genetic diseases, cancer and other conditions. Because of its broad commercial potential, the gene-editing technology has been surrounded by intellectual-property disputes for several years.In one such dispute, U.S. patent authorities ruled that the Broad Institute, a partnership including the Massachusetts Institute of Technology and Harvard University, was first to invent a method of editing plant and animal cells using the enzyme Cas9, a type of molecular scissors that can cut DNA.The dispute pitted Broad against the University of California, Berkeley, the University of Vienna and Emmanuelle Charpentier, who shared the 2020 Nobel Prize in Chemistry with Berkeley professor Jennifer Doudna for their Crispr-Cas9 research.The U.S. Patent and Trademark Office decision affects companies that use Cas9, favoring those with ties to the Broad, including Editas Medicine Inc., and going against drugmakers such as Intellia Therapeutics Inc. that have licenses from the University of California and its partners.Intellia last week said it had filed patent applications for its own Crispr-Cas9 innovations and that it doesn't expect the ruling to affect its ability to develop future Crispr-based medicines.Several Crispr-based startups raising venture capital recently are using enzymes other than Cas9 to enable new applications for gene editing, avoid existing patents, and generate new intellectual property. Last week's ruling will spur even more Crispr innovation, said Katherine Ann Rubino, chair of the life-sciences practice group for law firm Caldwell Intellectual Property Law.Globally, venture capitalists invested $1.08 billion in 31 Crispr startup financings last year, compared with $172.9 million in 18 such deals in 2020, according to market tracker PitchBook Data Inc. Part of the appeal is the efficiency, specificity and simplicity of Crispr gene editing, said Ursheet Parikh, a partner with venture firm Mayfield.

#### Gene editing is k2 innovation

Claire O’Connell, 11-14-2019, Claire O'Connell is a contributor to The Irish Times who writes about health, science and innovation "Why gene editing is decade’s most significant innovation", Irish Times, https://www.irishtimes.com/business/innovation/why-gene-editing-is-decade-s-most-significant-innovation-1.4080666, 6-28-2022, //ms

