Project Notes:

Project Title: Assessing the Correlation Between Genetic Predisposition and Health Insurance Rates
Name: Jared Rosen

Note Well: There are NO SHORT-cuts to reading journal articles and taking notes from them. Comprehension is paramount. You will most likely need to read it several times, so set aside enough time in your schedule.

Contents:

Knowledge Gaps:

This list provides a brief overview of the major knowledge gaps for this project, how they were resolved and where to find the information.

Knowledge Gap	Resolved By	Information is located	Date resolved
How does genetic testing impact the health insurance industry?	Article #5	Page 16	09/24/23
Where can I find data on health insurance costs?	Article #12	Page 42	11/26/23

Literature Search Parameters:

These searches were performed between (07/01/23) and XX/XX/2024.
List of keywords and databases used during this project.

Database/search engine	Keywords	Summary of search
National Library of Medicine	“Genetic Testing” “Health Insurance”	Found several articles comparing genetic testing with health insurance and supporting the hypothesis of a connection between them.
Google.com	“Breast Cancer” “Genome-Wide Association Study” “Location”	Found several possible options for GWAS that could be used for rates of genetic predisposition by location.
Google.com	“Health Insurance Rates” “Projections” “Location”	Found two tools to effectively gain an accurate projection of how health insurance costs vary by location.

Tags:

Tag Name	

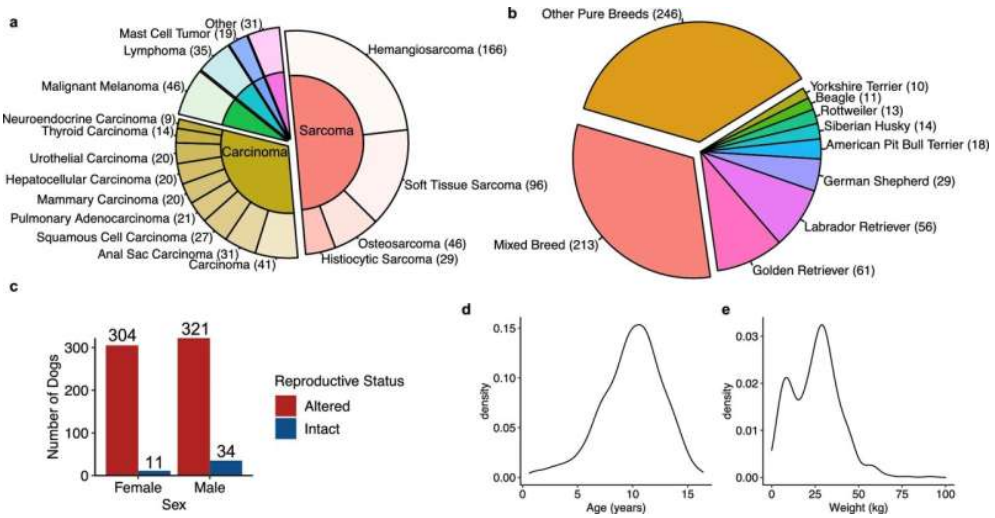
Article notes should be on separate sheets

KEEP THIS BLANK AND USE AS A TEMPLATE

Source Title	
Source citation (APA Format)	
Original URL	
Source type	
Keywords	
#Tags	
Summary of key points + notes (include methodology)	
Research Question/Problem/ Need	
Important Figures	
VOCAB: (w/definition)	
Cited references to follow up on	
Follow up Questions	

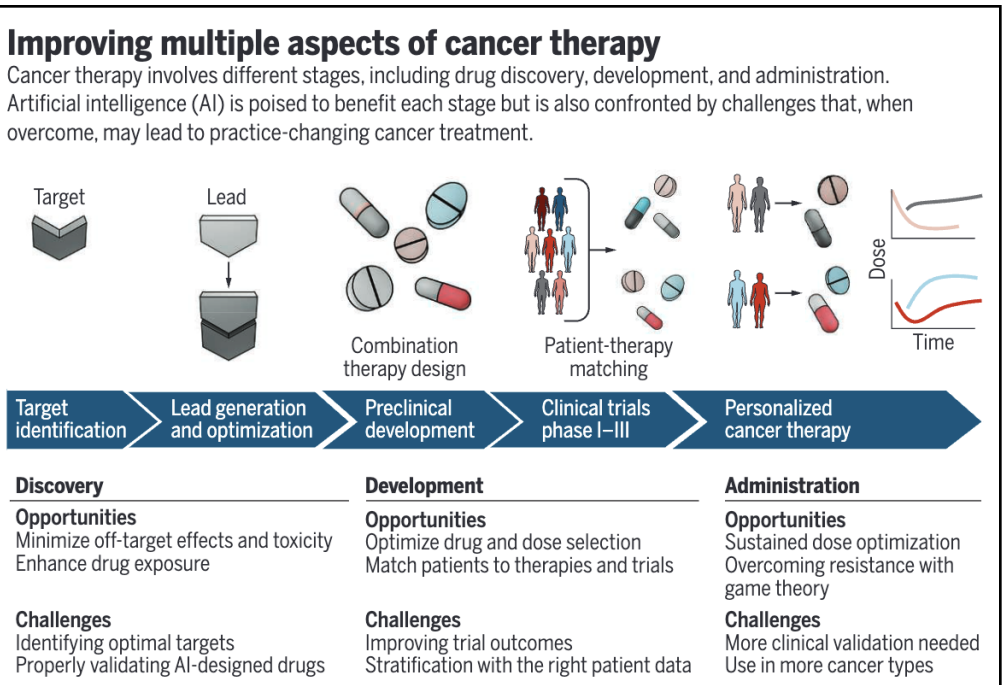
Article #1 Notes: Largest-ever genomic sequencing study of canine cancers reveals striking similarities to human cancers

Source Title	Largest-ever genomic sequencing study of canine cancers reveals striking similarities to human cancers
Source citation (APA Format)	Broad Institute of MIT and Harvard. (2023, July 6). Largest-ever genomic sequencing study of canine cancers reveals striking similarities to human cancers. Phys.org. https://phys.org/news/2023-07-largest-ever-genomic-sequencing-canine-cancers.html
Original URL	https://phys.org/news/2023-07-largest-ever-genomic-sequencing-canine-cancers.html
Source type	Scientific Journal/Report
Keywords	Genome sequencing, Cancer, Genetics, Cancer Treatment
#Tags	#Genome-Sequencing, #Cancer
Summary of key points + notes (include methodology)	Genome sequences of canines with cancer were compared to that of human tumor samples in a recent study by MIT and Harvard along with other organizations. As a result of the study, 8 mutational hotspots were found to be shared between the two species. This study has significant effects on canine cancer research as well as the overall cancer research industry as the connections created by this discovery are impactful for both. On one hand, canine cancer treatments are greatly progressed as human treatment methods already created in shared hotspots can be applied to canine treatments. On another hand, this is a significant milestone for the overall understanding of tumors and cancer treatment because it confirms the relationship between genetics, cancer, and treatment.
Research Question/Problem/ Need	How can our current knowledge about human cancer be applied to cancer research with other species?

Important Figures	
VOCAB: (w/definition)	FidoCure: an online commercial AI platform for canine oncology and genomic sequencing
Cited references to follow up on	https://medicalxpress.com/news/2019-06-human-genetic-dogs-cancer.html https://medicalxpress.com/news/2021-11-parallels-human-dog-oral-tumors.html
Follow up Questions	-If Human oncology research can be applied to canine cancer research, how can canine cancer research and knowledge be applied to human cancer research? -Are there/can there be similar studies for other species, including species more closely related to humans like apes?

Article #2 Notes: Artificial intelligence in cancer therapy

Source Title	Artificial intelligence in cancer therapy
Source citation (APA Format)	Ho, D. (2020, February 28). Artificial Intelligence in cancer therapy science - AAAS. Science.org. https://www.science.org/doi/10.1126/science.aaz3023
Original URL	https://www.science.org/doi/10.1126/science.aaz3023
Source type	Magazine Article
Keywords	Artificial Intelligence, Cancer, Cancer Treatment, Medicine
#Tags	#AI, #Cancer, #Oncology
Summary of key points + notes (include methodology)	One of the ideas which I wanted to explore for my STEM1 project was ways that Artificial Intelligence can be used to improve medical treatments, so this paper discussing the various methods AI can and will be applied to cancer treatment was very helpful for my research. Artificial Intelligence has already been applied to advancing several drug treatment methods outside of cancer. To begin, an AI program was first shown a dataset of current drug exposure methods used, as well as the chemical structures of the receptors often targeted by certain cancers. AI can help by predicting and simulating how separate drug exposure treatments would work with/counteract one another. For instance, the program predicted that a combination of two drug treatments for myeloma would work better than the current method of treatment used. Additionally, AI can be used to improve the course of drug treatment over time via adaptive therapy, a drug treatment plan where the quantity of exposure is determined by the unique effect of the treatment on the patient. I found the use of adaptive treatment to be the most interesting. Another one of the subjects which I was curious about was how cancer varies from patient to patient, particularly with outlier cases. I believe that exploring this idea more will enable me to combine many of my ideas into one and steer me in the right direction.
Research Question/Problem/ Need	How is Artificial Intelligence being used in cancer treatment and other treatment programs?

Important Figures	
VOCAB: (w/definition)	Biomarkers: “a measurable and quantifiable indicator of a biological or medical condition, process, or response to a treatment.” -ChatGPT
Cited references to follow up on	N/A
Follow up Questions	In what fields is AI most useful? Is there a difference in how it can be applied by field?

Article #3 Notes: Nanopore technology achieves breakthrough in protein variant detection

Source Title	Nanopore technology achieves breakthrough in protein variant detection
Source citation (APA Format)	Martin-Baniandres, P., Lan, WH., Board, S. et al. Enzyme-less nanopore detection of post-translational modifications within long polypeptides. Nat. Nanotechnol. (2023). https://doi.org/10.1038/s41565-023-01462-8
Original URL	https://www.nature.com/articles/s41565-023-01462-8
Source type	Journal Article
Keywords	Protein Analysis, Nanopore technology, Post-Translational Modification
#Tags	#Nanopore, #DNA, #Genetics
Summary of key points + notes (include methodology)	Nanopore technology achieves breakthrough in protein variant detection… Scientists have been able to utilize Post-Translational Modification (PTM) to manipulate and regulate complex cellular processes. However, they have not been able to effectively record which PTMs result in which changes until now. Thanks to a recent breakthrough by a team of scientists at Oxford University, scientists now have a method through the use of the flow of water to excavate the PTM proteins from the cell and directly observe them. This breakthrough is revolutionary, as it not only allows for the expansion of research via the ability to significantly expand the library of protein variants, but it also enables doctors to discover the protein variants in patients, as well as those created by diseases or cancer.
Research Question/Problem/ Need	The ability to analyze and interpret the molecular makeup of cellular proteins is incredibly beneficial to the pharmaceutical and biomedical industries.

