

At the Boundary of Healing and Selection: Catholic Teaching Applied to
Reproductive Engineering

Written by Fallon Barry

I. Biomedical Engineering at the Boundary of Healing and Selection

Biomedical engineering has historically been a discipline oriented toward the restoration of human health, aligning closely with the moral mission of medicine commonly associated with the Hippocratic maxim *primum non nocere*—first, do no harm. At its best, biomedical engineering places technical knowledge in the service of the vulnerable body. Biomedical engineering and medicine alike have participated in Christ’s healing ministry by alleviating suffering and enabling individuals to live fuller lives through life-restoring innovations. In this traditional form, the discipline has been caring for existing persons rather than determining which persons ought to exist. The field's greatest achievements may be measured by the good they have done for God’s children: restoring lost function through prosthetic limbs, cochlear implants, and mobility devices; preserving life through ventilators, insulin pumps, cardiac stents, and dialysis systems; responding compassionately to illness through neonatal incubators, and pain-management technologies. These biomedical inventions have equipped patients with chronic diseases and disabilities to live with greater dignity and independence.

However, reproductive developments over the last 30 years—including in vitro fertilization (IVF), preimplantation genetic testing (PGT), polygenic embryo screening, CRISPR gene editing, and germline genomic engineering—are expanding biomedical engineering beyond the treatment of disease and into the selection, modification, and design of future human life. These technologies are no longer hypothetical; assisted reproductive technology is already widely used. The European Society of Human Reproduction and Embryology (ESHRE) approximates that four million assisted reproductive technology (ART) cycles are performed

worldwide each year, resulting in one million births annually.¹ With these technologies becoming increasingly embedded in reproductive medicine, leaders in the field of biomedical engineering must revisit their moral purpose and decipher what methods of selection border on eugenics and stray from solely healing human life.

Genomic science now allows physicians and engineers to influence which genetic traits may appear in future generations. Through IVF, embryos can be genetically assessed and selected for implantation based on screening results. Since its first reported clinical use in 1990, PGT has expanded from early embryo selection for X-linked disease prevention into capabilities including identifying chromosomal abnormalities, structural rearrangements, and inherited single-gene disorders before implantation.² Its newer counterpart—polygenic embryo screening—also attempts to estimate disease risks shaped by multiple genetic variants rather than one identifiable mutation. A 2024 review in *Human Reproduction Update* regards polygenic embryo screening as a controversial extension of PGT, as it uses practically limited polygenic risk scores to rank embryos for complex diseases and traits.³ The authors identify several major societal risks of this technology, including discarded embryos, overemphasis on genetic determinism, unequal access, and, in turn, an increased demand for “designer babies.” At the same time, CRISPR gene-editing technologies introduce the possibility of directly modifying DNA.⁴

¹ European Society of Human Reproduction and Embryology, “ART Fact Sheet,” accessed April 20, 2026, https://www.eshre.eu/-/media/sitecore-files/Press-room/ESHRE_ARTFactSheet_v10_2025.pdf.

² Kenichiro Takeuchi, “Pre-implantation Genetic Testing: Past, Present, Future,” *Reproductive Medicine and Biology* 20, no. 1 (2020): 27–40, <https://pmc.ncbi.nlm.nih.gov/articles/PMC7812490/>.

³ Antonio Capalbo et al., “Screening Embryos for Polygenic Disease Risk: A Review,” *Human Reproduction Update* 30, no. 5 (2024): 529–49, <https://doi.org/10.1093/humupd/dmae012>.

⁴ National Academies of Sciences, Engineering, and Medicine, *Human Genome Editing: Science, Ethics, and Governance* (Washington, DC: National Academies Press, 2017), <https://doi.org/10.17226/24623>.

These technologies may have been developed for disease prevention; however, the logic used to justify them overlaps with the logic for genetic enhancement, thereby raising a major ethical concern. Polygenic embryo screening and discussions of the aforementioned “designer babies” raise questions about selecting embryos based on predicted aesthetic traits, perceived advantages, and parental preferences. This concern is no longer merely theoretical. Nucleus, a U.S.-based genomics company, advertises an embryo-screening service that allows IVF patients to compare embryos using genetic analyses not only related to potential disease risk, but also to eye color, height, hair color, male-pattern baldness, acne, and even IQ.⁵ CBS News reported that the company screens embryo samples for more than 2,000 traits and conditions; the founder describes the service as “genetic optimization.”⁶ The emergence of Nucleus represents the natural progression of the previously mentioned technologies, demonstrating how IVF, PGT, and polygenic embryo screening move reproductive medicine beyond disease prevention and toward practices that conflict with Catholic Social Teaching by enabling consumer-driven forms of eugenics.