gene editing (like the other innovations) has been in the works for a while, the last seven years have seen major developments in our ability to specifically edit DNA in living cells. It is not without controversy. Recent claims that human embryos in China had been genetically edited and had resulted in twin babies prompted widespread condemnation from scientists, as well as discussions about safety and ethics and calls for effective regulation. But as a technology, the ability to alter a gene in a living cell offers many potential benefits, including treating inherited diseases, understanding what specific genes do, generating more resilient crops and even detecting species in the environment. "The field is amazing," says Jane Farrar, a professor of genetics at Trinity College Dublin. "I have had some very late nights updating my lecture slides for undergraduates, because so much in gene technology is happening so quickly." Gene editing – which directly changes the “letters” of the genome – is becoming more of a feature of gene therapy, notes Farrar, but it is the new kid on the block. “The ability to edit specific genes in living cells is relatively new,” she says. “That means many forms of gene therapy that have by now reached the clinic or are under late-stage development don’t use these new gene-editing techniques. They deliver the gene into the cell, rather than correcting or editing the DNA,” she notes. Farrar was one of the pioneers of gene therapy research in Ireland in the 1980s and 1990s, when the patient-led charity Fighting Blindness supported work to find the genetic changes linked to inherited forms of vision loss. “The eye is really an ideal place for gene therapy,” she explains. “It is accessible, it can tolerate the viruses used to deliver genes and you have a natural control – if you put the gene therapy in one eye you can compare it to the other over time.” Rare eye disease Farrar, Prof Pete Humphries and colleagues identified gene changes involved in a rare eye disease called retinitis pigmentosa, and developed a system to "rescue" the gene function by suppressing the mutant gene and delivering a new gene into the cell. The technology was acquired by Spark Therapeutics in 2016. In 2017, the FDA in the USA approved a different Spark therapy, Luxturna, which replaces the function of gene changes associated with progressive sight loss. It was the first gene therapy of its kind to be approved in the US. “In general, there’s a huge amount of commercial interest in new gene therapies,” says Farrar. “Plenty more are in the works, not just for inherited eye diseases but also for rare diseases that affect how cells break down cellular components to recycle them, conditions that damage the mitochondria [which act as “batteries” in cells] and spinal and central nervous system disorders, among others.” She believes that gene editing will become more common in gene therapy approaches in the coming years, particularly as we work out how to do it safely and effectively. “With gene editing, there is the potential risk of ‘off-targets’, where editing a target gene could bring about unintentional changes in the genome or cell function, so some researchers are looking for ‘safe harbours’ in DNA,” she explains. “These are stretches of DNA where in principle you could add different genes targeting different disorders, while avoiding negative off-target effects.” The availability of gene editing in recent years also means that scientists can now use it as a research tool to target specific stretches of DNA relatively easily, according to Prof Breandan Kennedy, a senior lecturer at University College Dublin. Probably the best known gene-editing technology is CRISPR-Cas9, which was made commercially available in 2012. A little like having a sat-nav and a scissors, CRISPR-Cas systems allows you target a specific sequence of DNA “letters” in a living cell, then cut the sequence at that point. ‘Very powerful’ “By doing this, we can inactivate a specific gene, and this gives us a lot of information about what that gene normally does,” says Kennedy, whose work at UCD school of biomolecular and biomedical science uses gene editing technology on microscopic worms, zebrafish and human cells in the lab. “By inactivating specific genes, which we can do much more quickly and easily now with CRISPR-Cas systems, our group has been able to identify genes that are important for vision, for eye development and for blood vessels in the eye to grow and work properly. We are also using the approach to validate in the lab whether particular DNA change in patients are involved in inherited eye disease. Ten years ago if you said such a technology would be widespread, people would have laughed, but now labs around the world can do this. It’s very powerful.” Plant science, too, is reaping the rewards of being able to target specific stretches of DNA in living cells. "What is possible now is what was impossible five years ago," says Dr Ewen Mullins, head of the crop science department at Teagasc, Oak Park. “The holy grail for plant breeding is to be able to control the activity of a single gene, or several linked genes, and now gene editing allows us to do that,” he says. “And crucially, we are not necessarily adding a gene in from another species. With CRISPR-Cas systems, we can edit the genes already in the plant.” This could help to make crop plants more resilient in the face of droughts, fluctuating temperatures and agents of disease, notes Mullins: “These are becoming issues for farmers in Ireland and other parts of the world now, and in the face of climate change we need to reduce those susceptibilities where we can into the future.” Identifying species Gene-editing technology can even help us to identify what species are living in a particular environment, as Dr Anne Parle-McDermott from Dublin City University is finding out. "We are looking at the different species of salmon that live in rivers and aquaculture, but we are doing that by analysing the DNA they shed, also known as environmental or e-DNA," she explains. "We can take a sample of water, then we add CRISPR to find unique stretches of DNA that tell us about the species it came from. The associated Cas protein then cuts a reporter DNA and we can detect that cutting activity, so we know that stretch of DNA is present in the sample. It gives us a whole new way of knowing what DNA is present in the environment." Dr Ciaran Seoighe, deputy director general at Science Foundation Ireland, is impressed that gene technology won the reader vote for the innovation of the decade. "CRISPR-Cas9 is a case of a discovery turned into an innovation," he says. "Decades ago, researchers were discovering that bacteria had this system of being able to find and cut DNA in viruses and so stop them attacking, and the innovation was to take that and use it to specifically edit genes ourselves. It was a case of finding something interesting and then doing something different with it. Now it provides a tool for researchers to work on more personalised approaches to medicine." Farrar is also impressed by the winning vote. “I think the readers are very insightful,” she says. “Gene technology has matured in the last decade, and thanks to gene-editing technology we can also now get far more understanding about disease. This is really a story of fundamental biology enabling a new technology. Without that curiosity, we might not have these exciting innovations now.”