Important Figures

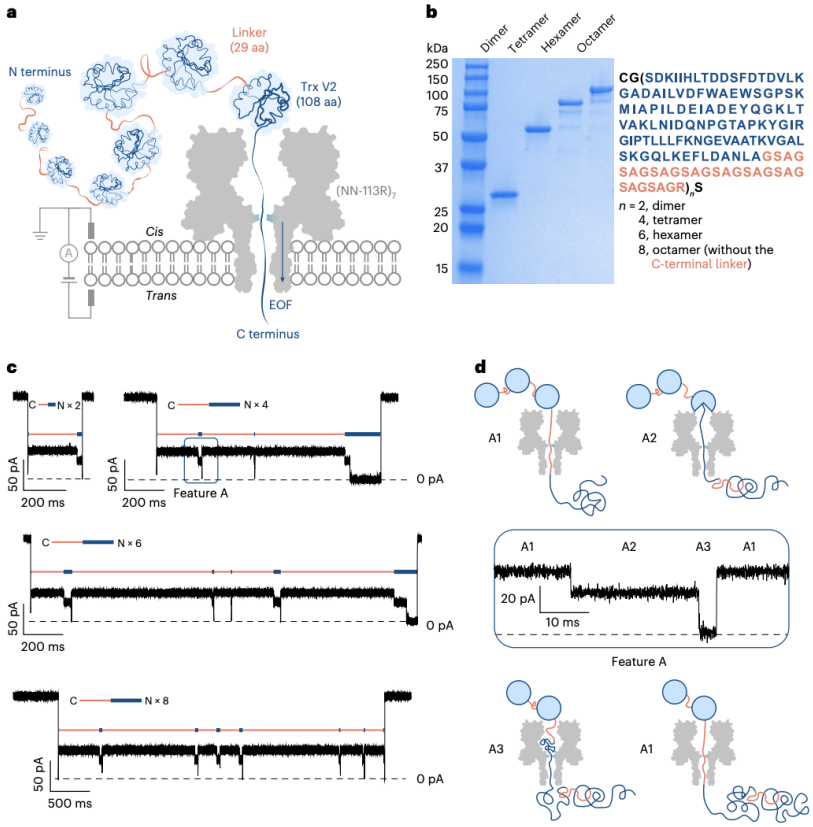


Fig. 1 | Electro-osmosis-driven translocation of Trx-linker concatemers through a protein nanopore. a, EOF in a charge-selective αHL nanopore $(NN\text{-}113R)_7$ drives the sequential co-translocational unfolding of Trx units within a polyprotein of >1,000 aa. **b**, A sodium dodecyl sulfate–polyacrylamide gel showing the Trx-linker dimer (28 kDa), tetramer (55 kDa), hexamer (83 kDa) and octamer (110 kDa). **c**, Current recordings for the C-terminus-first translocation of a dimer, a tetramer, a hexamer and an octamer without post-acquisition filtering. The repeating features A are indicated by orange and blue bars. **d**. Zoomed-in view of the repeating feature A boxed in blue in **c** without post-acquisition filtering. Three levels are assigned as follows: A1, a linker within the pore; A2 and A3, different segments of partly unfolded Trx within the pore. Conditions in **c** and **d** are as follows: 750 mM GdnHCl, 10 mM HEPES, 5 mM TCEP at pH 7.2, Trx-linker concatemers (*cis*) (dimer: 2.23 μM; tetramer: 0.63 μM; hexamer: 0.25 μM; octamer: 0.81 μM), +140 mV (*trans*), 24 ± 1 °C.

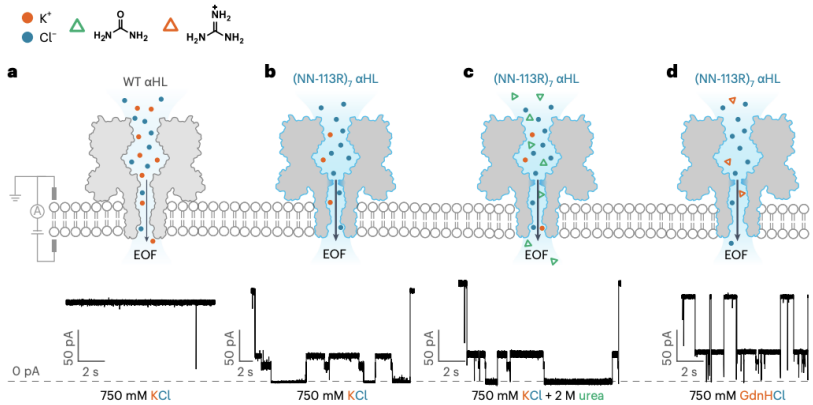


Fig. 2 | Chaotrope-facilitated electro-osmotic translocation of the Trx-linker octamers through a nanopore. a, Translocation of Trx-linker octamers through a weakly anion-selective WT αHL was not observed in the absence of a chaotrope. **b**–**d**, Current traces showing the translocation of Trx-linker octamers through the electro-osmotically active nanopore $(NN\text{-}113R)_7$ in the presence of 750 mM KCl (**b**), 750 mM KCl and 2 M urea (**c**) or 750 mM GdnHCl (**d**) with 2 kHz post-acquisition filtering. The use of non-denaturing concentrations of chaotropic agents (urea and GdnHCl) accelerated the co-translocational unfolding of the Trx units. Conditions: 10 mM HEPES at pH 7.2, 0.81 μM Trx-linker octamer (*cis*), +140 mV (*trans*), 24 ± 1 °C with 750 mM KCl (**a** and **b**); 2 M urea and 750 mM KCl (**c**); 750 mM GdnHCl (**d**).

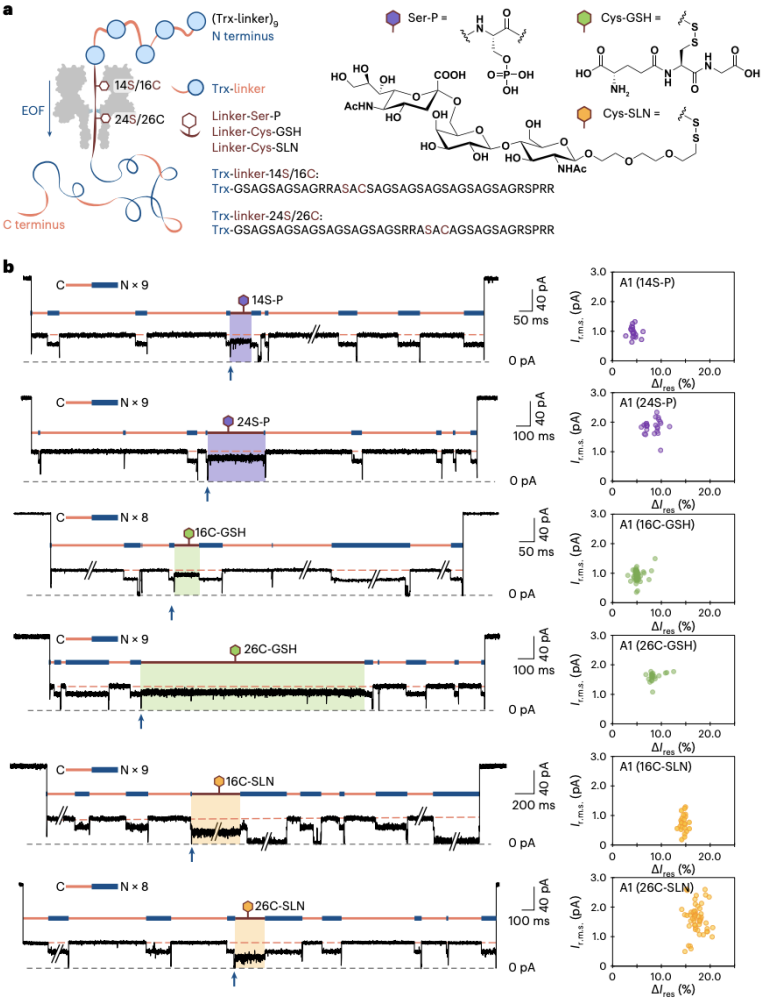
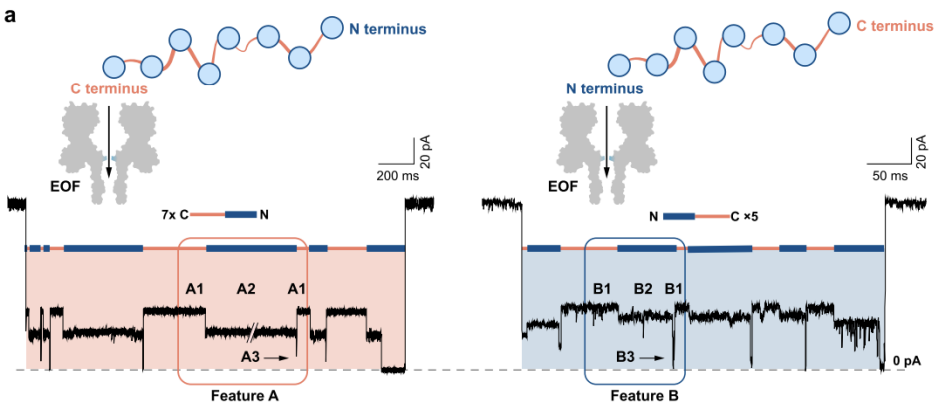
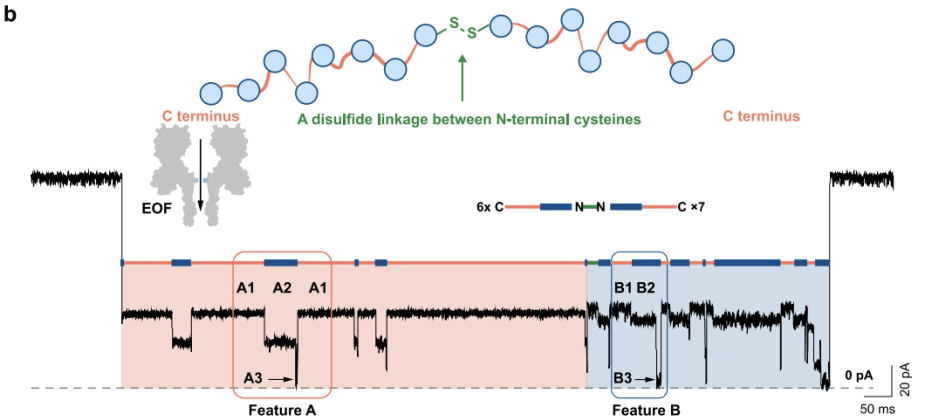