In fact, Catholic Social Teaching offers a distinctive framework for evaluating this shift beginning from the principle of inherent human dignity. Human worth, from the perspective of Catholic thought, is not dependent on any of the characteristics Nucleus screens for, but rather the dignity of a human person is recognized from conception to natural death.⁷ Catholic bioethics

⁵ Nucleus Genomics, “The Science behind Nucleus Embryo,” accessed April 29, 2026, <https://mynucleus.com/deep-dives/embryo>.

⁶ CBS News, “Nucleus Genomics CEO Explains How ‘Genetic Optimization’ Tools Help Parents Select Traits in Babies,” *CBS News*, accessed April 29, 2026, <https://www.cbsnews.com/news/nucleus-genomics-ceo-genetic-optimization-tools-parents-select-traits-babies/>

⁷ Congregation for the Doctrine of the Faith, *Dignitas Personae: On Certain Bioethical Questions* (Vatican City, December 8, 2008),

is founded on this idea, refusing to separate the value of a human life from the existence of the person who bears that life. The dignity of human life places moral limits on scientific and consumer intervention involving embryos. For this reason, Catholic Social Teaching rejects the use of innovation when it turns human life into an object of evaluation, preference, or disposal. When embryos are selected in accordance with desirability, medicine begins treating human life as a product to be chosen instead of a gift to be cherished. This distinction is imperative to evaluating reproductive engineering: biomedical engineering remains morally ordered when it heals and protects human life, but becomes ethically disordered when it assumes the authority to decide which lives are worthy of existence. Catholic Social Teaching can help biomedical engineering distinguish between ethically legitimate efforts to treat disease and morally troubling efforts to eliminate disease or undesirable traits by selecting against people who would carry them.

II. Catholic Thought in the History of Eugenic Resistance

Bringing Catholic thought into a discussion of biomedical engineering ethics is not a novel imposition on an otherwise secular field. Catholic teaching belongs to the historical moral inheritance of Western medicine itself. Long before biomedical engineering emerged as a distinct discipline, Christian commitments to charity and care for the sick helped shape the development of hospitals and shape the moral foundations of medical care. John O. Breen argues that “Western medicine developed as an expression of Christian charity,”⁸ reflecting the

https://www.vatican.va/roman_curia/congregations/cfaith/documents/rc_con_cfaith_doc_20081208_dignitas-personae_en.html.

⁸ John O. Breen, “Health in Need of Healing: Church History as a Road Map for Reforming Catholic Health Care,” *The Linacre Quarterly* 87, no. 4 (2020): 377–87, <https://pmc.ncbi.nlm.nih.gov/articles/PMC7551538/>

long-standing connection between healing and the Christian obligation to serve the vulnerable. Catholic thought helped form a vision of medicine in which the patient is viewed as a person whose dignity remains intact in illness, disability, poverty, or approaching death because each person is made in the image of God.⁹ This Christian anthropology challenges any purely utilitarian view of the body in which vulnerable persons could only be valued according to their capacity for social contribution.

This dignity-centered vision of medical care has been apparent in Catholic medical practice dating back to the fourth century. St. Basil of Caesarea, a bishop of the early Church and a venerated saint in the Catholic tradition, established the *Basileias*, a charitable complex described as one of the earliest large-scale Christian hospitals. The significance of this institution spans medical and theological lines. Here, illness was treated as a communal responsibility, because the suffering person remained fully human before God.¹⁰ In fourth-century Cappadocia, a glaring example of this new ethic was Basil's treatment of lepers. Lepers in the Greco-Roman world were socially shunned due to their visible lesions associated with contagion. Basil's *Basileias* departed from surrounding social practice by creating a dedicated place for the care of these persons. Historical accounts describe the complex as a "*keluphokomeion*" or a place for the care of lepers where those with little hope of recovery were housed, fed, treated, and physically tended.¹¹ Basil transformed a group often treated as disposable into persons toward whom the Christian community has direct moral responsibility. In later centuries, Catholic monasteries,

⁹ Vatican Council II, *Pastoral Constitution on the Church in the Modern World: Gaudium et Spes* (Washington, DC: National Catholic Welfare Conference, 1966), <https://distantreader.org/stacks/pamphlets/pdf/005195688.pdf>

¹⁰ "Reconstructing the World's First Hospital: The Basiliad," *Hektoen International*, February 24, 2017, <https://hekint.org/2017/02/24/reconstructing-the-worlds-first-hospital-the-basiliad/>.

¹¹ "Basileias," *Wikipedia*, last modified May 6, 2026, <https://en.wikipedia.org/wiki/Basileias>.

religious orders, and charitable hospitals continued the pattern of making care for the sick a visible expression of the Church's moral life. Medicine in Catholic thought has always been framed as a duty to vulnerable life; this distinction would become especially urgent in the twentieth century, when eugenic ideologies and abusive human experimentation revealed how medicine could be distorted once the sick and disabled were treated as lives of lesser value.

