

GET Questions Expanded Refinement (V1)

H559

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This documents contains the first iteration of refinement on the full list of questions that the author intends in the Genetic Evolution Tournament.

The original header on the first batch of questions:

This document contains the full question titles of a questions that the author intends to include in the Genetic Evolution Tournament. The author include some questions on neural implants / brain-computer inferences and has also shifted away from an exceedingly detailed approach on certain questions to one of broader scope. There is still room for improvement in this regard, though. There are many more questions than the 148 listed, if one sums by question group. There are 29 instances of [OECD Nations] and 102 instances of [2030, 2040]. Since there are 38 member nations of OECD (a lot to gather data for!), this means there are at least (some date questions are not covered by the Command-F search for [2030, 2040]) $(29 \cdot 38) + (3 \cdot 102) = 1102 + 306 = 1408$ questions. The author proposes possibly using the top 10 most populous OECD nations or, alternatively, the 10 with the highest GDP, even though this paints a smaller picture of the world.

1 Justification For OECD Nations

How to choose which of the 38 OECD nations. Top 5 by GDP. Then take another 5 at random.

2 Feedback On Question Batch By Colleague

I think selecting just one would be best when possible (binary / continuous version). Nice Qs from your DMs and great work with the overall comprehensiveness of the questions.

Here are a few specific comment for several questions.

14 - Costs can be quite variable depending on the modifications so this could be underspecified
18 - I think there are too many here as finding out about the lawsuits will be difficult

in itself 26 - This goes to 2075 but 21 and 23 only go to 2050
45 - Compared to baseline, right? 48 - How is enhancement defined here? 104 - Hard to answer

How about questions on:

- ✧ Genetic tourism - people will travel for treatments
- ✧ Pushback - there are questions on public approval but how about ones on religious decrees or mass movements
- ✧ Spread of new traits through populations? e.g. people born to genetically modified parents who themselves received no interventions
- ✧ Changes in regulations in sports? Old records exceeded by various multiples?

3 Forgotten External Questions

From LW user GeneSmith:

- ✧ When will the first stem cell derived oocyte be used for human reproduction?
- ✧ What will the maximum feasible IQ gain from any genetic alteration be by 2035?
- ✧ Will super-SOX allow the creation of new primates from stem cells?
- ✧ What percentage of variance will be explained by the best available IQ predictors by 2028 (or 2030 or whatever)
- ✧ By what date will there be at least ten IVF clinics with a hundred or more annual births that recommends polygenic embryo screening to some portion of parents as part of their official policy?
- ✧ By what date will polygenic embryo screening be officially encouraged by at least one national government?
- ✧ By what date will germline gene editing for non-disease traits be explicitly legalized by at least one country?
- ✧ How many states will require insurance to cover IVF by 2030?

4 Workshop Questions

Pending. See a table.

5 Some New Questions

1. How many births per year in the United States will result from “genetic tourism” [2030, 2040, 2050]?
2. What percentage of prospective parents in OECD nations will report having traveled (or plan to travel) internationally for gene editing or advanced reproductive services? [2040, 2050, 2075]
3. How many major “religious decrees” (not sure what to use here) will explicitly prohibit or discourage germline genetic modifications for humans? [2030, 2040, 2050]
4. How many large-scale protests or mass social movements (at least 50000 participants) will form in the US or EU specifically to oppose emerging genetic enhancement technologies?[2030, 2040, 2050]
5. What percentage of genetically modified newborns in OECD nations will have at least one parent who was themselves genetically modified (i.e., a second-generation genetically modified birth)? [2030, 2040, 2050, 2075]
6. What fraction of the total population in OECD nations under the age of 10 will carry inherited modifications (from parents’ edited germlines) that were not performed on the child itself? [2030, 2040, 2050, 2075]
7. How many international sports federations will have adopted formal rules banning or restricting athletes with genetically engineered enhancements from competing? [2030, 2040, 2050, 2075]
8. How many world records will be exceeded by athletes who are publicly confirmed to have undergone genetic enhancements? [2030, 2040, 2050, 2075]
9. When will the first verified birth from a stem cell–derived oocyte occur worldwide?
10. What will be the maximum feasible IQ gain from any single genetic alteration in the following years? [2030, 2040, 2050, 2075]
11. Will the use of super-SOX enable the creation of new non-human primates entirely from stem cells by 2030?

12. What percentage of variance in measured intelligence will be predicted by the best available polygenic IQ predictors in the following years? [2030, 2040, 2050]
13. By what date will polygenic embryo screening be officially encouraged (or incentivized) by at least one national government?
14. By what date will germline gene editing for non-disease traits be explicitly legalized by at least one country?
15. How many US states will require insurance to cover IVF by the following years? [2030, 2040]?