#### Germline editing is the biggest medical innovation in decades

Abinaya & Viswanathan 21 Abinaya, Ravichandran Vijaya, and Pragasam Viswanathan. “Biotechnology-Based Therapeutics.” Translational Biotechnology, 2021, pp. 27–52, www.sciencedirect.com/science/article/pii/B9780128219720000198, 10.1016/b978-0-12-821972-0.00019-8. Accessed 30 June 2022. //DRE

Within the last decade, biotechnology had a spontaneous growth spurt in developing numerous ground-breaking techniques for diagnosis, prevention, and curing various life-threatening diseases. Innovative methodologies, such as recombinant DNA technology, gene therapy, DNA vaccines, stem cell therapy, RNA-based therapeutics, and drug discovery, have significantly contributed to improving medical science. The biomaterials for tissue engineering, the genome editing for gene therapy, the development of nano-based drugs and novel antibiotics, stem cells therapy for regenerative medicine, the advancement in monoclonal antibodies production, and the highly modified vectors for drug delivery systems made possible to treat human diseases which are even untreatable. This chapter discusses the newly developed biotechnology principles, methods, and products, that aid in healthcare, pertaining to the field of biotechnology. In upcoming days, this stable and steady growth of biotechnology will revolutionize the field of medical and health science.

#### The aff bioterror solvency card concedes that a ban would disrupt innovation

1AC Barry Pavel and Vikram Venkatram , 21, (Barry Pavel, Barry Pavel is the senior vice president and director of the Scowcroft Center for Strategy and Security at the Atlantic Council. Prior to joining the Atlantic Council, Barry Pavel was a career member of the Senior Executive Service in the Officer of the Under Secretary of Defense for Policy for almost eighteen years. From October 2008 to July 2010, he served as the special assistant to the President and senior director for defense policy and strategy on the National Security Council (NSC) staff, serving both President George W. Bush and President Barack Obama. Prior to this, Pavel was the chief of staff and principal deputy assistant secretary of defense for special operations/low-intensity conflict and interdependent capabilities. From October 1993 to November 2006, Pavel also led or contributed to a broad range of defense strategy and planning initiatives for both the Clinton and George W. Bush administrations. In this capacity, Pavel supported post-9/11 deterrence policy (including deterrence of terrorist networks and regional nuclear powers); strategies for reducing ungoverned areas; and a long-range planning construct that accounts for trends and “strategic shocks” that could significantly change Department of Defense’s role in national security. Vikram Venkatram is a Young Global Professional in the Scowcroft Center for Strategy and Security, Forward Defense at the Atlantic Council. He is a recent graduate of Georgetown University’s School of Foreign Service, where he studied Science, Technology, and International Affairs with a minor in Biology. He is also currently a second-year graduate student in Georgetown’s Security Studies Program. Originally from San Jose, California, his main interests lie in biosecurity issues, ranging from pandemic preparedness to emerging biotechnology to environmental security to bioethics., 9-7-2021, Atlantic Council, Facing the future of bioterrorism, https://www.atlanticcouncil.org/commentary/article/facing-the-future-of-bioterrorism/, 7-1-2022) SCade