The clearest twentieth-century example of medicine becoming a tool of selection was Nazi eugenics. Under the Nazi "euthanasia" program, otherwise known as Operation T-4, physicians participated in the killing of individuals with mental and physical disabilities who were described as genetically defective and incurable. The United States Holocaust Memorial Museum describes T-4 as Nazi Germany's first program of mass murder, noting that its aim was the "cleansing" of the Aryan race of persons considered financially and genetically burdensome to society.¹² Catholic opposition emerged most famously through Bishop of Münster Clemens August Count von Galen, who preached publicly against the killings on August 3, 1941. His sermon condemned the principle that those deemed "unproductive" could be killed, warning that such logic would not remain limited to the disabled: "If you establish and apply the principle that you can kill 'unproductive' fellow human beings, then woe betide us all when we become old and frail!"¹³ von Galen's protest challenged the eugenic assumption of Nazi medicine: that human worth could be measured by health or productivity. Thousands of copies of von Galen's sermon were printed and circulated, which led to rising Catholic opposition to Adolf Hitler's

¹² United States Holocaust Memorial Museum, "Euthanasia Program," *Holocaust Encyclopedia*, accessed April 29, 2026, <https://encyclopedia.ushmm.org/content/en/article/euthanasia-program>.

¹³ United States Holocaust Memorial Museum, "German Bishop Condemns the Killing of People with Disabilities," *History Unfolded: U.S. Newspapers and the Holocaust*, accessed April 29, 2026, <https://newspapers.ushmm.org/events/german-bishop-condemns-the-killing-of-people-with-disabilities>

regime. In response to the growing pressure, Hitler ordered the halt of Operation T-4, not wanting to openly clash with the Catholic Church. This Catholic response matters for reproductive engineering because it identifies the core danger of eugenics: medicine ceases to care for the vulnerable and instead begins to classify which lives are biologically or socially acceptable. While contemporary embryo selection is not Nazi medicine, operating through parental choice rather than state coercion, the underlying moral question is similar: whether illness, disability, or genetic difference can justify treating some human lives as less worthy of existence.

Von Galen's protest anticipated a broader postwar reckoning with medicine's moral limits. The crimes of Nazi medicine forced the international community to articulate the ethical limits that Catholic thought has long defended—scientific progress cannot justify the instrumentalization of human life. The Nuremberg Code of 1947 placed voluntary consent of the human subject at the center of ethical research.¹⁴ The code's rejection of coercive experimentation reflected a philosophical claim central to Catholic anthropology, that the human person cannot be reduced to material for scientific advancement. Later Catholic bioethics extended this same logic to the embryo, arguing that no human being may be harmed or destroyed for the benefit of others. The United States Conference of Catholic Bishops has invoked the Nuremberg Code to criticize the destruction of embryos during research, stating that such practices are in violation of the Code's basic principle that researchers may not inflict death (in this case, of the embryo) for the sake of potential benefit for others.¹⁵

¹⁴ United States Holocaust Memorial Museum, "The Nuremberg Code," *Holocaust Encyclopedia*, accessed April 29, 2026, <https://encyclopedia.ushmm.org/content/en/article/the-nuremberg-code>.

¹⁵ United States Conference of Catholic Bishops, "Ethical Reviews of Embryonic Stem Cell Research," accessed April 29, 2026,

The Declaration of Helsinki later developed international principles for medical research involving human participants; it insisted that the interests and welfare of the subject must prevail over the goals of science and society at large.¹⁶ Catholic engagement with this declaration has continued to the present. In 2024, the Pontifical Academy for Life co-organized a Vatican conference with the World Medical Association and the American Medical Association on the revision of the Declaration of Helsinki (“The Declaration of Helsinki: Research in Resource-Poor Settings”). Pope Francis spoke to the conference, highlighting that the Declaration points to the fundamental issue of informed consent being necessary for freedom of choice in participation in clinical research. He also warned that medicine now operates amid “new technologies and pharmaceutical resources, economic interests, and commercial alliances,” as well as contexts in which “it is easier to instrumentalize others for one’s own purposes.”¹⁷ He concluded that medical care must not be subordinated to the reductive mentalities of the market and technology.¹⁸ Pope Francis’s warning is relevant to the issues arising with reproductive engineering because, in embryo selection, the vulnerable human subject is not an adult research participant who can consent to the genetic testing, clinical recommendation, and consumer (parental) recommendation forced upon it. The danger Pope Francis identified in his return to the

[hviolateBishopsttps://www.usccb.org/issues-and-action/human-life-and-dignity/stem-cell-research/ethical-views-of-embryonic-stem-cell-research](https://www.usccb.org/issues-and-action/human-life-and-dignity/stem-cell-research/ethical-views-of-embryonic-stem-cell-research)

¹⁶ World Medical Association, “WMA Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Participants,” adopted June 1964, last amended October 2024,

<https://www.wma.net/policies-post/wma-declaration-of-helsinki/>.