6 o1 Feedback Batch 02

Repeated Questions About Percentages of Genetically Modified or Screened Births

- ✧ Questions #1–5 ask for “What percentage of these nations’ populations will be born polygenically screened” in 2030, 2040, 2050, 2075, 2100.
- ✧ Questions #53–55 also ask “What percentage of births in the following nations will incorporate some form of genetic screening by 2030, 2040, 2050?”
- ✧ Question #27 asks “What percentages of newborns will be born using polygenic screening in the USA in [2030, 2040, 2050, 2075, 2100]?”

You have multiple sets that effectively ask the same thing (“What fraction of births undergo polygenic screening?”) but in slightly different wording or focusing on slightly different sub-populations (OECD vs. USA).

Suggestions

- ✧ Consolidate these into fewer, clearer questions. For instance:
 - One question for OECD: “By year X (2030, 2040, 2050, 2075, 2100), what percentage of all births in OECD nations undergo polygenic screening?”
 - One question for the USA: “By year X, what percentage of all births in the US undergo polygenic screening?”

- ✧ Ensure consistent phrasing:
 - “What percentage of births in year X are polygenically screened?” is usually clearer than “What percentage of these nations’ populations will be born polygenically screened?” (which can be misread).

Overlapping “Genetic Modification” Questions

- ✧ Questions #6–10 ask for percentages of the population “born genetically modified” in 2030, 2040, 2050, 2075, 2100 (OECD).
- ✧ Questions #19–23, #24–26 ask different thresholds of genetic modification (≥ 1000 newborns? $\geq 1,000,000$ newborns? Over 10% of births?) in similar time frames.
- ✧ Questions #28, #57–60, #109 also address the fraction of births that are genetically modified, in the USA, OECD, or for non-medical traits.

You have at least five different ways of measuring how many births are genetically modified:

- ✧ Exact percentage (#6–10, #28, #57–60, #109).
- ✧ Whether a certain numerical threshold (1,000 or 1,000,000 births) is reached (#19–23).
- ✧ Whether a certain percentage threshold (10%) is reached (#24–26).
- ✧ Differences between medical vs. non-medical modifications.
- ✧ Differences between USA vs. OECD coverage.

Suggestions

- ✧ If you want both numerical thresholds and percentages, merge them in a single question set:
 - For example, “In year X, do these nations surpass (a) 1,000 births, (b) 1,000,000 births, and (c) 10% of births for genetic modification?”
- ✧ Combine the “percentage of births” queries for medical vs. non-medical traits into a single two-part question or make it explicit:
 - “What percentage of births in OECD nations involve genetic modifications for (a) medical indications vs. (b) elective/non-medical traits by year X?”

Cost Questions Overlap

- ✧ Question #13: average cost (in 2020 USD) of IVF in the US in future years.
- ✧ Question #14: average cost (in 2020 USD) of genetic modification services in the US in future years.
- ✧ Question #56: average out-of-pocket expense for “genetic enhancement procedures” in the US in future years.
- ✧ Question #105: average cost (in 2020 USD) per neural implant procedure in the US.
- ✧ Question #113: average cost (in 2020 USD) of a gene therapy treatment in the US.

Each refers to a different but overlapping set of procedures (IVF vs. genetic modification vs. gene therapy vs. neural implants). However, some of these might be conflated under “genetic enhancement procedures,” and “average cost” vs. “out-of-pocket” may also overlap or conflict. Suggestions

- ✧ Separate them cleanly if you truly want cost estimates for each category (IVF, gene therapy, neural implants, etc.), but clearly define each category.
- ✧ If “genetic modification services” and “gene therapy” are intended to be distinct, specify what is included in each so forecasters don’t confuse them.
- ✧ Merge or cross-reference “average cost” vs. “out-of-pocket.” You could specify:
 - “List the average total cost and the out-of-pocket expense for a gene therapy in the US by year X.”

Multiple Market/Industry Size Questions

- ✧ Question #90: total market cap (genetic enhancement) in OECD.
- ✧ Question #91: total market cap (polygenic screening) in OECD.
- ✧ Question #92–94: share of GDP from these industries.
- ✧ Question #95: average market cap of US companies offering prenatal genetic modification.
- ✧ Question #99: how many US companies exceed USD 1B in revenue.
- ✧ Question #100: total VC investment (genetic engineer-

ing R&D) in OECD.

- ✧ Question #110, #111, #141, #146, #147...: many more about R&D, revenue, budgets, or investment.

You have a large set of industry- or market-focused questions that could be partially combined or streamlined. Suggestions

Group them into one or two main sections, for example:

- ✧ Total Market Size and Investment
 - “What will be the total market cap (in 2020 USD) of [genetic enhancement / gene therapy / neural implants] across OECD by year X?”
 - “What will be total annual VC investment in these fields by year X?”
- ✧ Share of GDP / Healthcare Budgets
 - “What percentage of OECD GDP (or healthcare budgets) will these fields represent by year X?”
- ✧ Number of Large Companies
 - “How many companies in [the US / OECD] will exceed USD 1B in annual revenue from these fields by year X?”