Fig. 3 | Detection of PTMs in protein concatemers traversing a nanopore driven by EOF. a, Trx-linker nonamers tested with a charge-selective nanopore ($(NN\text{-}113R)_7$) containing an RRASAC sequence within the central linker, which was post-translationally phosphorylated (purple), S-glutathionylated (green) or glycosylated (yellow). **b**, Recordings of C-terminus-first translocation events of Trx-linker nonamers (left), showing a distinct level A1 (boxed in purple, green or yellow) in the presence of a PTM compared with the level A1 of unmodified units (orange dash). Traces have been filtered at 2 kHz; transient A3 levels were truncated by filtering and therefore deviate from -0 pA. The A3 level produced by the translocation of an unmodified unit before the modified linker is indicated with a blue arrow and each of the features A is indicated by orange and blue bars. The number of repeats of feature A within the polypeptide translocation event shown is specified. Scatter plots of $I_{r.m.s.}$ and $\Delta I_{res\%}$ for individual polypeptide translocation events (right), where $\Delta I_{res\%} = <I_{res\%}(\text{A1, Trx-linker})> - I_{res\%}(\text{A1, Trx-linker + PTM})$, where $<I_{res\%}(\text{A1, Trx-linker})>$ is the mean $I_{res\%}$ value of the remaining A1 levels for unmodified repeat units within an individual translocation event. Conditions, 375 mM GdnHCl, 375 mM KCl, 10 mM HEPES at pH 7.2, 1.2 µM Trx-linker nonamer (*cis*), +140 mV (*trans*), 24 ± 1 °C.





Extended Data Fig. 1 | Repeating current features recorded during electroosmosis-driven concatemer translocation through a nanopore. **a**, Two repeating current features, A or B, were recorded with a charge-selective nanopore ((NN-113R)$_7$) and Trx-linker octamers pre-treated with 5 mM tris(2-carboxyethyl)phosphine (TCEP) for 10 min before their addition to the cis compartment of the recording chamber. Conditions: 750 mM GdnHCl, 10 mM HEPES, 5 mM TCEP, pH 7.2, 0.81 µM Trx-linker octamer (cis), +140 mV (trans), 24 ± 1 °C. **b**, Without the TCEP pre-treatment, features A were always seen before features B when they occurred together within a single translocation event. The first two levels (B1 and B2) in features B have larger noise and higher $I_{res\%}$ compared with A1 and A2 recorded within a single polypeptide translocation event by the same pore (A1: $I_{res\%}$ = 35 ± 1 %, $I_{r.m.s.}$ = 1.1 ± 0.1 pA, N = 25; A2: $I_{res\%}$ = 21 ± 1%, $I_{r.m.s.}$ = 1.5 ± 0.2 pA, N = 25; B1: $I_{res\%}$ = 38 ± 1 %, $I_{r.m.s.}$ = 1.7 ± 0.4 pA, N = 39; B2: $I_{res\%}$ = 32 ± 1%, $I_{r.m.s.}$ = 2.0 ± 0.5 pA, N = 39; $I_{r.m.s.}$ values for each level were reported without subtraction of the noise of the pore; number of individual levels from multiple polypeptide translocation events recorded by the same pore are specified). The translocating molecules, which gave sequential A and B features, were assigned as dimers of octamers linked by a disulfide bond between the two N-terminal cysteines. Therefore, in the unlinked molecules (see '**a**'), C terminus-first translocation occurred when features A were observed and N terminus-first translocation occurred when features B were observed. The recorded repeating features are indicated by orange and blue bars. Conditions: 750 mM GdnHCl, 10 mM HEPES, pH 7.2, 0.81 µM Trx-linker octamer (cis), +140 mV (trans), 24 ± 1 °C. All traces were filtered at 2 kHz for clarity; transient A3 levels were truncated by filtering and therefore deviated from -0 pA.

VOCAB: (w/definition)

Electro-Osmotic Translocation: Electro-osmotic translocation is a phenomenon in the field of nanotechnology and microfluidics that involves the movement of molecules or particles through a nanopore or microchannel under the influence of an applied electric field and the flow of liquid (typically an electrolyte solution). It is closely related to electrophoresis, which is the movement of charged particles in an electric field, but it also involves the flow of the surrounding liquid.

-ChatGPT

Nanopore technology: "Nanopore technology is a cutting-edge analytical technique that uses tiny, nanometer-sized pores to detect and analyze molecules, such as DNA, RNA, proteins, and even small chemicals."

-ChatGPT

	Post-translational modifications: “Post-translational modifications (PTMs) are chemical modifications that occur on proteins after they have been synthesized from the corresponding mRNA template (during translation).” -ChatGPT
Cited references to follow up on	
Follow up Questions	Where is this being used in healthcare today?

Article #4 Notes: God Time = Planck Time: Finally Detected!

Source Title	God Time = Planck Time: Finally Detected!
Source citation (APA Format)	Haug, E. G. (2022, September 17). God time = planck time: Finally detected! - hal.science. HAL open science. https://hal.science/hal-03769825/document
Original URL	https://hal.science/hal-03769825/document
Source type	Scientific Journal
Keywords	Planck time, fundamental time, indivisible time, Newton, Planck length, quantum gravity, quantisation gravity
#Tags	[physics], [quant-ph], [gr-qc]
Summary of key points + notes (include methodology)	The concept of an “indivisible time” has been conceived by many, from its first known proposition in the Bible to Newton’s Principia, and ultimately as proposed by Planck. Unfortunately, the value of the Planck Time is determined by unknown constants G and h, but as recently discovered, dimensional analysis can allow for the approximation of the Planck time without needing to know the value of G, h, or c. Thanks to this breakthrough, physicists can have much more precise estimations of many properties, such as gravitational acceleration, orbital velocity, orbital time, and light deflection.
Research Question/Problem/ Need	How have recent breakthroughs in Quantum Physics relating to Planck Units enabled physicists to advance their understanding of the universe and its properties?

Important Figures

From	Formula	Comments
Not dependent on G, $\hbar$ or c :		
Light deflection and orbital velocity	$t_p = \frac{\delta}{4v_o}\frac{R_1\bar{\lambda}_1}{\sqrt{R_2\bar{\lambda}_2}}$	
Light deflection and gravitational acceleration	$t_p = \frac{\delta}{4\sqrt{g}}\frac{R_1\bar{\lambda}_1}{R_2\sqrt{\bar{\lambda}_2}}$	
Not dependent on G or $\hbar$, but on c:		
Gravitational acceleration	$t_p = \frac{R\sqrt{g\bar{\lambda}}}{c^2}$	
Orbital velocity	$t_p = \frac{v_0\sqrt{R\bar{\lambda}}}{c^2}$	
Orbital time	$t_p = \frac{2\pi\sqrt{R^3\bar{\lambda}}}{Tc^2}$	
Periodicity pendulum clock	$t_p = \frac{2\pi R\sqrt{L\bar{\lambda}}}{Tc^2}$	L is length pendulum.
Velocity ball Newton cradle	$t_p = \frac{R\sqrt{v_{out}\bar{\lambda}}}{c^2\sqrt{2H}}$	H hight of ball drop.
Light deflection	$t_p = \frac{\sqrt{\delta R\bar{\lambda}}}{c}$	δ light deflection.
Advance of perihelion	$t_p = \frac{\sqrt{\sigma\bar{\lambda}a(1-e^2)}}{c\sqrt{6\pi}}$	σ Advance of perihelion
Micro lensing	$\frac{\theta\sqrt{\bar{\lambda}\frac{d_S d_L}{d_S - d_L}}}{2c}$	θ micro lensing.
Cavendish apparatus	$t_p = \frac{L4\pi^2R^2\theta_c}{T^2c^2}$	R distance from small to large ball. L distance between small balls, θ_c angle, T pendulum periodicity.

From	Formula	Comments
Not dependent on G, $\hbar$ or c :		
Light deflection	$\frac{l_p}{\lambda} = n_p = \frac{\sqrt{\delta R}}{\bar{\lambda}}$	δ light deflection.
Advance of perihelion	$\frac{l_p}{\lambda} = n_p = \frac{\sqrt{\sigma a(1-e^2)}}{\sqrt{6\pi\bar{\lambda}}}$	σ Advance of perihelion
Micro lensing	$\frac{l_p}{\lambda} = n_p = \frac{\theta\sqrt{\frac{d_S d_L}{d_S - d_L}}}{2\sqrt{\bar{\lambda}}}$	θ micro lensing
Not dependent on G or $\hbar$, but on c:		
Gravitational acceleration	$\frac{l_p}{\lambda} = n_p = \frac{R\sqrt{g}}{c\sqrt{\bar{\lambda}}}$	
Orbital velocity	$\frac{l_p}{\lambda} = n_p = \frac{v_0\sqrt{R}}{c\sqrt{\bar{\lambda}}}$	
Orbital time	$\frac{l_p}{\lambda} = n_p = \frac{2\pi\sqrt{R^3}}{Tc\sqrt{\bar{\lambda}}}$	
Periodicity pendulum clock	$\frac{l_p}{\lambda} = n_p = \frac{2\pi R\sqrt{L}}{Tc\bar{\lambda}}$	L is length pendulum.
Velocity ball Newton cradle	$\frac{l_p}{\lambda} = n_p = \frac{R\sqrt{v_{out}}}{c\sqrt{2H\bar{\lambda}}}$	H hight of ball drop.
Cavendish apparatus	$\frac{l_p}{\lambda} = n_p = \frac{L4\pi^2R^2\theta_c}{T^2c\bar{\lambda}}$	R distance from small to large ball. L distance between small balls, θ_c angle, T pendulum periodicity.