¹⁷ Francis, “We Cannot Subordinate Care to the Reductive Mentalities of the Market and of Technology,” *L’Osservatore Romano*, January 19, 2024,

<https://www.osservatoreromano.va/en/news/2024-01/ing-004/we-cannot-subordinate-care-to-the-reductive-mentalities-of-the-m.html>

¹⁸ Francis, “Message to the Participants in the International Conference ‘The Declaration of Helsinki: Research in Resource-Poor Settings,’” January 16, 2024, Vatican,

<https://www.vatican.va/content/francesco/en/messages/pont-messages/2024/documents/20240116-messaggio-pav.html>.

Declaration of Helsinki—the subordination of care to technological and market assets—appears when reproductive medicine treats human embryos as data-bearing objects to be screened and selected based on desirability. While some may argue that screening embryos only for disease would benefit the family it is born into or even the broader population, Catholic teaching rejects the notion that dignity can depend on the desirability of the person’s genes, nor can the prevention of disease justify the elimination or rejection of the human being who may carry it.

The post–World War II language of consent and subject protection addressed one form of medical abuse; Catholic teaching had already confronted another: the use of reproductive policy to prevent the birth of those deemed genetically and socially undesirable. In the United States, Virginia's 1924 Eugenic Sterilization Act authorized the sterilization of institutional people diagnosed with "hereditary forms of insanity," "idiocy," "imbecility," or epilepsy, along with those associated with poverty, institutionalization, criminality, or sexual promiscuity.¹⁹ This law was later upheld in *Buck v. Bell*, and authorized the sterilization of institutionalized patients described as having hereditary forms of insanity.²⁰ Carrie Buck was committed to the Virginia State Colony for Epileptics and Feeble-Minded at seventeen years old after being classified as “feeble-minded”-- an archaic term to describe someone with perceived low intelligence or mental deficiencies. Her mother was also institutionalized, and the state treated her infant daughter as evidence of possessing a hereditary defect. The Supreme Court upheld her sterilization in the name of “the health of the patient and the welfare of society,”²¹ showing that

¹⁹ “Chapter 46B of the Code of Virginia, § 1095h–m (1924),” *Encyclopedia Virginia*, accessed April 29, 2026, <https://encyclopediavirginia.org/primary-documents/chapter-46b-of-the-code-of-virginia-%C2%A7-1095h-m-1924/>

²⁰ Elizabeth C. J. Pike, “Buck v. Bell (1927),” *The Embryo Project Encyclopedia*, Arizona State University, June 21, 2012, <https://embryo.asu.edu/pages/buck-v-bell-1927>

²¹ *Buck v. Bell*, 274 U.S. 200 (1927), <https://www.law.cornell.edu/supremecourt/text/274/200>.

medical language can quickly become a tool for eliminating the reproductive abilities of people deemed undesirable. In *Casti Connubii* (1930), Pope Pius XI condemned eugenic efforts such as these that placed the biological improvement of a population above the dignity of the person and the sanctity of the family, criticizing those who sought to use public authority to prevent people considered likely to produce "defective offspring" from marrying.²² The form of reproductive control has changed to parental desires rather than state desires; however, with many reproductive engineering technologies, medicine is still accepting predicted hereditary quality as a standard for determining whose lives should continue.

The relevance of this history to modern-day reproductive engineering is not that embryo selection and similar technologies are identical to Nazi eugenics, coercive experimentation, or compulsory sterilization. The same ethical danger persists because reproductive engineering is similarly beginning to evaluate human life according to desirability. Catholic teaching has consistently resisted this moral dilemma and continued to insist that vulnerable persons must be protected and not eliminated. What once appeared as overt coercion in policy eugenics can now reappear more quietly through clinical recommendation, consumer preference, and the language of genetic risk.

III. Reproductive Engineering and the Commercialization of Embryo Selection

Reproductive engineering gives biomedical science a power distinct from the healing technologies historically associated with medicine. The technical foundation of modern

²² Pius XI, *Casti Connubii*, December 31, 1930, Vatican, https://www.vatican.va/content/pius-xi/en/encyclicals/documents/hf_p-xi_enc_19301231_casti-connubii.htmEmbryos

reproductive engineering is the separation of fertilization from the body. During IVF, mature eggs are retrieved from the ovaries and then fertilized with sperm in a laboratory. The resulting embryos are cultured for several days before one or more are transferred into the uterus.²³ The time the embryo remains in the laboratory makes genetic assessment possible before the pregnancy term begins. According to the American College of Obstetricians and Gynecologists, preimplantation genetic testing refers to genetic assays used to evaluate embryos before transfer to the uterus.²⁴ Thus, embryos created through IVF can be biopsied, genetically tested, compared, and prioritized for implantation according to clinical or parental criteria. IVF treatment creates conditions in which reproduction can become selective.