Clinical Trials / Studies Questions

- ✧ Questions #67–88: how many clinical trials will be underway for genetic enhancements (each trait listed) in OECD in future years.
- ✧ Similarly #78–88 specifically about polygenic screening for different traits.
- ✧ Questions #49, #50: how many demographic studies on genetic engineering or polygenic screening.
- ✧ Questions #65, #66: how many studies in the US on effects on cognitive abilities.
- ✧ Question #139: what percentage of global gene therapy research publications come from OECD?

You have extensive duplication of “How many clinical trials for X trait by Y year?” repeated for many traits (strength, longevity, intelligence, etc.), plus multiple questions about publications, demographic studies, or research share. Suggestions

- ✧ Consolidate the trait-specific questions (#67–88) into a smaller table or matrix:

- “In 2030 / 2040 / 2050 / 2075, how many clinical trials (or at which phase) will be underway in OECD nations for: intelligence, cardiovascular health, disease resistance, etc.?”
- ✧ For “studies” or “publications,” consider merging into one question about research volume:
 - “How many peer-reviewed studies or demographic analyses on genetic enhancements (for any trait) will be published by year X?”
 - Or maintain separate categories (clinical trials vs. academic studies vs. demographic studies) but avoid duplicating the same question for 10–15 different traits.

Overlapping Insurance Coverage and Regulatory Bodies

- ✧ Questions #29–31 and #48, #135: how many insurers in the US will cover certain enhancements by year X?
- ✧ Questions #34–35: how many regulatory bodies will be established by 2050 or 2075?
- ✧ Question #18: how many lawsuits...?
- ✧ Questions #36–37, #61–63: adoption rates among various US demographics.

All revolve around infrastructure: coverage, regulation, lawsuits, adoption rates. But they sometimes overlap or might be partially answered by the same data. Suggestions

- ✧ Combine coverage questions into a single suite, e.g.:
 - “How many US insurance agencies (or what % of the market) will cover polygenic screening / gene therapy / etc. by year X?”
 - Distinguish “intelligence” vs. “depression” coverage only if that difference is crucial.
- ✧ For regulatory bodies (#34, #35), you might merge or clarify:
 - “How many new national-level regulatory agencies or frameworks for prenatal genetic engineering will exist in OECD countries by year X?”
- ✧ If the lawsuit question (#18) is essential, keep it. But be sure forecasters understand the difference between “how many lawsuits” and “what fraction of providers are legally challenged.”

Trait-Improvement and “Conditional” Questions

- ✧ Question #15: “Conditional on adoption, how will [trait] measurements change by year X in these nations?”

- ✧ Question #16: “How much more intelligent will those screened for intelligence be?”
- ✧ Question #17: “How much less depressed...?”

These are fairly overlapping. #15 is already an umbrella question about changes in a large set of traits (intelligence, longevity, height, etc.). #16 and #17 are just narrower versions for intelligence/depression. Suggestions

- ✧ Either keep #15 as your “umbrella trait-change question” and eliminate #16 and #17 to avoid duplication, or keep #16 and #17 as stand-alone but remove them from #15’s trait list.
- ✧ Consider combining them into a single matrix: “By year X, how do we estimate the improvement or reduction in [list of traits] for those who underwent [polygenic screening or genetic modification]?”

Clarify Terminology and Scope

A recurring issue is that different terms—“genetic enhancement,” “gene therapy,” “genetic engineering,” “genetic modification,” “polygenic screening,” “prenatal genetic modification,” “IVF plus screening,” etc.—are sometimes used interchangeably or are partially overlapping. Forecasters need clear definitions:

- ✧ Polygenic Screening: Typically selecting among embryos (via IVF) based on polygenic scores; no direct “edit,” only selection.
- ✧ Genetic Modification / Engineering: Directly editing the genome (via CRISPR, base editing, etc.).
- ✧ Gene Therapy: Often refers to postnatal or in-utero therapies, typically for disease correction rather than embryo selection or modification.
- ✧ Neural Implant: Hardware or bioelectronic device that interfaces with the brain; quite different from gene editing.

Recommendation: Provide a short “Definitions” section at the start of your tournament so that every question referencing “genetic modification” or “gene therapy” is interpreted consistently.

Timeframes and Consistency

You often use 2030, 2040, 2050, 2075, 2100 as key years. Some questions omit certain years or add extra (e.g., 2020, 2025). Verify that you want all those time points for each question. Fewer time intervals can reduce

complexity and keep the tournament more manageable.