VOCAB: (w/definition)

Planck time: the time required for light to travel a distance of 1 Planck length in vacuum

Compton Wavelength: the wavelength of the particle equal to the wavelength of the photon with the same mass.

Cited references to follow up on

-E. G. Haug. Can the Planck length be found independent of big G ? Applied Physics Research, 9(6):58, 2017.
URL https://doi.org/10.5539/apr.v9n6p58.
-E. G. Haug. Finding the Planck length multiplied by the speed of light without any knowledge of G, c, or h, using a Newton force spring. Journal Physics Communication, 4:075001, 2020. URL https://doi.org/10.
1088/2399-6528/ab9dd7.
-E. G. Haug. Measurements of the Planck length from a ball-clock without knowledge of newton's gravitational
constant G or the Planck constant. European Journal of Applied Physics, 3:15, 2021. URL https://www.

	ej-physics.org/index.php/ejphysics/article/view/133. -E. G. Haug. Planck units measured totally independently of big g. Open Journal of Microphysics, 12:55, 2022. URL https://doi.org/10.4236/ojm.2022.122004.
Follow up Questions	-In what ways can/has the same process been applied to the other Planck units? -Are there any proposed theories on occurrences at the sub-Planck scale? -How accurate are the methods of observation used to approximate these properties?

Article #5 Notes: Assessing the Impact of Developments in Genetic Testing on Insurers' Risk Exposure

Source Title	Assessing the Impact of Developments in Genetic Testing on Insurers' Risk Exposure
Source citation (APA Format)	Rodriguez-Rincon, D., Parkinson, S., Hocking, L., Evans, H., Hudson, E., & Morley, K. I. (2022, August 31). Assessing the impact of developments in genetic testing on insurers' risk exposure. Rand health quarterly. https://www.rand.org/content/dam/rand/pubs/research_reports/RRA1200/RRA1209-1/RAND_RRA1209-1.pdf
Original URL	https://www.rand.org/content/dam/rand/pubs/research_reports/RRA1200/RRA1209-1/RAND_RRA1209-1.pdf
Source type	Professional Report
Keywords	Genetics, Health Insurance, Health Screening, Science, Technology, and Innovation Policy, United Kingdom
#Tags	#Health-Insurance, #Genetic-Testing
Summary of key points + notes (include methodology)	Genetic testing is a revolutionary resource because it can provide folks with information about the risks of developing certain diseases or disorders, and that information could have a significant impact on insurance companies, which often rely on the uncertainty in their clients. In the UK, there exists an organization that is responsible for regulating this relationship between clients and insurers and what information may or may not be disclosed. The organization ran a study that found that depending on which disease clients are at risk of, genetic testing can be both beneficial and harmful for insurers, although it remains a constantly-changing and nuanced discussion with incomplete data.
Research Question/Problem/ Need	What does the growth of genetic testing mean for the insurance industry?
Important Figures	Outline of Framework for the Evaluation of Genetic Tests **Factors Relevant to Framework** | **Description of the Factors** | **Relevance to the Framework and the Insurance Industry**

Area		
How useful is the test for characterising the risk of developing a condition?		
Clinical utility	Extent to which clinically relevant action can be taken based on the results of the test. For a test to have clinical utility, it must have demonstrated analytic validity, and scientific and clinical validity.	For tests available through the NHS, adoption in clinical practice is a proxy for clinical utility. However, assessing this link for tests provided by direct-to-consumer (DTC) companies may be more difficult as they may not be equivalent to those used by the NHS.
Alternative information sources	Extent to which predisposition to a given condition can be estimated using information other than genetic test results (e.g. family history or lifestyle).	If information from a genetic test provides a more accurate estimate of disease risk than these alternatives, or can improve risk estimation when combined with them, there is risk of information asymmetry for insurers.
How many people take the test?		

	Societal acceptability	Community's desire for genetic tests, which is influenced by whether the community benefits from the tests, as well as personal preferences and autonomy. Community in this context could be the general population, or those who are already at elevated risk due to family history or other factors.	Interest in genetic testing varies by age, education, knowledge of genetics, family history of genetic conditions and the integration of genetic tests into the healthcare system. Consideration of uptake in certain subgroups may be important for insurers if the subgroup is more likely to have insurance or more likely to be at risk of developing a condition.
	Personal utility	Value of the information to the person being tested.	Personal utility of a genetic test will vary by person and by the characteristics of the condition being tested for. Personal utility of a genetic test is likely to increase as capacity of genetic tests to estimate risk improves and/or as the range and effectiveness of interventions for a condition increase.

	Availability of the test and clinical support for it	How a test is accessed in terms of public (or private) medical system or DTC provision, eligibility criteria and the degree of clinical support both before and after testing.	Under current NHS guidance, most individuals will only be referred for a genetic test if they are suspected by a clinician of having a certain condition, either due to symptoms or family history. Genetic testing for many conditions in the absence of family history or other indicative factors and without interaction with healthcare providers is available via DTC testing. However, most DTC tests that are currently available do not have the same clinical utility as those offered in the NHS.

	Cost of the test	Upfront financial investment undertaken by an individual in purchasing the genetic test.	The impact of test cost on uptake may be limited to tests not currently available via the NHS, and to individuals who do not meet NHS criteria for test access but perceive the personal utility to be high and have the ability to pay. If the technological costs decrease but access to genetic tests via the NHS remains limited to those who meet eligibility criteria, the risk of information asymmetry and associated anti-selection may increase substantially.
	What is the impact of the condition in terms of the length and quality of life of people who develop it?		

Penetrance	Likelihood that specific forms of a gene or genes (genetic variants) will be expressed in an individual and lead to development of the condition.	For a condition to be important for medical underwriting in insurance, it must have high penetrance. Capacity to assess penetrance depends on the type of conditions being tested. For example, for conditions determined by a large number of genes, the likelihood of developing the condition is more challenging to estimate.
Age of onset	Age range in which the condition being predicted by the genetic test usually occurs.	The age of onset of a condition may affect anti- selection of insurance. For example, an individual at risk of an early onset condition may purchase insurance earlier than they may have otherwise done or, conversely, an individual at risk of a late onset condition may delay seeking insurance. Also, consumers may be able to anti-select if they have reason to believe that they are subject to a late onset condition that

		has presented no symptoms at the time of purchasing insurance.
Prognosis and morbidity	Prognosis is the time from development of the condition to death, while morbidity refers to the consequences for quality of life and/or the health of the individual who develops the condition.	Conditions with a high mortality rate (combined with a lack of effective treatment) are important for insurance underwriting, but the time from diagnosis to death and the health state during those years are also important as there may be implications for employment and health and/or social care, which may also have implications for insurance.
Prevalence	Proportion of people within a population who develop the condition being tested.	Conditions with high prevalence may have a large overall financial impact on insurers. However, conditions with low prevalence may also have an impact if people who are at high genetic risk are disproportionally likely to purchase insurance or make an insurance claim.
What is the potential for reducing the risk of developing the		

	condition and managing its effects if it develops?		
	Potential for risk reduction and/or treatment	Risk reduction includes interventions delivered before an individual develops symptoms of a condition or when they have developed early symptoms and prevention may still be possible. Treatment strategies are interventions delivered to people after they have developed a condition, with the aim of reducing its impact on their quality of life and/or life expectancy.	Risk reduction approaches may lead to overdiagnosis and overtreatment, a situation in which an asymptomatic individual is identified as being at high risk of a condition that would not have discernible consequences for them during their lifetime but triggers clinical interventions, which may have an impact on critical illness and medical insurance providers. Conditions for which treatments are available may have implications for medical insurers, while those for which there is no effective treatment present the greatest risk in terms of life insurance.

	Effectiveness and engagement	Risk reduction effectiveness is the capacity of a strategy to reduce an individual's risk of developing a condition. Treatment effectiveness is the effect on an individual's prognosis and morbidity. Engagement is the extent to which an individual uses an intervention, which may affect its effectiveness.	The effectiveness of an intervention and the extent to which individuals engage with it are key influences on whether risk reduction or management are feasible for a health condition. Many insurance companies encourage their customers to lead healthy lifestyle and offer financial rewards for doing so (e.g. reduced premiums or discounts on services), but evidence for the impact of risk reduction strategies following genetic tests is mixed and dependent on the condition tested for.

	Intervention costs	Financial investment required to carry out an intervention.	If an individual is identified as being at genetic risk of a condition, the cost of providing them with risk reduction interventions and treatment if the condition develops will have an impact on the risk a genetic test poses to the insurance industry. This risk will be greatest when the cost of treatment is high, particularly in the absence of preventative interventions.
VOCAB: (w/definition)	Genetic testing: the sequencing of human DNA in order to discover genetic differences, anomalies, or mutations that may prove pathological. CCHSR: An organization which runs a dynamic programme of collaborative research between RAND Europe and the University of Cambridge, with the aim to inform policy on health services. REA: A method of data gathering which is used to systematically collect information from databases to provide a report within a shorter amount of time ABI: The association of British insurers, who commissioned the CCHSR and RAND organizations to conduct this study for information on how genetic testing can impact insurers.		
Cited references to follow up on	-UK Office for Life Sciences. “Genome UK: The Future of Healthcare,”. 2020. https://www.gov.uk/government/publications/genome-uk-the-future-of-healthcare/genome-uk-the-future-of-healthcare webpage, . As of August 8, 2021: -Hassan L., Dalton A., Hammond C., and Tully M. P. Public Understanding of Science, 2020. , “A Deliberative Study of Public Attitudes Towards Sharing Genomic Data Within NHS Genomic Medicine Services in England,”		
Follow up Questions	-Is/can a similar program be established in the US? -How does this process differ in the United States? -How would these results change if more people went through with genetic testing? If they would improve, how could genetic testing become more accessible?		

	-If the correlation between insurance and genetic testing is constantly changing, could a model be designed to predict the trends of this change? How can these variables be quantified to create one? -If a model can produce a result, what further steps can be taken?