Preimplantation genetic testing builds directly on the structure laid by IVF. Once embryos exist outside the body, clinicians can remove a small number of cells from each respective embryo and analyze its genetic makeup to decide which embryo to transfer. The forms of PGT used in IVF differ in what they attempt to identify. PGT-A (preimplantation genetic testing for aneuploidy) screens embryos for an abnormal chromosome number, such as an extra copy of chromosome 21 associated with Down syndrome, an extra copy of chromosome 18 associated with Edwards syndrome, or monosomy X associated with Turner syndrome. PGT-M (preimplantation genetic testing for monogenic disorders) is used when parents are known carriers of specific single-gene conditions, such as cystic fibrosis, Huntington disease, and sickle cell disease. PGT-SR (preimplantation genetic testing for structural rearrangements) evaluates

²³ Richard E. Gipson and Joshua O. Usoro, "In Vitro Fertilization," in *StatPearls* (Treasure Island, FL: StatPearls Publishing, updated June 3, 2024), <https://www.ncbi.nlm.nih.gov/books/NBK562266/>

²⁴ American College of Obstetricians and Gynecologists, "Preimplantation Genetic Testing," Committee Opinion No. 799, March 2020, <https://www.acog.org/clinical/clinical-guidance/committee-opinion/articles/2020/03/preimplantation-genetic-testing>.

embryos when a parent carries a chromosomal rearrangement because embryos may inherit unbalanced chromosomal material, as may occur with reciprocal translocation, inversion, deletion, or Robertsonian translocation.²⁵ Catholic teaching has directly criticized this use of embryo testing in *Dignitas Personae*. The document describes preimplantation diagnosis as “the expression of a eugenic mentality” because it “accepts selective abortion to prevent the birth of children affected by various types of anomalies.”²⁶ It further condemns the practice as “shameful and utterly reprehensible” because it measures the value of life within the parameters of normality and physical well-being. The significance of this criticism has only intensified since 2008. If the Church warned that targeted embryo testing could become eugenic when used to exclude embryos with identifiable chromosomal anomalies, then newer forms of polygenic screening and commercial embryo ranking demand renewed attention.

Polygenic embryo screening converts genome-wide variation into a comparative risk estimate. Instead of searching for one mutation known to cause a single disorder, the test analyzes a plethora of genetic variants across the genome and then combines them into a polygenic risk score to estimate relative predisposition to complex conditions. The result is a statistical comparison among embryos in the same IVF cohort to judge the likelihood for each embryo to develop diseases spanning from breast cancer, diabetes, schizophrenia, and heart disease. One of the companies offering this test as a service to prospective parents, Orchid, markets this broader approach as “whole genome screening,” and claims to read more than 99

²⁵ American College of Obstetricians and Gynecologists, “Preimplantation Genetic Testing.”

²⁶ Congregation for the Doctrine of the Faith, *Dignitas developPersonae*.

percent of an embryo's DNA from the same small trophectoderm biopsy used in standard PGT to screen for hundreds of genetic conditions before pregnancy.²⁷

Another player in the market—Nucleus—presents embryo selection through a consumer-facing platform that allows prospective parents to compare embryos across projected height, weight, acne proneness, eye color, and numerous other superfluous characteristics. CEO of Nucleus Kian Sadeghi, in an interview with CBS Mornings, defended this model by framing "genetic optimization" as information rather than eugenics. Sadeghi argues that prospective parents should be able to use genetic data to give their child "the best start to life."²⁸ He compared the desire for selecting embryos for implantation based on traits such as height or intelligence to ordinary human dating preferences, implying that embryo selection merely formalizes the kinds of considerations people already bring to marriage and reproduction. However, preferences in a partner occur between adults; embryo screening translates those preferences into a ranking system over embryonic human life. Calling the process "information" does not change its morality, because the information is gathered for the purpose of deciding which embryo will be transferred and which will not. Nucleus illustrates a consumer-driven form of eugenic reasoning: social ideals about health, intelligence, appearance, and advantage are converted into reproductive selection. Catholic bioethical writers warned of this trajectory before such services became commercially available. A USCCB article from 2004 on genetic enhancement cautioned that, without ethical limits, "market forces alone will forge the course of

²⁷ Orchid, "The Science behind Orchid's Whole Genome Embryo Screening," accessed April 29, 2026, <https://www.orchidhealth.com/science>

²⁸ CBS Mornings, "Extended Interview: Nucleus Genomics CEO Kian Sadeghi," YouTube video, December 3, 2025, <https://www.youtube.com/watch?v=ChC7A-jaT20>.

genetic enhancement,” and described “custom children with made-to-order intelligence, stature, disposition, etc.” as a future danger.²⁹