Overall Recommendations

- ✧ Combine or streamline highly similar questions.
- ✧ Ensure consistent phrasing (“% of births” vs. “% of population,” “in year X” vs. “by year X”).
- ✧ Add a definitions/assumptions page for key terms.
- ✧ Stick to the most decision-critical questions if 148 questions is too large.
- ✧ Consider grouping by topic (e.g., “Adoption and Prevalence,” “Costs,” “Insurance & Regulation,” “Market & Industry,” “Clinical Trials & Research,” “Trait Improvements,” etc.) to give forecasters a logical flow.

By removing redundancies and clarifying each metric (percentage, absolute number, threshold, etc.), you will make the tournament more approachable and ensure that forecasts are precise, well-defined, and non-overlapping.

7 o1 Feedback Batch 01

Watch Out for Overlapping or Nested Questions

- ✧ Questions like “Will these nations have over 1000 genetically modified newborns by year X?” and “What percentage of newborns will be genetically modified by year X?” are partially redundant. Perhaps decide which style of question (absolute number vs. percentage) is more important.

“Genetically modified,” “polygenically screened,” “genetic enhancement,” “gene therapy,” and “elective genetic modifications” may each have overlapping or ambiguous technical meanings. To improve data consistency and interpretability:

- ✧ Briefly clarify whether “genetically modified” includes CRISPR-based somatic changes vs. germline changes.
- ✧ Distinguish “polygenic screening” from “selecting among embryos” vs. “editing embryo DNA.”

Combine Similar Questions

- ✧ There's a lot of overlap around "How many clinical trials...for trait X in OECD nations" from #67 to #88. You could unify them into a smaller set:
 - "How many clinical trials will be underway for [list of traits]?"
 - Or a single question table: Rows = years, Columns = traits.
- ✧ Likewise, the repeated questions about "percentage of births with genetic screening" vs. "percentage of births with genetic modifications" could be merged into fewer, broader questions.

Several questions cover the usage of these technologies for clearly medical targets (e.g., inherited diseases) versus enhancement traits (intelligence, strength, etc.). It might help to separate them into two question blocks, so the medical vs. enhancement discussion stays focused and consistent within each category.

If your goal is to forecast and scenario-plan overall human genetic and reproductive tech adoption, you might question whether you need quite so many granular questions about every single inherited disease (cystic fibrosis, hemophilia, etc.). Instead, you could:

- ✧ Combine them in a single question block: "What percentage reduction in monogenic disorders is expected in OECD nations?" or "How many inherited diseases will have widely accessible gene therapy in place by X year?"

Focus vs. Redundancy

- ✧ If the key story you're telling is about the widespread adoption and economic/societal impact of gene editing vs. polygenic screening, many of the "detailed trait" questions might be folded into a smaller set (e.g., "Top 3 prevalent single-gene disorders," "Top 3 widely attempted enhancements").
- ✧ Too many granular items can fatigue participants and might not yield much incremental insight, especially if they're forecasting the same underlying phenomenon (like "number of gene therapy trials" repeated 10 times).

Key Decision

Ultimately, ask yourself: “Are we trying to deeply map every possible angle on gene therapies and screening, or do we just need enough coverage to feed a few robust future scenarios?” If you want participants to form a cohesive big-picture scenario, you could:

- ✧ Trim repetitive lines about each single disorder or each single trait.
- ✧ Use aggregated questions that still capture the difference between, say, medical disease correction and enhancement.
- ✧ Keep a smaller set of big-impact diseases or traits (like cystic fibrosis, Huntington’s, or intelligence, longevity) if they’re truly pivotal to your scenario.

In short, there’s no universal “too much,” but the current set could feel lopsided. If your ultimate aim is scenario-based insight, some consolidation of genetic engineering vs. polygenic screening would keep the survey more efficient and let you address other interesting frontiers (social/ethical/regulatory angles, or neural implants, or advanced fertility tech) with comparable depth.

8 Original Questions

1. What percentage of these nation’s populations will be born polygenically screened in 2030? [OECD Nations]
2. What percentage of these nation’s populations will be born polygenically screened in 2040? [OECD Nations]
3. What percentage of these nation’s populations will be born polygenically screened in 2050? [OECD Nations]
4. What percentage of these nation’s populations will be born polygenically screened in 2075? [OECD Nations]
5. What percentage of these nation’s populations will be born polygenically screened in 2100? [OECD Nations]
6. What percentage of these nation’s populations will be born genetically modified in 2030? [OECD Nations]
7. What percentage of these nation’s populations will be born genetically modified in 2040? [OECD Nations]