Article #6 Notes: Plans may cover the costs of provider-recommended genetic testing, but universal criteria are lacking

Source Title	Plans may cover the costs of provider-recommended genetic testing, but universal criteria are lacking
Source citation (APA Format)	Nelson, R. Health Insurance Denials Limit Access to Genetic Testing. (2023). *American journal of medical genetics. Part A*, *191*(9), 2260–2261. https://doi.org/10.1002/ajmg.a.62825
Original URL	https://onlinelibrary.wiley.com/doi/10.1002/ajmg.a.62825
Source type	Journal Article
Keywords	Health Insurance, Genetic Testing
#Tags	#Health-Insurance, #Genetic-Testing
Summary of key points + notes (include methodology)	Genetic testing, crucial in diagnosing pediatric genetic conditions, faces inconsistent insurance coverage, with no standardized eligibility criteria. A recent study found that 18% of patients experienced insurance denials, primarily impacting those with private insurance. Denials, especially for exome sequencing and microarray tests, resulted in missed diagnoses and altered medical management for some patients, emphasizing the need for policy changes to ensure equitable access to genetic testing. -Provided by ChatGPT
Research Question/Problem/ Need	Plans may cover the costs of provider-recommended genetic testing, but universal criteria are lacking
Important Figures	“Without policy change, more medically impactful genetic diagnoses will be missed.” — Tomi Pastinen, MD, PhD
VOCAB: (w/definition)	Coverage Denials: “Health insurance coverage denials occur when a health insurance company refuses to cover certain medical services, treatments, or procedures that a policyholder or their healthcare provider has requested.” -ChatGPT
Cited references to follow up on	https://www.sciencedirect.com/science/article/pii/S1098360023000266?via%3Dihub

Follow up Questions	Many of these articles analyze the impact of genetic testing on health insurance companies from an insurance providers' perspective. Could this be analyzed from a consumer's perspective?

Article #7 Notes: A Method for Empirical Estimation of Planck's Length, Mass, and Time through the Characteristics of an Electron. Improving the Accuracy of Some Physical Constants.

Source Title	A Method for Empirical Estimation of Planck's Length, Mass, and Time through the Characteristics of an Electron. Improving the Accuracy of Some Physical Constants.
Source citation (APA Format)	Timkov, V. (2023, June 3). *A method for empirical estimation of Planck's length, mass, and time through the characteristics of an electron. improving the accuracy of some physical constants*. SSRN. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4468172
Original URL	https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4468172
Source type	Journal Article
Keywords	Planck's length, mass, and time, the accuracy of physical constants, Euler number, Planck's Universal Proportions, gravitational quantization step.
#Tags	#Planck-Constant, #Planck-Time, #Planck-Mass, #Planck-Length
Summary of key points + notes (include methodology)	This article discussed the ways which constants such as the gravitational constant and planck's constant are estimated, then proposed several ways to estimate them using knowledge of formulas as well as Avagadro's number and Euler's number. This article proposed a way "to improve the accuracy of the following physical constants:Planck's length, mass, and time, Newtonian constant of gravitation, Planck's constant, fine structure constant, elementary electric charge, electron mass, temperature Planck, as well as all physical constants that can be expressed analytically in terms of Planck's length, mass, and time, for example, the Hartree energy, the Bohr magneton, the von Klitzing constant."
Research Question/Problem/	How are numbers such as the Plank units approximated?

Need	
Important Figures	
VOCAB: (w/definition)	
Cited references to follow up on	
Follow up Questions	

Article #8: Genetic testing and health insurance: Can they coexist?

Source Title	Genetic testing and health insurance: Can they coexist?
Source citation (APA Format)	
Original URL	https://www.ccjm.org/content/ccjom/71/1/8.full.pdf
Source type	
Keywords	
#Tags	
Summary of key points + notes (include methodology)	The article, authored by Nancy L. Fisher, MD, explores the complex relationship between genetic testing and health insurance, addressing the concerns of discrimination based on genetic information. Fisher acknowledges the potential benefits of genetic testing in identifying individuals at risk for diseases, enabling early preventive measures. However, she highlights the fear that genetic information might lead to discrimination in health insurance and employment, echoing historical concerns about eugenics. The article discusses a bill, S. 1053, the Genetic Nondiscrimination Act of 2003, which aims to protect genetic information privacy and prevent discrimination by insurance companies and employers. Fisher raises questions about defining what genetic information insurers should be barred from using and the actual risk of denial of health insurance based solely on genetic tests. The article suggests redefining "preexisting conditions" based on signs and symptoms rather than DNA tests and calls for society to consider the balance between insurance practices and the expectation of comprehensive health care. The methodology involves a critical analysis of the issues surrounding genetic testing, health insurance, and proposed legislation. -ChatGPT
Research Question/Problem/ Need	
Important Figures	
VOCAB: (w/definition)	
Cited references to follow up on	
Follow up Questions	

Article #9: The Health Insurance Policy Simulation Model for 2020

Source Title	The Health Insurance Policy Simulation Model for 2020 t
Source citation (APA Format)	Buettgens, M., & Banthin, J. (2020). The Health Insurance Policy Simulation Model for 2020. Urban.Org. https://www.urban.org/sites/default/files/publication/103412/the-health-insurance-policy-simulation-model-for-2020.pdf
Original URL	https://www.urban.org/sites/default/files/publication/103412/the-health-insurance-policy-simulation-model-for-2020.pdf
Source type	Research Report
Keywords	
#Tags	
Summary of key points + notes (include methodology)	This Report was created by the Urban Institution, a program designed to model data relating to health insurance cost and coverage policies. To create the model, the program utilized data available through the ACA, UIMAF, as well as other programs to access information on variables, as well as undergoing calculations to find separate variables such as underlying healthcare expenditures, work firm categorization, and population projection. Using the variables identified, the program was able to create a projection of data based on many factors, from State, age, income, insurance status, insurance eligibility, and more. The information provided by this report is incredibly useful for healthcare organizations, legislators, and for future modeling programs on the topic.

The Health Insurance Policy Simulation Model (HIPSM 2021)

- Problem/Research Question: There are not many effective ways to model the future of healthe insurance cost and coverage policies

- Approach: Create a model which can "incorperate timely, real world data" to produce estimates" and test new scenarios

- Applications: Used in Massachusetts that led to legislation of Health Care Reform
- Cited in court cases
- Used by Medicaid for expansion

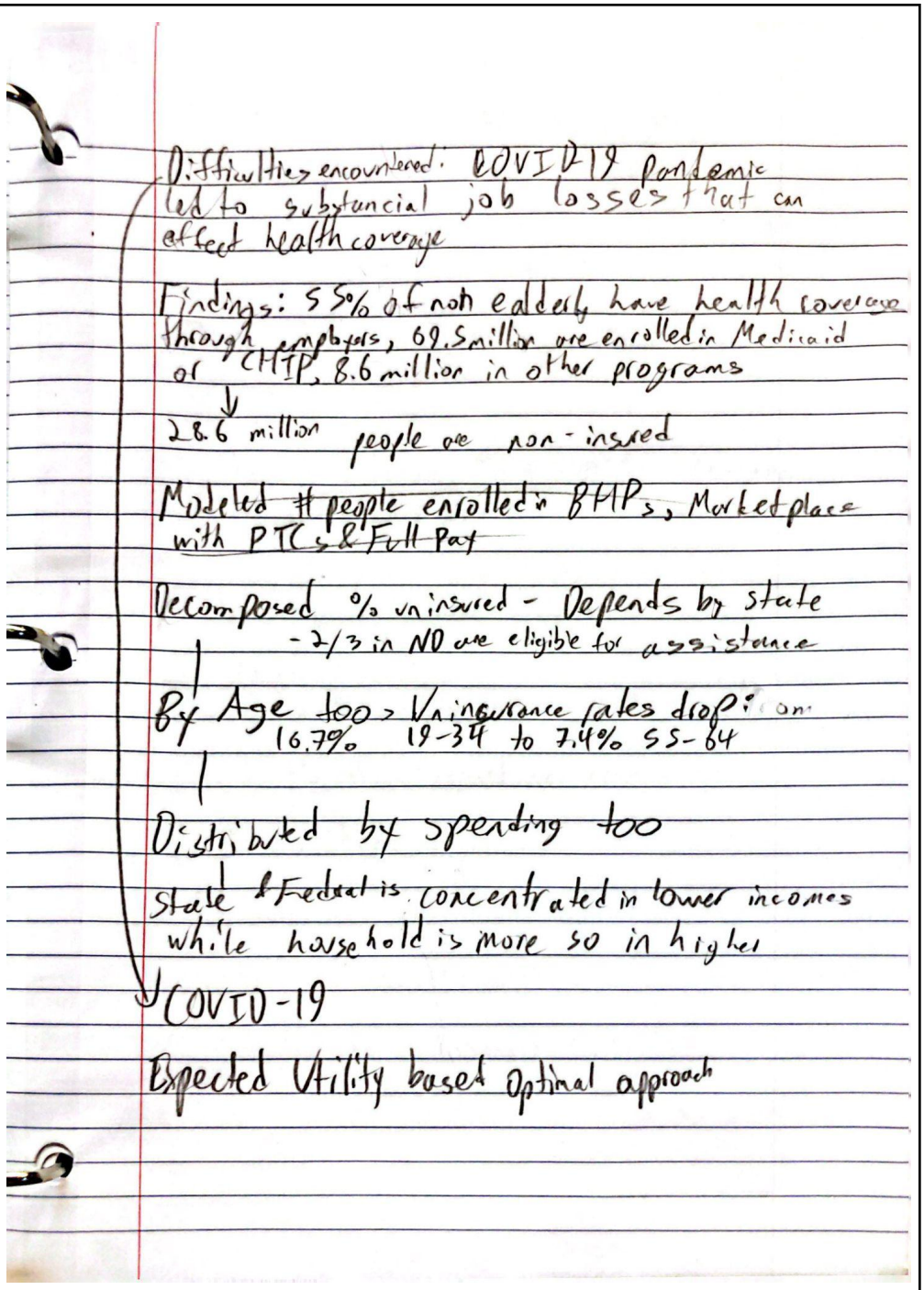
Strengths: Updated Annually
- Built From Binary Decisions
- Data based From th ACS

Expected-Utility Framework
- Each Family chooses the option w/ the highest Expected Utility (when given a choice) to predict decisions, all options are assigned a value, utility value, cost, risk factor to make a decision

DATA: From ACS, Urban Institute's Mapping America's Futures Program, MEPS-HC

Survey by US Agency for Healthcare Research & Quality

- Used to estimate: Medicaid eligibility, demographics, ESI Related Costs, marketplace, healthcare spending



Difficulties encountered: COVID-19 pandemic led to substancial job losses that can affect health coverage

Findings: 55% of non elderly have health coverage through employers, 69.5 million are enrolled in Medicaid or CHIP, 8.6 million in other programs