Given the broad scope and scale of this growing threat, the United States should take a series of actions to mitigate the risks, without unduly stunting the growth of the biotechnology field. To date, bioterrorist attacks have been low-risk, high-impact events. While they have been extremely rare, their frequency will only increase as will their ramifications. However, overregulating the spread of biotechnological tools could stunt innovation and the profound potential of this increasingly important sector. Furthermore, existing methods of preventing bioterrorism may no longer be effective. The government could previously monitor the purchase of expensive and dangerous biotechnology tools and the laboratories that owned them in large quantities. This is no longer possible to the same degree when such tools are increasingly cheap, widespread, and usable in a garage. The FBI is currently attempting to address this risk by building relationships with the iGEM community and with life scientists so that they can report suspicious behavior. These efforts should continue, but are wildly insufficient, since some bioterrorists may have minimal contact with the larger community of biologists and biology hobbyists. The release of a bioweapon by a terrorist, if left unchecked, could spread throughout the globe, just as a naturally occurring pandemic would. Thus, one major step that the United States should take is to establish improved responses to disease outbreaks, particularly learning from COVID-19. This should include building a larger stockpile of PPE and establishing a set of clear step-by-step actions to be taken in the event of an attack. Building resilience in this fashion will not prevent bioterrorism, but it will mitigate its effects, and may slightly disincentivize utilizing bioweapons to cause terror. Beyond this, the United States should secure its laboratories and the data within, as terrorists could leverage that knowledge to build bioweapons. For example, new technology allows pathogens to be synthesized from the data describing their genetic sequences. In a recent controversial study, scientists published a methodology that would allow horsepox virus, a virus very similar to one that causes smallpox, to be synthesized. This research was conducted with a noble goal: understanding how the horsepox virus could be used as a potential treatment for cancer. However, it had significant dual-use implications. Research like this should not be banned outright, but the United States should establish norms to evaluate whether it is worth the risk before such research is conducted, and then ensure that it is conducted and the results published in the most secure ways. Replicability is an important part of science, but the general public should not be able to replicate the most dangerous experiments. Where building resilience would reduce the impact of a bioterror incident, restricting access to dual-use methodologies will reduce the likelihood of one occurring in the first place. Finally, enforcing domestic standards is not enough. Pathogens spread across borders, and the spillover effects of even a targeted bioterrorist attack could kill many unintended victims. Thus, the United States must work with other countries to protect against the bioterrorist threat, monitor the emergence of new viruses and bacteria that could be leveraged for a bioweapon, limit access to the most dangerous pathogens (and data associated with those), and build global response networks in the event of an attack. Importantly, this collaboration should emphasize working with allies, but should also include adversaries: if China or Russia remain unregulated, an attack within their borders would still affect the United States and its allies. Emerging biotechnology will result in new medicines and medical techniques, a greater understanding of how pathogens function and spread (and thus a better understanding of how to combat them), a healthier populace, innovative new capabilities that could transform daily life, and greater engagement with the biological sciences. While ensuring that these benefits are maintained, the United States and its allies and partners must take logical steps to protect themselves from the worst-case scenarios. The risk of bioterrorism is growing, and the United States must be prepared to face the future.

### CP – Regulations

#### Regulations and norms are the best option – bans won’t solve and are a dangerous illusion of control.

König, H. The illusion of control in germline-engineering policy. *Nat Biotechnol* **35,**502–506 (2017). <https://doi.org/10.1038/nbt.3884>