IV. CRISPR as a Bridge between Reproductive Technology and Catholic Teaching

CRISPR (short for clustered regularly interspaced short palindromic repeats) introduces a different technological possibility from embryo screening. The gene editing technology is a genome–editing system adapted from a bacterial immune mechanism.³⁰ It allows scientists to target and alter specific DNA sequences and guide CRISPR-associated enzymes to particular locations in the genome where they can cut the DNA and allow the sequence to be repaired.³¹ CRISPR-based therapies have moved into clinical medicine and are already approved to treat diseases such as sickle cell disease and beta thalassemia.³² For reproductive engineering, CRISPR raises the possibility of directly treating a genetic defect in the person who carries it. CRISPR complicates the moral analysis of reproductive engineering because it raises the possibility of treating genetic disease in the same developing child rather than preventing that child’s birth through embryo selection. Catholic teaching should not reject such a possibility because it seeks to heal the person who bears the disease, not eliminate or redesign the person.

²⁹ United States Conference of Catholic Bishops, “Genetic Enhancement: Custom Kids and Chimeras,” accessed April 29, 2026, <https://www.usccb.org/prolife/genetic-enhancement-custom-kids-and-chimeras>.

³⁰ MedlinePlus, “What Are Genome Editing and CRISPR-Cas9?,” National Library of Medicine, accessed April 29, 2026, <https://medlineplus.gov/genetics/understanding/genomicresearch/genomeediting/>.

³¹ Stanford University, “Stanford Explainer: CRISPR, Gene Editing, and Beyond,” *Stanford Report*, June 20, 2024, <https://news.stanford.edu/stories/2024/06/stanford-explainer-crispr-gene-editing-and-beyond>.

³² U.S. Food and Drug Administration, “FDA Approves First Gene Therapies to Treat Patients with Sickle Cell Disease,” December 8, 2023, <https://www.fda.gov/news-events/press-announcements/fda-approves-first-gene-therapies-treat-patients-sickle-cell-disease>

Rossidis et al. argue that in-utero gene editing has the potential to treat genetic diseases that cause serious illness or death before or shortly after birth. In their 2018 animal study, they used CRISPR-Cas9 and base-editing approaches in fetal mice to target metabolic disease.³³ This research is most relevant to the kinds of conditions currently addressed through PGT-M. Instead of selecting against embryos that carry monogenic disorders, in-utero gene editing imagines the possibility for parents to learn of a genetic condition through prenatal diagnosis, such as chorionic villus sampling or amniocentesis, and a future therapy could be delivered to the naturally conceived embryo during pregnancy. The intervention would aim to treat the same developing child rather than avoid the child's birth through embryo selection. Unlike embryo selection, this pathway would not require creating and discarding unused embryos judged to be genetically undesirable. This distinction is central to Catholic thought on bioethics. *Donum Vitae* teaches that therapeutic procedures on the human embryo can be licit when they respect the embryo's life and integrity, while avoiding disproportionate risk and are directed toward healing, improving health, or individual survival.³⁴ A future in-utero CRISPR therapy could therefore be morally distinguishable from PGT-M selection if it treated a serious disease in an already-existing child without imposing disproportionate risk.

Dignitas Personae clarifies the Catholic distinction that would govern such a future therapy. The document explains that gene therapy may be considered on two levels: 1) somatic

³³ Alan C. Rossidis et al., "In Utero CRISPR-Mediated Therapeutic Editing of Metabolic Genes," *Nature Medicine* 24, no. 10 (2018): 1513–18, <https://pmc.ncbi.nlm.nih.gov/articles/PMC6249685/>

³⁴ Congregation for the Doctrine of the Faith, *Donum Vitae: Instruction on Respect for Human Life in Its Origin and on the Dignity of Procreation* (Vatican City, February 22, 1987), https://www.vatican.va/roman_curia/congregations/cfaith/documents/rc_con_cfaith_doc_19870222_respect-for-human-life_en.html.

cell therapy, 2) germline cell therapy.³⁵ Somatic gene therapy seeks to reduce or eliminate defects in the body cells of an individual patient, with effects limited to that person. Germline therapy, by contrast, alters reproductive cells in ways that may be transmitted to future descendants of that person. Germline therapy receives a different moral evaluation from that discussed for somatic gene therapy, because its risks would be inherited by future generations and are not yet adequately controllable. Cardinal William Levada summarized that somatic gene therapy that was strictly aimed at reducing defects in an individual person is morally legitimate in principle, but germline therapy is not morally permissible under current conditions.³⁶

Catholic limits on reproductive engineering correspond to the current scientific limits of CRISPR. In-utero editing is far less straightforward for conditions identified by PGT-A (Down syndrome, Edwards syndrome, Turner syndrome) because these involve missing or extra chromosomes rather than a single repairable mutation. Early research has begun to explore whether CRISPR-based methods could someday address trisomy 21 at the cellular level, including work on allele-specific CRISPR-Cas9 chromosome cleavage in trisomy 21 cells.³⁷ However, this work is likely to remain purely experimental rather than clinically available in fetal therapy for a considerable time. CRISPR is also not a simple response to PGT-SR conditions nor to polygenic traits that Nucleus and Orchid screen for, which are shaped by many genes and environmental conditions. These limits prevent CRISPR from becoming a justification for “designer-baby” logic. Treating a serious disease in an already-existing child belongs to a different category of thought than editing embryos for preferred aesthetic traits.