8. What percentage of these nation's populations will be born genetically modified in 2050? [OECD Nations]
9. What percentage of these nation's populations will be born genetically modified in 2075? [OECD Nations]
10. What percentage of these nation's populations will be born genetically modified in 2100? [OECD Nations]
11. How many companies will there be offering prenatal genetic modification services in the United States in the following years? [2040, 2050, 2075, 2100]
12. How many companies will there be offering IVF services in the United States in the following years? [2040, 2050, 2075, 2100]
13. What will be the average cost of using IVF services in the United States in 2020 US Inflation Adjusted USD in the following years? [2040, 2050, 2075, 2100]
14. What will be the average cost of using genetic modification services in the United States in 2020 US Inflation Adjusted USD in the following years? [2040, 2050, 2075, 2100]
15. Conditional on the use of polygenic screening or genetic modification for these traits being adopted in the United States, what will measurements in [trait] change by [year] in the following nations? [Intelligence, Longevity, Height, Eye Color, Skin Color, Hair Color/Texture, Physical Strength, Disease Resistance, Cardiovascular Health, Metabolism, Pain Tolerance, Depression/Anxiety, Visual Acuity, Resistance To Addiction, Empathy, Aggression, Morality]
16. How much more intelligent will individuals polygenically screened for intelligent be than those who were not screened for intelligent in the following years? [2040, 2050, 2075, 2100]
17. How much less depressed will individuals polygenically screened against depression be than those who were not screened for depression in the following years? [2040, 2050, 2075, 2100]
18. How many lawsuits will be filed in the United States against companies offering in-vitro fertilization (IVF) services that screen for the following traits by 2050? [Intelligence, Longevity, Height, Eye Color, Skin Color, Hair Color/Texture, Physical Strength, Disease Resistance, Cardiovascular Health, Metabolism, Pain Tolerance, Depression/Anxiety, Visual Acuity, Resistance To Addiction, Empathy, Aggression, Morality]
19. Will these nations have over 1000 genetically modified newborns by the year 2030? [OECD Nations]

20. Will these nations have over 1000 genetically modified newborns by the year 2040? [OECD Nations]
21. Will these nations have over 1000 genetically modified newborns by the year 2050? [OECD Nations]
22. Will these nations have over 1000000 genetically modified newborns by the year 2040? [OECD Nations]
23. Will these nations have over 1000000 genetically modified newborns by the year 2050? [OECD Nations]
24. Will these nations have over 10% genetically modified newborns annually by the year 2040?
25. Will these nations have over 10% genetically modified newborns annually by the year 2050?
26. Will these nations have over 10% genetically modified newborns annually by the year 2075?
27. What percentages of newborns will be born using polygenic screening in the USA in the following years? [2030, 2040, 2050, 2075, 2100]
28. What percentages of newborns will be born using genetic engineering services in the USA in the following years? [2030, 2040, 2050, 2075, 2100]
29. How many insurance agencies in the USA will cover polygenic screening for intelligence in the following years? [2030, 2040, 2050, 2075, 2100]
30. How many insurance agencies in the USA will cover polygenic screening for depression in the following years? [2030, 2040, 2050, 2075, 2100]
31. How many insurance agencies in the USA will cover prenatal genetic engineering in the following years? [2030, 2040, 2050, 2075, 2100]
32. What percentage of the populations in the following nations will be enrolled in government-subsidized genetic enhancement programs by 2050? [OECD Nations]
33. What percentage of the populations in the following nations will be enrolled in government-subsidized genetic enhancement programs by 2075? [OECD Nations]
34. How many regulatory bodies will be established in the following nations to oversee prenatal genetic engineering by 2050? [OECD Nations]
35. How many regulatory bodies will be established in the following nations to oversee prenatal genetic engineering by 2075? [OECD Nations]

Nations]

36. What will be the difference in adoption rates between urban and rural areas of the United States for genetic modification services in the following years? [2040, 2050, 2075]
37. What percentage of bottom 50% of families by earnings in the USA will have access to polygenic screening in the following years? [2030, 2040, 2050, 2075]
38. How many public hospitals in the USA will offer genetic enhancement services in the following years? [2030, 2040, 2050, 2075, 2100]
39. What proportion of national healthcare budgets in the following nations will be allocated to genetic enhancement initiatives in 2030? [OECD Nations]
40. What proportion of national healthcare budgets in the following nations will be allocated to genetic enhancement initiatives in 2040? [OECD Nations]
41. What proportion of national healthcare budgets in the following nations will be allocated to genetic enhancement initiatives in 2050? [OECD Nations]
42. What will be the public approval rating for genetic engineering programs will there be in the United States in the following years? [2030, 2040, 2050, 2075]
43. What will be the public approval rating for polygenic screening programs will there be in the United States in the following years? [2030, 2040, 2050, 2075]
44. How many genetic enhancement clinics are expected to operate in major European cities in the following years? [2030, 2040, 2050, 2075, 2100]
45. What percentage increase in average life expectancy is predicted for individuals receiving genetic enhancements in the USA in the following years? [2030, 2040, 2050, 2075, 2100]
46. How many companies offering personalized genetic enhancement packages will operate in the USA in the following years? [2030, 2040, 2050, 2075, 2100]
47. What percentage of public research funding across OECD nations will be directed toward genetic enhancement programs in the following years? [2030, 2040, 2050, 2075, 2100]
48. Will major US insurance companies begin covering genetic enhancements as standard benefits by the following years? [2030, 2040, 2050, 2075]