The arrival and rapid adoption of the clustered, regularly interspaced, short palindromic repeats (CRISPR)–CRISPR-associated protein 9 (Cas9) system1 has sparked ethical and societal controversy around genome editing of the human germline. Here, I point out the fallacy that such technologies and their applications can be globally prohibited on the basis of universal ethics and bans—the so-called 'illusion of control'. A look at previous technological developments suggests instead that differentiated and multi-faceted approaches that take into account the broadest range of possible ethical and social issues would be preferable for the oversight of CRISPR–Cas9 germline engineering. Such an approach would not only be more effective but also ensure that society has the greatest chance of capitalizing on potential opportunities of the technology. To date, the CRISPR–Cas9 technique has been used to edit the genomes of (non-viable) one-celled human embryos2,3. The first of these genome-editing studies published in the spring of 2015 prompted debate from within the field and by national academies about not only safety issues (such as off-target effects) but also ethical-moral questions. As a result, calls and statements have been released urging researchers to cease performing CRISPR–Cas9 experiments on human germ cells in a clinical context until safety issues have been resolved and the ethical and social implications of directed germline modifications broadly discussed among diverse societal groups and the public4,5,6. In February 2017 a report by the US National Academies of Sciences, Engineering, and Medicine concluded that clinical trials might be permitted and outlined criteria for a strict regulatory framework. These include the restriction to preventing a serious disease, credible pre-clinical and/or clinical data on risks and potential health benefits, or long-term, multigenerational follow-up (that still respects personal autonomy)7. Furthermore, several groups have suggested the need to develop norms and harmonize regulations \*\*internationally or globally5,6. Among the numerous ethical and social challenges of genome editing and its potential applications, a key unresolved issue relates to the notion that certain technologies or applications can be prohibited globally. The notion of banning technologies or applications worldwide has come to the fore as calls have grown for regulating germline editing in humans. The central assumption underlying this notion is that technologies can be prohibited—continuously or until they are 'safe enough'—and, moreover, that this can be done globally. Considering reproductive technology as a whole, history provides several examples of procedures that prompted controversy due to ethical (including safety) or moral concerns once they became technically feasible. These include the use of assisted-reproduction techniques (ARTs), such as in vitro fertilization (IVF), intracytoplasmic sperm injection (ICSI), and pre-implantation genetic diagnosis (PGD). As time has passed, these technologies have become more and more widely adopted and accepted across the globe. Today, they have come into use, even in countries where they were initially prohibited for considerable time periods (e.g., Costa Rica, which only \*\*\*effectively lifted its ban on IVF in 2016; and Germany, which only granted conditional permission for PGD in 2011). In 2015, the United Kingdom approved therapeutic approaches that involve three-parent mitochondrial genome replacement (MGR) in egg cells or one-cell embryos, which thus entail inheritable changes to the human germline. Furthermore, in the Ukraine, MGR has been applied to treat infertility, with a first baby girl reported to have been born early this year8. Similarly, US fertility researchers recently announced that they had conducted MGR in Mexico to prevent mitochondrial disease in a boy born last April9. An expert panel recently convened by the US Food and Drug Administration (FDA) concluded that clinical investigations of MGR are ethically permissible, though only under strict conditions, for example, if restricted solely to male embryos, which cannot pass on mitochondrial DNA to later generations10. Yet, by the time this article went to press, MGR therapy was still effectively banned in the United States owing to an FDA decision in 2001 (http://bit.ly/2q2898X) because of concerns over safety issues such as negative effects from mitochondrial heteroplasmy and mitochondrial–nuclear mismatches. The decision was made in response to ART applied in several fertility clinics that involved the transfer of egg cytoplasm (including mitochondria)11. The decision indicates that the use in therapy of human cells “involving the transfer of genetic material by means other than the union of gamete nuclei” requires application to the FDA for permission. Even the idea that technologies can be banned or prohibited until they are proven by research to be 'safe enough'—at least in the context of reproduction and/or therapies—appears to be disputable. What safe enough means may in practice be as much a question of perception involving different values and interests (and weighing perceived benefits against perceived risks) as it is one of available 'strictly scientific' evidence or numbers (should they be available at all before first clinical applications). An example may be the decisions for the first ART via ICSI by four couples after 3–13 years of unsuccessful trials with traditional ART methods, even though only data from rabbits were available12. An ambiguous state of global union Imposing legal regulations that might prohibit the use of ART technology globally also appears non-feasible, at least when ethical or moral arguments stand in the way of new medical opportunities. Even with respect to human somatic cell nuclear transfer—and despite a seemingly broad international scientific consensus against reproductive cloning due to its