↓

28.6 million people are non-insured

Modeled # people enrolled in BHIPs, Marketplace with PTCs & Full Pay

Decomposed % uninsured - Depends by state
- 2/3 in ND are eligible for assistance

By Age too > Uninsurance rates drop: 16.7% 19-34 to 7.4% 55-64

Distributed by spending too

State & Federal is concentrated in lower incomes while household is more so in higher

COVID-19

Expected Utility based Optimal approach

Urban Institute

Methodology:

Using accuracy of ACA they can narrow down data to state and even substate regions

↓

Adding firm size, policy holder status, unemployment compensation, ESI offers, immigration status

Using Census Bureau & UI MAF Program for population projection

↓

Grouping Workers into firms using many variables - firm size, Major industry group, region, health coverage

↓

Use that to model

"family affordability glitch" modeled

Underlying Healthcare expenditures needed

↓

match healthcare expenditure data

↓

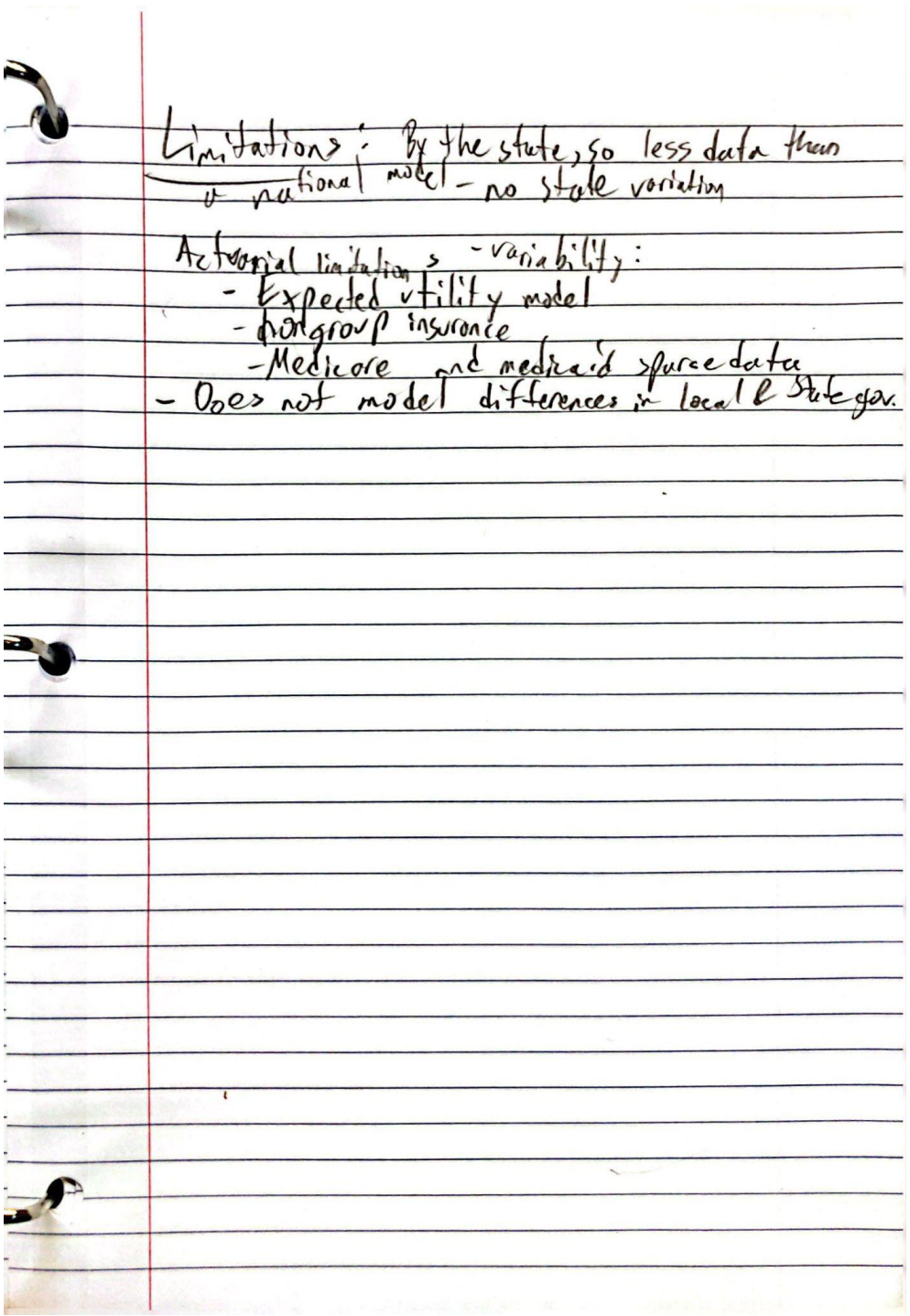
find statistical expenditure distribution data

Society of Actuaries' Health Care Cost Institute Database

Benefit Packages in Insurance Expenditures

↓

Adjusting costs, packages & premiums by state/region

	
Research Question/Problem/ Need	
Important Figures	
VOCAB: (w/definition)	Expected-Utility Framework: A model which assumes that each client/family will

	choose the option with the highest expected utility ACS: American Community Survey - “This is a survey conducted by the U.S. Census Bureau. It provides detailed demographic, social, economic, and housing information about communities in the United States. The ACS is conducted on an ongoing basis and is used for various purposes, including government resource allocation, policy planning, and research.” -ChatGPT OER: Open Enrollment Period: “refers to a specific time frame during which individuals can sign up for or make changes to their health insurance plans. This period is essential for people who want to purchase health insurance or make modifications to their existing coverage. The open enrollment period can vary depending on the type of health insurance plan and the country's healthcare system, but it commonly includes the following features: -ChatGPT BHP: Basic Health Program: “a healthcare option available in the United States, specifically designed for low-income individuals who do not qualify for Medicaid but still need affordable health insurance coverage. BHP was established as part of the Affordable Care Act (ACA) to provide an additional option for individuals in this income range.” -ChatGPT PCT: Premium Tax Credits: “a financial assistance program provided by the U.S. government to help eligible individuals and families afford health insurance through the Health Insurance Marketplace, which is a key component of the Affordable Care Act (ACA).” -ChatGPT Nongroup Insurance: “often referred to as individual or individual-market insurance, is a type of health insurance coverage that individuals purchase directly from an insurance company or through a health insurance marketplace. It is distinct from group health insurance, which is typically offered through employers to their employees.” -ChatGPT
Cited references to follow up on	
Follow up Questions	How much did the COVID-19 pandemic impact this data’s validity? How did Court cases use this program’s conclusions? Can variables be manipulated? Has this study been used anywhere applying genetic testing into the calculation?

	Are other years' reports (2021,2022,2023) available?

Article #10: Pharmacogenetics: Reproduce Implications of race and ethnicity on defining genetic profiles for personalized medicine

Source Title	Pharmacogenetics: Implications of race and ethnicity on defining genetic profiles for personalized medicine
Source citation (APA Format)	
Original URL	https://www.jacionline.org/action/showPdf?pii=S0091-6749%2813%2901701-6
Source type	Journal Article
Keywords	Asthma, genes, pharmacogenetics, response heterogeneity, single nucleotide polymorphism, admixture mapping, ethnic group
#Tags	
Summary of key points + notes (include methodology)	The goal of this correlative study was to correlate genetic variability by ethnic group It is well known that frequencies and even severities of disease can differ between races. The genetic diversity of different ancestral populations has been shown to have implications for the frequency of rare genetic variants.
Research Question/Problem/ Need	To date, pharmacogenetic studies have been primarily performed in trial cohorts consisting of non-Hispanic asthmatic subjects of European descent.
Important Figures	These studies consistently demonstrated that asthmatic patients homozygous for the Arg16 allele were more likely to experience adverse effects on peak flow rate during regular SABA treatment compared with Gly16 homozygotes
VOCAB: (w/definition)	Pharmacogenetics: Pharmacogenetics is the study of the role of genetic variability in determining interindividual (between-subject) variability in responses to a pharmacologic therapy
Cited references to follow up on	Human Genome Project
Follow up Questions	

Article #11: The Affordable Care Act's Impacts on Access to Insurance and Health Care for Low-Income Populations

Source Title	The Affordable Care Act's Impacts on Access to Insurance and Health Care for Low-Income Populations
Source citation (APA Format)	Kominski, G., et al. (2016). The Affordable Care Act's Impacts on Access to... - Annual Reviews. Retrieved from https://www.annualreviews.org/doi/pdf/10.1146/annurev-publhealth-031816-044555
Original URL	https://www.annualreviews.org/doi/pdf/10.1146/annurev-publhealth-031816-044555
Source type	Scientific Article
Keywords	health reform, Medicaid expansion, health insurance exchanges, poor, health care access, utilization
#Tags	#Affordable-Care-Act #Health-Insurance
Summary of key points + notes (include methodology)	-The ACA of 2010 was an act enacted to expand health insurance and medicaid eligibility for Americans particularly of low-middle income status. Before the act -Before the passing of the act, 50 million Americans did not have health insurance. Of those 50 million, about 91% fell into the income bracket which provided them eligibility following this act. -The ACA may also have reverse effects on lower/middle class people by creating plans which are purposefully restricted to few doctors and hospitals in order to remain competitive. This process is known as narrow networks -The plan would have expanded all Medicaid eligibility to individuals up to 138% of the FPL but that was ruled unconstitutional by the supreme court, so 19 states rejected that option
Research Question/Problem/ Need	How has the Affordable Care Act Impacted Insurance access for lower income Americans?
Important Figures	SUMMARY POINTS

	1. An estimated 20 million individuals have gained coverage under the ACA. Since open enrollment began in 2013, more than 15 million individuals enrolled in Medicaid and CHIP. In addition, ~12.7 million were enrolled in Marketplace plans after the third open enrollment period (not everyone enrolled in Marketplace plans or Medicaid was previously uninsured). 2. Insurance coverage among Americans has significantly increased since ACA implementation, especially those in Medicaid expansion states and among subpopulations targeted by the law, namely the poor, childless adults, ethnic minorities, and young adults. 3. Approximately 32 million nonelderly adults remain uninsured, half of whom are eligible forMedicaid/CHIP orMarketplace tax credits. As undocumented residents do not qualify for assistance under the ACA, the remaining uninsured also include about 5.2 million of the approximate 11 million undocumented individuals residing in the U.S. 4. The ACA has generally been associated with significant improvements in access and affordability and increases in outpatient utilization among low-income populations, but changes in inpatient utilization and health outcomes have been less conclusive. 5. Despite the availability of subsidies and cost-sharing reductions, the reliance of the ACA on health insurance exchanges might increase access to health insurance, but simultaneously pose unintended barriers to access through creation of narrow networks and existence of high-deductible Bronze plans. 6. A major limitation of post-ACA evaluations is minimal follow-up time, as it will likely take longer for the effects of the law to materialize. Therefore, continued monitoring of implementation and effectiveness is essential.
VOCAB: (w/definition)	ACA: The Affordable Care Act, also known as Obamacare, is a comprehensive healthcare reform law enacted in the United States in 2010. It aimed to improve access to health insurance, regulate the insurance industry, and reduce healthcare costs. FPL: The Federal Poverty Level (FPL) is a measure used by the U.S. government to determine income eligibility for certain programs and benefits, including subsidies for health insurance under the ACA. It is updated annually and varies based on household size and location.