49. How many demographic studies will be published on the impact of genetic engineering on population health in OECD nations by the following years? [2030, 2040, 2050, 2075]
50. How many demographic studies will be published on the impact of polygenic screening on population health in OECD nations by the following years? [2030, 2040, 2050, 2075]
51. What proportion of genetic enhancement procedures will be conducted in public institutions versus private clinics in the USA by the following years? [2030, 2040, 2050, 2075]
52. How many new patents for genetic enhancement techniques will be filed globally in the following years? [2030, 2040, 2050, 2075]
53. What percentage of births in the following nations will incorporate some form of genetic screening by 2030? [OECD Nations]
54. What percentage of births in the following nations will incorporate some form of genetic screening by 2040? [OECD Nations]
55. What percentage of births in the following nations will incorporate some form of genetic screening by 2050? [OECD Nations]
56. What will be the average out-of-pocket expense for genetic enhancement procedures in the USA in the following years? [2030, 2040, 2050, 2075]
57. What percentage of births in the following nations will involve elective genetic modifications for non-medical traits by 2030? [OECD Nations]
58. What percentage of births in the following nations will involve elective genetic modifications for non-medical traits by 2040? [OECD Nations]
59. What percentage of births in the following nations will involve elective genetic modifications for non-medical traits by 2050? [OECD Nations]
60. What percentage of births in the following nations will involve elective genetic modifications for non-medical traits by 2075? [OECD Nations]
61. What percentage of American adults will opt for genetic modifications aimed at increasing disease resistance by 2030?
62. What percentage of American adults will opt for genetic modifications aimed at increasing disease resistance by 2040?
63. What percentage of American adults will opt for genetic modifications aimed at increasing disease resistance by 2050?
64. How many international treaties focused on genetic engineering ethics will be established by the following years? [2030, 2040,

2050]

65. How many studies on the effects of genetic enhancements on cognitive abilities will be completed in the USA by the following years? [2050, 2075, 2100]
66. How many studies on the effects of polygenic screening on cognitive abilities will be completed in the USA by the following years? [2050, 2075, 2100]
67. How many clinical trials testing genetic enhancements for improved cardiovascular health will be underway in OECD nations in the following years? [2030, 2040, 2050, 2075]
68. How many clinical trials testing genetic enhancements for improved intelligence will be underway in OECD nations in the following years? [2030, 2040, 2050, 2075]
69. How many clinical trials testing genetic enhancements for enhanced longevity will be underway in OECD nations in the following years? [2030, 2040, 2050, 2075]
70. How many clinical trials testing genetic enhancements for increased physical strength will be underway in OECD nations in the following years? [2030, 2040, 2050, 2075]
71. How many clinical trials testing genetic enhancements for optimized metabolism will be underway in OECD nations in the following years? [2030, 2040, 2050, 2075]
72. How many clinical trials testing genetic enhancements for improved visual acuity will be underway in OECD nations in the following years? [2030, 2040, 2050, 2075]
73. How many clinical trials testing genetic enhancements for enhanced disease resistance will be underway in OECD nations in the following years? [2030, 2040, 2050, 2075]
74. How many clinical trials testing genetic enhancements for increased pain tolerance will be underway in OECD nations in the following years? [2030, 2040, 2050, 2075]
75. How many clinical trials testing genetic enhancements for reduced depression and anxiety will be underway in OECD nations in the following years? [2030, 2040, 2050, 2075]
76. How many clinical trials testing genetic enhancements for improved immune system function will be underway in OECD nations in the following years? [2030, 2040, 2050, 2075]
77. How many clinical trials testing genetic enhancements for enhanced resistance to addiction will be underway in OECD nations in the following years? [2030, 2040, 2050, 2075]

78. How many clinical trials testing polygenic screening for improved cardiovascular health will be underway in OECD nations in the following years? [2030, 2040, 2050, 2075]
79. How many clinical trials testing polygenic screening for improved intelligence will be underway in OECD nations in the following years? [2030, 2040, 2050, 2075]
80. How many clinical trials testing polygenic screening for enhanced longevity will be underway in OECD nations in the following years? [2030, 2040, 2050, 2075]
81. How many clinical trials testing polygenic screening for increased physical strength will be underway in OECD nations in the following years? [2030, 2040, 2050, 2075]
82. How many clinical trials testing polygenic screening for optimized metabolism will be underway in OECD nations in the following years? [2030, 2040, 2050, 2075]
83. How many clinical trials testing polygenic screening for improved visual acuity will be underway in OECD nations in the following years? [2030, 2040, 2050, 2075]
84. How many clinical trials testing polygenic screening for enhanced disease resistance will be underway in OECD nations in the following years? [2030, 2040, 2050, 2075]
85. How many clinical trials testing polygenic screening for increased pain tolerance will be underway in OECD nations in the following years? [2030, 2040, 2050, 2075]
86. How many clinical trials testing polygenic screening for reduced depression and anxiety will be underway in OECD nations in the following years? [2030, 2040, 2050, 2075]
87. How many clinical trials testing polygenic screening for improved immune system function will be underway in OECD nations in the following years? [2030, 2040, 2050, 2075]
88. How many clinical trials testing polygenic screening for enhanced resistance to addiction will be underway in OECD nations in the following years? [2030, 2040, 2050, 2075]
89. How many genetically modified individuals will serve in the militaries of the USA in the following years? [2030, 2040, 2050, 2075, 2100]
90. What will be the total market cap (in 2020 USD) of companies specializing in genetic enhancement services in OECD nations in the following years? [2030, 2040, 2050, 2075, 2100]
91. What will be the total market cap (in 2020 USD) of companies spe-