low efficiency and the unacceptable potential health issues associated with cloned offspring—no binding global convention has been agreed upon. What's more, the resulting non-binding United Nations (UN; New York) “Declaration on Human Cloning” remains ambiguous by calling to “prohibit all forms of human cloning inasmuch as they are incompatible with human dignity and the protection of human life”13. The ambiguity in the UN declaration arises from its failure to define or interpret the forms of cloning that are incompatible with human dignity or what human life and human dignity should mean. The reason this ambiguity exists was because UN negotiations had to address the issue that dignity and life have different meanings in different cultures and religions globally14. In line with this, regulations vary in different countries or regions of the world, ranging from prohibition of all forms of cloning, to selectively permitting therapeutic cloning, to no official regulations at all (Table 1). Furthermore, the Council of Europe's (Strasbourg, France) legally binding “Convention on Human Rights and Biomedicine,” which prohibits in its protocol on cloning the creation of “a human being genetically identical to another human being, whether living or dead,” has not been signed or ratified by various member states, although it explicitly leaves the interpretation of “human being” to national policies to allow therapeutic cloning where it is accepted15. That (reproductive) cloning appears not to have been performed anywhere so far, including in countries where there is no legal ban, may encourage supporters of such international declarations or conventions. However, it can hardly provide evidence that they were instrumental in—or even contributed to—this outcome, especially given the huge technical hurdles that reproductive cloning faces16. Illusion of (universal) control The idea that biological technologies, like CRISPR–Cas9, or their applications can be (continuously) prohibited, and that this can be done globally thus appears to be reminiscent of the 'illusion of control' in psychology—a phenomenon in which people's beliefs in the control are greater than can be actually justified. For instance, people act as if they have control in situations that are actually determined by chance17. Similarly, when people envision that they will obtain a certain result that they then achieve, they frequently overestimate their influence in bringing about the result18. It is very unlikely that a global ban across jurisdictions is feasible. Indeed, current regulations related to germline interventions vary considerably across the globe19,20. They encompass bans—based on law or less-enforceable governmental or research council guidelines—that prohibit both research and clinical or reproductive applications; or that prohibit clinical or reproductive application only; or that remain sufficiently unclear to raise doubts as to whether they cover human germline gene modification at all (Table 1). In the United States, no federal law describes an outright ban on human germline interventions and work on human embryos, and in some states researchers could do research on embryos with private funding (as was the case with MGR experiments in Oregon in 2012; ref. 21). Yet, there are regulatory means in place that in fact prevent human germline modifications in publicly funded research and in clinical settings. Thus, the US National Institutes of Health does not fund “any use of gene-editing technologies in human embryos” and its Recombinant DNA Advisory Committee (RAC) will not entertain or review proposals for human germline alterations22. Furthermore, the FDA has regulatory authority over cell and gene therapy applying to any (not only publicly funded) research and clinical trials in the United States, and the agency has never approved a proposal to modify the germline. In addition, a renewable provision (that has been extended twice into 2017) of the US Congress's Fiscal Year 2016 omnibus spending bill prevents the FDA from using the budget to evaluate or permit trials with human embryos “intentionally created or modified to include a heritable genetic modification”23 (see also ref. 24). The bill may thus also affect the FDA's capability to review MGR therapy approaches (see above). When it comes to developing regulations on whether or under which conditions germline modifications should be permitted, entrenched moral stances and views on ethics will always be confronted by, and weighed against, the hopes and needs of affected people and their families and caregivers. These may include a desire for people to have their 'own' (genetically related) children not suffering the same disease (e.g., deafness or cystic fibrosis) as both parents do, or new fertility treatments that may be (felt to be) needed due to economic or cultural factors. Naturally, the result of the confrontation between societal ethics and individual hopes—be it a strict ban on all forms of human germline interventions or more differentiated regulations—will strongly depend on the prevalent ethical and moral stances of the societies in which those individuals are found. And these societal ethical or moral stances will differ across the globe. As in the case of cloning, moral stances with respect to the compatibility with human dignity may also be a key issue with respect to germline modification. The UN Declaration on Human Cloning includes statements on human genetic engineering. But as for its language about reproductive cloning, it remains vague and ambiguous with respect to genetic modification and human dignity, calling for the adoption of “measures necessary to prohibit the application of genetic engineering techniques that may be contrary to human dignity”13. Notions of global bans, and maybe even of globally harmonized regulations, on germline interventions—at least of ones that would not be too vague or ambiguous—may thus in fact