	QHP: Qualified Health Plan (QHP) refers to a health insurance plan that meets the standards and regulations set by the ACA. These plans are offered on the Health Insurance Marketplace and are eligible for premium subsidies and other cost-sharing reductions for qualifying individuals and families. OOP: Out-of-Pocket (OOP) refers to the expenses that individuals must pay for covered healthcare services, such as deductibles, co-payments, and coinsurance. There is usually a limit on annual out-of-pocket expenses to protect individuals from catastrophic medical costs. Narrow Networks: Health insurance plans often have networks of healthcare providers with whom they have negotiated lower rates. Narrow networks refer to a limited selection of doctors, hospitals, and other healthcare providers that are covered by a particular insurance plan. Choosing providers within the network typically results in lower out-of-pocket costs. Bronze/Silver/Gold/Platinum Plans: These are the metal categories used to classify health insurance plans on the Health Insurance Marketplace based on the level of coverage they provide: Bronze Plans: Generally have lower premiums but higher out-of-pocket costs. They cover about 60% of the total average cost of care. Silver Plans: Offer a moderate level of coverage, covering about 70% of the total average cost of care. They often come with lower out-of-pocket costs than Bronze Plans. Gold Plans: Have higher premiums but lower out-of-pocket costs, covering about 80% of the total average cost of care. Platinum Plans: Typically have the highest premiums but the lowest out-of-pocket costs, covering about 90% of the total average cost of care. -ChatGPT
Cited references to follow up on	Off. Assist. Secr. Plan. Eval. 2015. Health Insurance Coverage and The Affordable Care Act. US Dep. Health Hum. Serv., Off. Assist. Secr. Plan. Eval., May 5, Washington, DC. https://aspe.hhs.gov/sites/default/files/pdf/139211/ib_uninsured_change.pdf Antonisse L, Garfield R, Rudowitz R, Artiga S. 2016. The effects of Medicaid expansion under the ACA: findings from a literature review. Kaiser Family Found. Issue Brief, June, Washington, DC. http://files.kff.org/attachment/Issue-brief-The-Effects-of-Medicaid-Expansion-under-the-ACA-Findingsfrom-a-Literature-Review
Follow up Questions	Why has the ACA been so ineffective?

Article #12: PPO Insurance: What Is It?

Source Title	PPO Insurance: What Is It?
Source citation (APA Format)	Rivelli, E. (2023, November 23). PPO Insurance: What Is It? Forbes. Retrieved from https://www.forbes.com/advisor/health-insurance/ppo-health-insurance-plans/
Original URL	https://www.forbes.com/advisor/health-insurance/ppo-health-insurance-plans/
Source type	Journal Article
Keywords	PPO, Insurance, Health Care, Financial Advisor
#Tags	#Health-Insurance #PPO #HMO #EPO #POS
Summary of key points + notes (include methodology)	-PPOs are plans known for their flexibility, and are a type of plan which covers a percentage of cost once you reach your deductible. -With a PPO, you can go to a doctor or a hospital that is not associated with the preferred provider for a smaller percentage coverage. -PPO incentivizes you to get in-network care because it a higher rate is discounted and will cost you less out of pocket -Found average insurance plan cost for Aetna, Blue Cross Blue Shield, and Cigna -based on factors like age, tobacco use, dependents on the plan, plan tier and your location -Describes pros and cons of PPO, not needing specialist referral and having flexibility to go out of network but having more expensive premiums and no PCP
Research Question/Problem/ Need	How are Health Insurance Plans Categorized?
Important Figures	 -HMO plans are less expensive and generally have much lower premiums, but they do not commonly provide flexibility for out-of-network care services, requiring the full price to be paid entirely out-of-pocket.

	<table><tr><th>Feature</th><th>EPO</th><th>PPO</th></tr><tr><td>Cost</td><td>Less expensive</td><td>More expensive</td></tr><tr><td>Referrals required?</td><td>No</td><td>No</td></tr><tr><td>Out-of-network care?</td><td>No</td><td>Yes</td></tr></table> -EPO Plans are the affordable option but they also do not provide flexibility for out-of-network care. <table><tr><th>Feature</th><th>POS</th><th>PPO</th></tr><tr><td>Cost</td><td>Less expensive</td><td>More expensive</td></tr><tr><td>Referrals required?</td><td>Yes</td><td>No</td></tr><tr><td>Out-of-network care?</td><td>Yes (with higher cost sharing)</td><td>Yes</td></tr></table> -POS Plans are similar to PPO plans, however they are less expensive and require more out-of-pocket expenses for out-of-network care. They also require referrals.
VOCAB: (w/definition)	PPO: Preferred provider organization (PPO), A plan which allows flexibility in health care. Covers a percentage of health care expenses (amount discounted depends on whether provider is in or out of network) until the user reaches a certain amount, known as the deductible. EPO Plans are the affordable option but they also do not provide flexibility for out-of-network care. HMO plans are less expensive and generally have much lower premiums, but they do not commonly provide flexibility for out-of-network care services, requiring the full price to be paid entirely out-of-pocket. POS Plans are similar to PPO plans, however they are less expensive and require more out-of-pocket expenses for out-of-network care. They also require referrals.
Cited references to follow up on	https://www.forbes.com/advisor/health-insurance/how-much-does-health-insurance-cost/
Follow up Questions	Are the rates of PPO plans the same as that of other plans?

Article #13: National Health Expenditures 2022 Highlights

Source Title	National Health Expenditures 2022 Highlights
Source citation (APA Format)	Centers for Medicare & Medicaid Services. (2022). Fact Sheet National Health Expenditures 2022 Highlights. CMS.gov. Retrieved from https://www.cms.gov/newsroom/fact-sheets/national-health-expenditures-2022-highlights
Original URL	https://www.cms.gov/files/document/highlights.pdf
Source type	Professional Report
Keywords	Health Care Spending, Uninsured Individuals, Medicaid, Medicare
#Tags	#Health-Insurance #Health-Care #Medicaid #Medicare
Summary of key points + notes (include methodology)	The National Health Expenditures report for 2022 highlights key trends in U.S. healthcare spending. Total healthcare spending reached $4.5 trillion, growing at 4.1%, reflecting an increase from 3.2% in 2021 but a significant drop from the 10.6% surge in 2020 during the COVID-19 pandemic. Medicaid and private health insurance spending grew, while federal COVID-19 supplemental funding declined. The insured population reached 92%, with 26.6 million uninsured individuals. Hospital care, physician services, and retail prescription drugs constituted significant spending categories. Notably, the GDP share devoted to healthcare fell to 17.3% in 2022. Methodologically, the report analyzes spending by type of service, sources of funds, and sponsorship, providing insights into the dynamics shaping the nation's healthcare expenditure landscape. -ChatGPT
Research Question/Problem/ Need	How are American healthcare expenses distributed in terms of Service, Source, or Sponser?
Important Figures	Private Health Insurance (29 percent share): Private health insurance spending increased by 5.9 percent in 2022 (to $1.3 trillion), which was slightly slower than the increase of 6.3 percent in 2021. For hospital care, physician and clinical services, and dental services, private health insurance expenditures grew more slowly in 2022 following stronger growth in 2021. Private health insurance enrollment increased 1.5 percent, or by 2.9 million individuals, in 2022—the fastest increase since 2015.
VOCAB: (w/definition)	Out-of-Pocket Expenses: Refers to the expenses that individuals must pay directly for healthcare services, not covered by insurance

	Medicaid: A government program in the United States that provides health coverage for low-income individuals and families. Premiums: The regular payments individuals make to their insurance companies for coverage. Federal Medical Assistance Percentage (FMAP): A formula used to determine the amount of federal matching funds provided to states for Medicaid. -ChatGPT
Cited references to follow up on	Health Affairs article: Hartman et al, "National Health Care Spending In 2022: Growth Similar To Prepandemic Rates"
Follow up Questions	Is there information on the rates of insurance costs in other years? Similarly, are there rates of the number of people insured over the years? Are there models in place which project how much health care may cost in the future

Article #14: Don’t Count on 23andMe to Detect Most Breast Cancer Risks, Study Warns

Source Title	Don’t Count on 23andMe to Detect Most Breast Cancer Risks, Study Warns
Source citation (APA Format)	Murphy, H. (2019, April 16). Don’t Count on 23andMe to Detect Most Breast Cancer Risks, Study Warns. The New York Times. https://www.nytimes.com/2019/04/16/health/23andme-brca-gene-testing.html
Original URL	https://www.nytimes.com/2019/04/16/health/23andme-brca-gene-testing.html
Source type	Journal Article
Keywords	23andMe, Genetic Testing, Breast Cancer
#Tags	#23andMe #GWAS #Breast Cancer #BRCA1 #Genetic-Predisposition
Summary of key points + notes (include methodology)	The article discusses the limitations of 23andMe's genetic testing for breast cancer risks, particularly related to the BRCA gene mutations. It highlights a study of 100,000 people suggesting that 90% of those with a BRCA mutation would be missed by 23andMe's test, which focuses on just three genetic variants. The study, conducted by Invitae, indicates that many individuals carry other mutations not covered by 23andMe's approach. Critics, including medical professionals and geneticists, express concerns about misleading results and emphasize the importance of comprehensive genetic testing. The article delves into the study's methodology, contrasting 23andMe's approach with Invitae's more extensive genetic analysis, and discusses potential consequences of false positives in online genetic tests -ChatGPT
Research Question/Problem/ Need	How effective is 23andMe’s Breast Cancer Risk Identification?
Important Figures	A study of 100,000 people released earlier this month suggested that this experience could be widespread. Nearly 90 percent of participants who carried a BRCA mutation would have been missed by 23andMe’s test, geneticists found.
VOCAB: (w/definition)	BRCA Gene Mutations: Mutations in the BRCA1 and BRCA2 genes, which are associated with an increased risk of breast and ovarian cancer. Founder Mutations: Specific genetic variations that are prevalent in certain populations or ethnic groups. Preventive Mastectomy: Surgical removal of one or both breasts to reduce the risk of developing breast cancer.