- cializing in polygenic screening services in OECD nations in the following years? [2030, 2040, 2050, 2075, 2100]
92. What percentage of OECD nations' GDP will be generated by the genetic engineering industry in the following years? [2030, 2040, 2050, 2075, 2100]
 93. What percentage of OECD nations' GDP will be generated by the polygenic screening industry in the following years? [2030, 2040, 2050, 2075, 2100]
 94. What percentage of OECD nations' GDP will be generated by the reproductive services industries in the following years? [2030, 2040, 2050, 2075, 2100]
 95. What will be the average market cap of USA companies offering prenatal genetic modification services in the following years? [2030, 2040, 2050, 2075, 2100]
 96. What percentage of OECD nations' national healthcare budgets will be allocated to genetic enhancement research and development in the following years? [2030, 2040, 2050, 2075, 2100]
 97. What percentage of OECD nations' national budgets will go towards education in the following years? [2030, 2040, 2050, 2075, 2100]
 98. What percentage of OECD nations' national budgets will go towards healthcare in the following years? [2030, 2040, 2050, 2075, 2100]
 99. How many publicly traded USA companies will exceed USD 1 billion in annual revenue from genetic enhancement services in the following years? [2030, 2040, 2050]
 100. What will be the total venture capital investment (in 2020 USD) in genetic engineering R&D across OECD nations in the following years? [2030, 2040, 2050]
 101. What percentage of working-age adults in OECD nations will adopt neural implants for cognitive enhancement by the following years? [2030, 2040, 2050, 2075, 2100]
 102. What will be the total market cap (in 2020 USD) of companies specializing in neural implant technologies in OECD nations by the following years? [2030, 2040, 2050, 2075, 2100]
 103. How many startups focusing on human biological enhancement technologies will be established in the USA by the following years? [2030, 2040, 2050, 2075, 2100]
 104. What percentage increase in average workforce productivity will be observed in OECD nations as a primary effect of widespread

- cognitive enhancement technologies by the following years? [2030, 2040, 2050, 2075, 2100]
105. What will be the average cost (in 2020 USD) per neural implant procedure in the USA by the following years? [2030, 2040, 2050, 2075, 2100]
 106. What percentage of public healthcare budgets in OECD nations will be allocated to research and maintenance of bioenhancement technologies by the following years? [2030, 2040, 2050, 2075, 2100]
 107. What will be the annual global revenue (in 2020 USD) from brain-machine interface devices in the following years? [2030, 2040, 2050, 2075, 2100]
 108. What percentage of military personnel in OECD nations will be equipped with brain-machine interface devices by the following years? [2030, 2040, 2050, 2075, 2100]
 109. What percentage of newborns in OECD nations will receive gene therapy interventions for inherited diseases by the following years? [2030, 2040, 2050, 2075, 2100]
 110. What will be the total market cap (in 2020 USD) of companies specializing in gene therapy services in OECD nations by the following years? [2030, 2040, 2050, 2075, 2100]
 111. What percentage of national healthcare budgets in OECD nations will be allocated to gene therapy research and development by the following years? [2030, 2040, 2050, 2075, 2100]
 112. How many clinical trials focusing on gene therapy for genetic disorders will be underway in OECD nations by the following years? [2030, 2040, 2050, 2075, 2100]
 113. What will be the average cost (in 2020 USD) of a gene therapy treatment in the USA by the following years? [2030, 2040, 2050, 2075, 2100]
 114. What percentage of patients with rare genetic diseases in OECD nations will have access to gene therapy treatments by the following years? [2030, 2040, 2050, 2075, 2100]
 115. How many gene therapy products will have received FDA (or equivalent) regulatory approval in the USA by the following years? [2030, 2040, 2050, 2075, 2100]
 116. What will be the total annual revenue (in 2020 USD) of companies offering gene therapy for monogenic disorders in OECD nations by the following years? [2030, 2040, 2050, 2075, 2100]
 117. How many publicly traded USA companies focused on gene therapy will exceed USD 1 billion in annual revenue by the following