³⁵ Congregation for the Doctrine of the Faith, *Dignitas developPersonae*.

³⁶ Congregation for the Doctrine of the Faith, *Dignitas developPersonae*.

³⁷ Ryotaro Hashizume et al., “Allele-Specific CRISPR-Cas9 Cleavage of Chromosome 21 in Trisomy 21 Cells,” *PNAS Nexus* 4, no. 2 (2025): pgaf022, <https://doi.org/10.1093/pnasnexus/pgaf022>

Catholic thought does not require biomedical engineering to accept genetic disease as inevitable. The teaching permits the possibility of treating disease in the person who bears it, but rejects the pursuit of eliminating disease through the discarding of embryos. A future in-utero CRISPR therapy could be morally permissible in the eyes of the Church if it remained truly therapeutic, somatic, and ordered toward the health of the same child already in existence. Such a therapy would seek to heal rather than select. This possibility would preserve the identity of biomedical engineering as a discipline ordered toward care, while avoiding the eugenic logic evident elsewhere in the field. Catholic bioethics offers biomedical engineering a coherent standard to cure disease when possible, but never to make the worth of a person depend upon the absence of disease.

Bibliography

American College of Obstetricians and Gynecologists. “Preimplantation Genetic Testing.” Committee Opinion No. 799. March 2020.
<https://www.acog.org/clinical/clinical-guidance/committee-opinion/articles/2020/03/preimplantation-genetic-testing>.

Breen, John O. “Health in Need of Healing: Church History as a Road Map for Reforming Catholic Health Care.” *The Linacre Quarterly* 87, no. 4 (2020): 377–87.
<https://pmc.ncbi.nlm.nih.gov/articles/PMC7551538/>.

Buck v. Bell, 274 U.S. 200 (1927). <https://www.law.cornell.edu/supremecourt/text/274/200>.

Capalbo, Antonio, et al. “Screening Embryos for Polygenic Disease Risk: A Review.” *Human Reproduction Update* 30, no. 5 (2024): 529–49. <https://doi.org/10.1093/humupd/dmae012>.

CBS Mornings. “Extended Interview: Nucleus Genomics CEO Kian Sadeghi.” YouTube video, December 3, 2025. <https://www.youtube.com/watch?v=ChC7A-jaT20>.

CBS News. “Nucleus Genomics CEO Explains How ‘Genetic Optimization’ Tools Help Parents Select Traits in Babies.” *CBS News*. Accessed April 29, 2026.
<https://www.cbsnews.com/news/nucleus-genomics-ceo-genetic-optimization-tools-parents-select-traits-babies/>.

“Chapter 46B of the Code of Virginia, § 1095h–m (1924).” *Encyclopedia Virginia*. Accessed April 29, 2026.
<https://encyclopediavirginia.org/primary-documents/chapter-46b-of-the-code-of-virginia-%C2%A7-1095h-m-1924/>.

Congregation for the Doctrine of the Faith. *Dignitas Personae: On Certain Bioethical Questions*. Vatican City, December 8, 2008.
https://www.vatican.va/roman_curia/congregations/cfaith/documents/rc_con_cfaith_doc_20081208_dignitas-personae_en.html.

Congregation for the Doctrine of the Faith. *Donum Vitae: Instruction on Respect for Human Life in Its Origin and on the Dignity of Procreation*. Vatican City, February 22, 1987.
https://www.vatican.va/roman_curia/congregations/cfaith/documents/rc_con_cfaith_doc_19870222_respect-for-human-life_en.html.

European Society of Human Reproduction and Embryology. “ART Fact Sheet.” Accessed April 29, 2026.
https://www.eshre.eu/-/media/sitecore-files/Press-room/ESHRE_ARTFactSheet_v10_2025.pdf.

Francis. “Message to the Participants in the International Conference ‘The Declaration of Helsinki: Research in Resource-Poor Settings.’” Vatican, January 16, 2024.

<https://www.vatican.va/content/francesco/en/messages/pont-messages/2024/documents/20240116-messaggio-pav.html>.

Francis. “We Cannot Subordinate Care to the Reductive Mentalities of the Market and of Technology.” *L’Osservatore Romano*, January 19, 2024.

<https://www.osservatoreromano.va/en/news/2024-01/ing-004/we-cannot-subordinate-care-to-the-reductive-mentalities-of-the-m.html>.

Gipson, Richard E., and Joshua O. Usoro. “In Vitro Fertilization.” In *StatPearls*. Treasure Island, FL: StatPearls Publishing. Updated June 3, 2024.

