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CRISPR and intelligence enhancement: science, limits and ethics

A deep dive into whether gene editing could make people smarter: how CRISPR, base and prime editing work, what genetics really says about intelligence, why embryo editing for IQ is not feasible today, and the ethical lines involved.

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A deep dive into whether gene editing could make people smarter: how CRISPR, base and prime editing work, what genetics really says about intelligence, why embryo editing for IQ is not feasible today, and the ethical lines involved.

2012	Dec 2023	Thousands	2018
CRISPR-Cas9 editing described	first CRISPR therapy approved (FDA)	of variants linked to cognitive traits	first gene-edited babies (condemned)

Key takeaways

- CRISPR is already medicine: Casgevy, approved by the FDA in December 2023, treats sickle cell disease, and personalized base editing saved an infant in 2025.
- Intelligence is highly polygenic: thousands of variants each have tiny effects, and environment matters enormously.
- Editing embryos to raise intelligence is not feasible today: too many sites, unclear causal variants, pleiotropy, and safety risks.
- Polygenic embryo screening (choosing, not editing) is already sold commercially and is drawing growing ethical criticism; modeled gains are small.
- The responsible near-term goal is treating disease, including brain disease, not designing 'smarter' children.

How gene editing works

- **CRISPR-Cas9 (2012):** a guide RNA leads the Cas9 enzyme to a matching DNA sequence, where it cuts both strands; the cell's repair process then disrupts or rewrites the gene. Jennifer Doudna and Emmanuelle Charpentier received the 2020 Nobel Prize in Chemistry for it.
- **Base editing (2016):** changes a single DNA letter without a double-strand break, reducing unintended damage.
- **Prime editing (2019):** "search and replace" editing that can make small insertions, deletions and substitutions.
- **Somatic vs. germline:** somatic edits affect only the treated person; germline edits (in embryos, eggs or sperm) are inherited by future generations.

CRISPR as medicine today

- **Casgevy:** the FDA approved the first CRISPR-based therapy for sickle cell disease in December 2023 [1].
- **Personalized editing:** in 2025, an infant with a rare metabolic disorder received a base-editing therapy designed for his specific mutation, published in NEJM.
- **Pipeline:** trials target inherited blindness, high cholesterol, rare liver diseases and more.

What genetics says about intelligence

- **Heritability:** twin studies estimate that roughly half of the variation in adult cognitive test scores is associated with genetic differences, within the populations studied, but heritability is not destiny and doesn't describe individuals.
- **Polygenicity:** large genome-wide studies have linked thousands of genetic variants to cognitive ability and educational attainment, each with a tiny effect.
- **Prediction is weak:** polygenic scores explain only a modest share of differences between people, and much less within families.
- **Pleiotropy:** the same variants affect other traits, including some psychiatric risks; selecting for one can change others [2].

Why editing for IQ isn't feasible

1. **Too many targets:** meaningful change would need edits at hundreds or thousands of sites; today's tools are tested on one or a few.
2. **Unknown causality:** most associated variants are markers near the true causal ones.
3. **Safety:** each edit risks off-target changes and mosaicism (only some cells edited), a serious risk in an embryo.
4. **Context:** effects depend on ancestry, environment and other genes; results from one population don't transfer cleanly.

A 2025 Nature analysis modeled heritable polygenic editing and found large *theoretical* effects on disease risk, while stressing the approach is speculative and raises eugenics and inequality concerns [3].

What is happening instead

- **Polygenic embryo screening:** during IVF, companies score embryos' genomes and parents choose among them. Modeling suggests the expected gain in cognitive scores is small, and critics argue it can produce eugenic outcomes with less regulatory attention than editing [2][4].
- **Germline editing:** prohibited or heavily restricted in most countries since He Jiankui's 2018 gene-edited twins, which were widely condemned and led to his imprisonment. In 2026, commentary noted falling technical barriers and new startups, with ethical scrutiny rising in response [4].

How it could change life

Responsibly, the biggest impact on human minds will come from **treating brain disease**: inherited neurodevelopmental disorders, and lowering risk for conditions such as Alzheimer's. Gene therapies that keep brains healthy for longer are far more realistic than gene edits that make healthy brains "smarter".

Future scenarios

2027–2030	2030s	2040	Long term
More somatic CRISPR, base and prime editing therapies approved; costs start falling.	Regulation of embryo screening tightens; international debate on any germline use for disease.	Possible narrowly defined germline use to prevent severe single-gene disease, if ever permitted.	Cognitive enhancement by editing remains scientifically uncertain and ethically contested.

- **Optimistic:** gene editing cures many inherited diseases affordably worldwide.

- **Base case:** steady therapeutic progress; enhancement stays off-limits.
- **Pessimistic:** unregulated "enhancement" markets emerge in permissive jurisdictions, deepening inequality.

Ethics

- **Consent:** future people can't consent to germline changes.
- **Eugenics:** history shows how "improving" populations leads to discrimination and harm.
- **Inequality:** enhancement available only to the wealthy could entrench advantage across generations.
- **Diversity:** traits linked to cognitive variation also connect to creativity and neurodiversity; "optimizing" is not neutral.

What to watch

- New somatic gene-editing approvals and prices.
- Regulation of polygenic embryo screening.
- International summits and national laws on heritable editing.
- Peer-reviewed evidence (not marketing) from embryo-screening companies.

My take

I'm excited about CRISPR as medicine and skeptical of it as an IQ upgrade. Intelligence grows from health, nutrition, education, relationships and good tools. If we want smarter societies, the highest-return investments are still schools, healthcare, and AI that helps everyone learn and think.

Key players & programs

Casgevy (Vertex / CRISPR Therapeutics)	First approved CRISPR therapy, sickle cell disease (2023) [1]
Embryo-screening companies	Polygenic screening during IVF; ethically contested [2]
Germline-editing startups (2025–26)	Under rising ethical scrutiny [4]
International summits and WHO	Governance frameworks for human genome editing

Frequently asked questions

Can CRISPR make people smarter?
Not with today's science. Intelligence involves thousands of genetic variants with tiny effects plus strong environmental influence, and editing many sites in an embryo safely is not possible.

What is CRISPR used for today?
Treating disease. The FDA approved Casgevy for sickle cell disease in December 2023, and personalized base editing treated an infant with a rare metabolic disorder in 2025.

What is polygenic embryo screening?
Scoring IVF embryos' genomes for many traits and choosing among them. It is sold commercially, but modeled gains are small and it is ethically controversial.

Is editing human embryos legal?
Heritable human genome editing is prohibited or heavily restricted in most countries, especially since the 2018 gene-edited twins case.

Glossary

Polygenic: Influenced by many genes, each with a small effect.

Germline editing: Editing embryos, eggs or sperm so changes are inherited.

Pleiotropy: When one gene or variant affects several different traits.

Mosaicism: When only some of an organism's cells carry an edit.

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