- years? [2030, 2040, 2050, 2075, 2100]
118. What percentage of gene therapy patents filed globally will originate from OECD nations by the following years? [2030, 2040, 2050, 2075, 2100]
 119. What percentage reduction in the prevalence of specific inherited disorders is expected in OECD nations as a secondary effect of widespread gene therapy by the following years? [2030, 2040, 2050, 2075, 2100]
 120. How prevalent will cystic fibrosis be across OECD nations in the following years? [2030, 2040, 2050, 2075, 2100] relative to 2020
 121. How prevalent will sickle cell disease be across OECD nations in the following years? [2030, 2040, 2050, 2075, 2100] relative to 2020
 122. How prevalent will hemophilia be across OECD nations in the following years? [2030, 2040, 2050, 2075, 2100] relative to 2020
 123. How prevalent will Huntington's disease be across OECD nations in the following years? [2030, 2040, 2050, 2075, 2100] relative to 2020
 124. How prevalent will Duchenne muscular dystrophy be across OECD nations in the following years? [2030, 2040, 2050, 2075, 2100] relative to 2020
 125. How prevalent will thalassemia be across OECD nations in the following years? [2030, 2040, 2050, 2075, 2100] relative to 2020
 126. How prevalent will familial hypercholesterolemia be across OECD nations in the following years? [2030, 2040, 2050, 2075, 2100] relative to 2020
 127. How prevalent will Tay-Sachs disease be across OECD nations in the following years? [2030, 2040, 2050, 2075, 2100] relative to 2020
 128. How prevalent will phenylketonuria be across OECD nations in the following years? [2030, 2040, 2050, 2075, 2100] relative to 2020
 129. How prevalent will Marfan syndrome be across OECD nations in the following years? [2030, 2040, 2050, 2075, 2100] relative to 2020
 130. How prevalent will Fragile X syndrome be across OECD nations in the following years? [2030, 2040, 2050, 2075, 2100] relative to 2020
 131. How prevalent will alpha-1 antitrypsin deficiency be across OECD nations in the following years? [2030, 2040, 2050, 2075, 2100] rel-

- ative to 2020
132. How prevalent will spinal muscular atrophy be across OECD nations in the following years? [2030, 2040, 2050, 2075, 2100] relative to 2020
 133. How prevalent will hereditary breast and ovarian cancer (BRCA mutations) be across OECD nations in the following years? [2030, 2040, 2050, 2075, 2100] relative to 2020
 134. How prevalent will neurofibromatosis type 1 be across OECD nations in the following years? [2030, 2040, 2050, 2075, 2100] relative to 2020
 135. How many insurance providers in the USA will incorporate gene therapy coverage as a standard benefit by the following years? [2030, 2040, 2050, 2075, 2100]
 136. What percentage of USA healthcare spending will be dedicated to gene therapy treatments by the following years? [2030, 2040, 2050, 2075, 2100]
 137. What will be the average time (in months) from initiation to regulatory approval for gene therapy products in the USA by the following years? [2030, 2040, 2050, 2075, 2100]
 138. What percentage of gene therapy treatments in OECD nations will employ viral vector delivery systems compared to non-viral methods by the following years? [2030, 2040, 2050, 2075, 2100]
 139. What percentage of the global gene therapy research publications will come from OECD nations by the following years? [2030, 2040, 2050, 2075, 2100]
 140. How many adverse events per 1000 gene therapy procedures are projected in the USA by the following years? [2030, 2040, 2050, 2075, 2100]
 141. What will be the total venture capital investment (in 2020 USD) in gene therapy startups across OECD nations by the following years? [2030, 2040, 2050, 2075, 2100]
 142. What will be the projected average lifespan extension (in years) attributable to gene therapy interventions in OECD nations by the following years? [2030, 2040, 2050, 2075, 2100]
 143. What percentage of inherited metabolic disorders across OECD nations will be treatable by gene therapy by the following years? [2030, 2040, 2050, 2075, 2100]
 144. How many gene therapy manufacturing facilities will be operational in the USA by the following years? [2030, 2040, 2050, 2075, 2100]

145. How many gene therapy interventions for improving cognitive function will be approved in the USA by the following years? [2030, 2040, 2050, 2075, 2100]
146. What will be the projected increase in workforce productivity (percentage) in OECD nations as a secondary effect of gene therapy-enhanced cognitive abilities by the following years? [2030, 2040, 2050, 2075, 2100]
147. What will be the projected increase in GDP in OECD nations as a secondary effect of gene therapy-enhanced cognitive abilities by the following years? [2030, 2040, 2050, 2075, 2100]
148. How many insurance claims related to adverse events from gene therapy procedures will be filed annually in the USA by the following years? [2030, 2040, 2050, 2075, 2100]

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