include features related to the 'illusion-of-control'. Alternatives to illusions Features like exaggerated belief in control or in the causal role of one's own intentions, or unrealistic optimism are elements of normal human thought. They can promote motivation, persistence or the ability to care for others25. However, when it comes to the development or choice of policies, it may be worth considering that these phenomena could also have a downside: they may entail less 'realistic' and thus less-efficient policies. Thus, policies may be followed that strive to universally, and maybe continuously, ban or prohibit technologies or their application—irrespective of their purpose—on a national level or even globally. But on the basis of the evidence, there is in fact little or no empirical support that such strategies work. In addition, they may obscure and distract from alternative policy approaches, focusing on processes that we could better or more realistically control. Such processes could be case-by-case evaluations, dealing with specific applications in which we use knowledge and the technologies in question, such as CRISPR–Cas9 genome editing. Developing and delineating tests and standards (including clinical ones) for techniques or therapeutic tools used in the specific context of these applications may be important elements of such evaluations. Furthermore, focusing on concrete applications and conditions should facilitate interpretations and definitions (including legal ones) related to applications and ethical boundaries20. In contrast to global regulations or bans based on efforts to 'globalize' ethics that universally disapprove germline applications of genome editing, alternative, more realistic policies would support more case-oriented approaches. Such policies may in fact benefit from experiences coming from diverse governance schemes or authorities. These may involve state, regional and national regulations, multiple monitoring bodies (both public and private), but also formal and informal bilateral or multilateral interactions and the engagement of stakeholders on various levels. Stakeholders should include not only researchers and ethicists, but also companies and investors, non-governmental organizations, groups of concerned citizens or families who would be involved in deciding, for instance, on (experimental) approaches. The difficulty of deciding who should be included in such consultations should not be underestimated. For example, it may be important to engage in the policy development processes of not only do-it-yourself biology and biohacker communities as well as biohacker spaces, but also funding sources, such as crowd-funding platforms or investor-supported 'hackubators', even though human germline applications of CRISPR–Cas may not (yet) appear as a goal for these groups26. Involving them and their efforts on codes of ethics may be beneficial, not least of all because any bans or guidelines on institutional research or research funding may hardly provide guidance and oversight on such non-institutional activities27. These more 'polycentric' patterns of approaches and stakeholders may promote key elements linked to polycentric governance in other contexts, like diverse experimental efforts, enhanced collaboration or mutual monitoring and trust28. These elements could be important to facilitate bilateral and multilateral exchange between nations, and gain scientific data and knowledge on safety issues by carefully crafted and monitored laboratory and clinical experimental approaches. But they may also prove beneficial to the development of democratically meaningful deliberation processes. These would need to go beyond the type of expert-dominated summits or one-time public consultations with largely expert-driven agendas (that resulted from calls, including for global action, and statements by various groups4,5,6 so far). Furthermore, these processes would need to contribute to understanding risks by continuously revisiting earlier choices and questions, and thus improve policies over time—based on experiences (about hardly predictable interactions between society and technology) from different conditions and involving a wide variety of perspectives29. Such deliberation processes may reduce the danger of missing potentially important ethical, social or political implications, and further strengthen mutual trust. 'Illusion-of-control'-like notions of universal ethics and bans on germline applications may thus favor one-dimensional thinking and illusionary policies, harboring the danger of leaving aside potentially more realistic and efficient policy alternatives. The latter type of 'polycentric' approach should be better capable of exploring the opportunities of genome-editing techniques, foster collaboration between countries and enhance the chances to grasp the broad range of possible ethical and social issues that would have to be taken into account by efficient and trust-building policies. They may also require governments, non-profits, investors and corporate managers to invest more effort to understand and experiment with conditions that both foster and ethically guide innovation. Ensuring that these differentiated and polycentric policymaking strategies take into account the realities of 'manyness' (i.e., societal differences in values and interests across the globe) would mean tailoring regulations around specific conditions rather than rejecting applications of technologies as a whole. Such an approach to regulations would not only allow space for experimental efforts that generate important scientific data (e.g., on safety issues), but also reduce incentives for researchers to move to countries with more lax standards or less stringent oversight. At the same time as they allow research to progress, they would also allow meaningful democratic deliberation processes on futures with genome-editing applications that people may, or may not, want.