<https://www.ncbi.nlm.nih.gov/books/NBK562266/>.

Hashizume, Ryotaro, et al. “Allele-Specific CRISPR-Cas9 Cleavage of Chromosome 21 in Trisomy 21 Cells.” *PNAS Nexus* 4, no. 2 (2025): pgaf022.

<https://doi.org/10.1093/pnasnexus/pgaf022>.

MedlinePlus. “What Are Genome Editing and CRISPR-Cas9?” National Library of Medicine. Accessed April 29, 2026.

<https://medlineplus.gov/genetics/understanding/genomicresearch/genomeediting/>.

National Academies of Sciences, Engineering, and Medicine. *Human Genome Editing: Science, Ethics, and Governance*. Washington, DC: National Academies Press, 2017.

<https://doi.org/10.17226/24623>.

Nucleus Genomics. “The Science behind Nucleus Embryo.” Accessed April 29, 2026.

<https://mynucleus.com/deep-dives/embryo>.

Nuffield Council on Bioethics. *Genome Editing and Human Reproduction: Social and Ethical Issues*. London: Nuffield Council on Bioethics, 2018.

<https://www.nuffieldbioethics.org/publication/genome-editing-and-human-reproduction-social-and-ethical-issues/>.

Orchid. “The Science behind Orchid’s Whole Genome Embryo Screening.” Accessed April 29, 2026. <https://www.orchidhealth.com/science>.

Pike, Elizabeth C. J. “*Buck v. Bell* (1927).” *The Embryo Project Encyclopedia*. Arizona State University, June 21, 2012. <https://embryo.asu.edu/pages/buck-v-bell-1927>.

Pius XI. *Casti Connubii*. Vatican, December 31, 1930.

https://www.vatican.va/content/pius-xi/en/encyclicals/documents/hf_p-xi_enc_19301231_casti-connubii.html.

“Reconstructing the World’s First Hospital: The Basiliad.” *Hektoen International*, February 24, 2017. <https://hekint.org/2017/02/24/reconstructing-the-worlds-first-hospital-the-basiliad/>.

Rossidis, Alan C., et al. "In Utero CRISPR-Mediated Therapeutic Editing of Metabolic Genes." *Nature Medicine* 24, no. 10 (2018): 1513–18.

<https://pmc.ncbi.nlm.nih.gov/articles/PMC6249685/>.

Stanford University. "Stanford Explainer: CRISPR, Gene Editing, and Beyond." *Stanford Report*, June 20, 2024.

<https://news.stanford.edu/stories/2024/06/stanford-explainer-crispr-gene-editing-and-beyond>.

Takeuchi, Kenichiro. "Pre-implantation Genetic Testing: Past, Present, Future." *Reproductive Medicine and Biology* 20, no. 1 (2020): 27–40.

<https://pmc.ncbi.nlm.nih.gov/articles/PMC7812490/>.

United States Conference of Catholic Bishops. "Ethical Reviews of Embryonic Stem Cell Research." Accessed April 29, 2026.

<https://www.usccb.org/issues-and-action/human-life-and-dignity/stem-cell-research/ethical-reviews-of-embryonic-stem-cell-research>.

United States Conference of Catholic Bishops. "Genetic Enhancement: Custom Kids and Chimeras." Accessed April 29, 2026.

<https://www.usccb.org/prolife/genetic-enhancement-custom-kids-and-chimeras>.

United States Food and Drug Administration. "FDA Approves First Gene Therapies to Treat Patients with Sickle Cell Disease." December 8, 2023.

<https://www.fda.gov/news-events/press-announcements/fda-approves-first-gene-therapies-treat-patients-sickle-cell-disease>.

United States Holocaust Memorial Museum. "Euthanasia Program." *Holocaust Encyclopedia*.

Accessed April 29, 2026. <https://encyclopedia.ushmm.org/content/en/article/euthanasia-program>.

United States Holocaust Memorial Museum. "German Bishop Condemns the Killing of People with Disabilities." *History Unfolded: U.S. Newspapers and the Holocaust*. Accessed April 29, 2026.

<https://newspapers.ushmm.org/events/german-bishop-condemns-the-killing-of-people-with-disabilities>.

United States Holocaust Memorial Museum. "The Nuremberg Code." *Holocaust Encyclopedia*. Accessed April 29, 2026.

<https://encyclopedia.ushmm.org/content/en/article/the-nuremberg-code>.

Vatican Council II. *Pastoral Constitution on the Church in the Modern World: Gaudium et Spes*. Washington, DC: National Catholic Welfare Conference, 1966.

<https://distantreader.org/stacks/pamphlets/pdf/005195688.pdf>.

World Medical Association. "WMA Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Participants." Adopted June 1964. Last amended October 2024. <https://www.wma.net/policies-post/wma-declaration-of-helsinki/>.