	Confirmation Bias: The tendency to interpret information in a way that confirms one's preexisting beliefs or expectations. -ChatGPT
Cited references to follow up on	-https://www.acmg.net/ -The study was not referenced at the end but it would be helpful to find it to view the primary source
Follow up Questions	Is it possible to find this study online? What was the methodology of this study? Does this mean that the accuracy of their GWAS would be less, or does this only apply to their genetic testing? What other studies could I use if this type of study from 23andMe is not effective?

Article #15: Average Cost of Health Insurance (2024)

Source Title	Average Cost of Health Insurance (2024)
Source citation (APA Format)	Shepard, D. (2023, December 12). Average Cost of Health Insurance (2024) - ValuePenguin. In B. Law (Ed.), Value Penguin. Retrieved from https://www.valuepenguin.com/average-cost-of-health-insurance
Original URL	https://www.valuepenguin.com/average-cost-of-health-insurance
Source type	Journal Article
Keywords	Health Insurance, Silver Plan, Private Health Insurance
#Tags	#Health-Insurance, #Health-Care
Summary of key points + notes (include methodology)	The article discusses the average cost of health insurance for the year 2024, particularly focusing on Silver plans for 40-year-olds in the United States. It reveals that the average monthly premium for a Silver plan is $584, indicating a 4% increase from the previous year. The report provides a state-by-state breakdown of costs, highlighting variations and percentage changes. It also explores the national trends in health insurance rates, discussing changes and variations across different tiers (Catastrophic, Bronze, Silver, Gold, Platinum) and plan types (HMO, PPO, EPO). Additionally, the article addresses private health insurance costs and factors influencing health insurance rates, such as age, location, smoking, and the number of people insured. The FAQ section addresses common queries, and the methodology involves aggregating data from CMS and state-run marketplaces for a comprehensive analysis. -ChatGPT
Research Question/Problem/ Need	How do Silver Monthly Health Insurance Premiums vary by state?
Important Figures	State 2023 cost 2022 cost % change National $560 $541 4% Alabama $591 $579 2% Alaska $822 $715 15% Arizona $569 $577 -1% Arkansas $456 $419 9% California $541 $537 1% Colorado $489 $409 20% Connecticut $614 $564 9% Delaware $566 $555 2% Florida $599 $585 2%

Georgia	$474	$394	20%	
Hawaii	$482	$490	-2%	
Idaho	$483	$516	-6%	
Illinois	$561	$556	1%	
Indiana	$425	$433	-2%	
Iowa	$551	$533	3%	
Kansas	$565	$534	6%	
Kentucky		$479	$478	0%
Louisiana		$652	$728	-10%
Maine	$506	$465	9%	
Maryland		$385	$365	5%
Massachusetts		$553	$535	3%
Michigan		$435	$410	6%
Minnesota		$404	$389	4%
Mississippi		$499	$511	-2%
Missouri		$626	$620	1%
Montana		$519	$479	8%
Nebraska		$652	$685	-5%
Nevada	$575	$578	-1%	
New Hampshire		$372	$360	3%
New Jersey		$535	$537	0%
New Mexico		$551	$480	15%
New York		$776	$713	9%
North Carolina		$666	$634	5%
North Dakota		$538	$524	3%
Ohio	$513	$490	5%	
Oklahoma		$634	$635	0%
Oregon	$493	$475	4%	
Pennsylvania		$532	$498	7%
Rhode Island		$424	$413	3%
South Carolina		$469	$436	8%
South Dakota		$792	$811	-2%
Tennessee		$533	$508	5%
Texas	$589	$575	2%	
Utah	$558	$563	-1%	
Vermont		$760	$810	7%
Virginia	$425	$512	-17%	
Washington		$470	$443	6%
West Virginia		$871	$831	5%
Wisconsin		$550	$514	7%
Wyoming		$882	$764	15%

	Monthly health insurance cost by tier **Tier** / **2024 rate** / **2023 rate** / **% change** Catastrophic / $335 / $332 / 1% Bronze / $462 / $440 / 5% Silver / $584 / $560 / 4% Gold / $641 / $604 / 6% Platinum / $813 / $737 / 10% Monthly policy premiums are for 40-year-olds. Expanded Bronze was omitted due to a lack of data across states. Information on how health insurance costs vary by tier - Silver is the most common tier and the one used by this study Data for the Catastrophic tier and plan types is averaged from the 32 states that use HealthCare.gov.
VOCAB: (w/definition)	Premiums: Payments made by individuals to insurance companies in exchange for coverage. Tiers: Categorizations of health insurance plans based on the level of coverage they provide, with Platinum plans offering the highest coverage and Catastrophic plans offering the least. Deductibles: The amount individuals must pay out of pocket for covered health care services before their insurance plan starts to pay. Copays: Fixed amounts individuals pay for covered health care services, typically paid at the time of service. Catastrophic Plan: A type of health insurance plan with low monthly premiums and high deductibles, designed for young and healthy individuals. Obamacare: Informal term for the Affordable Care Act (ACA), a comprehensive healthcare reform law in the United States. -ChatGPT
Cited references to follow up on	-HealthCare.gov. -State Marketplaces -More information by the state
Follow up Questions	How do these amounts further vary by county? How did they access Healthcare.gov? Can I do that?

Article #16: Breast Cancer Risk Among Male BRCA1 and BRCA2 Mutation Carriers

Source Title	Breast Cancer Risk Among Male BRCA1 and BRCA2 Mutation Carriers
Source citation (APA Format)	Tai, Y. C., et al. (2007, December 5). Breast Cancer Risk among Male BRCA1 and BRCA2 Mutation Carriers. Journal of the National Cancer Institute. U.S. National Library of Medicine. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2267289/pdf/nihms41843.pdf.
Original URL	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2267289/pdf/nihms41843.pdf
Source type	Scientific Article
Keywords	BRCA1, BRCA2, Breast Cancer, Mutation
#Tags	#Breast-Cancer #GWAS #BRCA1 #BRCA2
Summary of key points + notes (include methodology)	This article titled "Breast Cancer Risk Among Male BRCA1 and BRCA2 Mutation Carriers" investigates the risk of developing breast carcinoma in men carrying germline mutations in the BRCA1 and BRCA2 genes. The study analyzes data from 1939 families with 97 male subjects with breast carcinoma collected from eight centers across the National Cancer Institute's Cancer Genetics Network. The results indicate that male BRCA1 and BRCA2 mutation carriers have higher cumulative risks of breast cancer compared to non-carriers, with BRCA2 carriers having a higher risk than BRCA1 carriers. The relative risks are highest in men in their 30s and 40s, decreasing with age. The study provides important risk estimates for guiding risk management strategies for male members of families with these mutations. The methodology involves a retrospective analysis of family history data, and the study contributes valuable insights into the association between BRCA mutations and male breast cancer. -ChatGPT
Research Question/Problem/ Need	Do male BRCA1 and BRCA2 carriers have a higher risk of Breast Cancer?

Important Figures

Table 1

Male breast cancers, grouped by family

Mutated gene	Mutation	Ethnicity	Age at first diagnosis*, y	No. of female breast cancers in family†
BRCA1	633delC	Other	46‡	2
BRCA1	2931CC→G	Other	64‡	1
BRCA1	2985del5	Other	73	4
BRCA1	5149del5	Other	51	3
BRCA1	5296del4	Other	68	4
BRCA1	Exon 13 dup	Other	42	4
BRCA2	379delG	Other	79, 49‡	1
BRCA2	1128insG	Other	48‡	2
BRCA2	3034del4	Other	52,‡§	3
BRCA2	Y1894X	Other	64, 70‡	1
BRCA2	6174delT	Other	46‡	0
BRCA2	6174delT	Other	61‡	0
BRCA2	6174delT	Other	75‡	2
BRCA2	7989delC	Other	53, 70‡	5
BRCA2	1538del4	Other	66	6
BRCA2	1982delA	Ashkenazi Jewish	85, 71	4
BRCA2	2041insA	Other	51	4
BRCA2	3034del4	Other	47	4
BRCA2	3945delA	Other	66, 42	4
BRCA2	4075delGT	Ashkenazi Jewish	70	2
BRCA2	5482delC	Other	70	1
BRCA2	5849del4	Other	62, 65	7
BRCA2	5950delCT	Other	65	1
BRCA2	6051delA	Other	58	2
BRCA2	6174delT	Other	49	3
BRCA2	6174delT	Ashkenazi Jewish	61	1
BRCA2	6659delA	Other	49	4
BRCA2	9538delAA	Other	50	5
BRCA2	Q3066X	Other	26	5
None found	—	18 Ashkenazi Jewish	60 (13.7)‖	1.56 (1.29)
None found	—	44 Other	64 (12.2)	1.45 (1.38)

*When more than one breast cancer was diagnosed in a single man, the age at each diagnosis is presented for BRCA1 and BRCA2 mutation carriers, and the mean age at diagnosis (standard deviation) is presented for noncarriers.

†The mean number of female breast cancers (standard deviation) is presented for noncarriers.

‡Carriage of a mutation was confirmed by genotype analysis.

§This man had contralateral breast cancer. Cancer in the second breast was diagnosed at age 55 years.

‖This group includes two men with contralateral male breast cancer: one was diagnosed at ages 58 and 59 years, and the other was diagnosed at age 45 years for both breasts. Both patients were genotyped, but no mutation was found.

This chart shows the rates of breast cancer among individuals with the mutated BRCA1 and BRCA2 genes. Rates tend to be higher among those with the genes than without.

VOCAB: (w/definition)

Germline mutations: Inherited genetic alterations present in the germ cells (sperm or egg) that can be passed onto offspring.

Retrospective study: A type of research design that looks backward in time to analyze events that have already happened, such as reviewing historical data or medical records.

Risk management: Strategies and interventions aimed at minimizing the impact of potential risks, often applied in the context of genetic conditions or diseases.

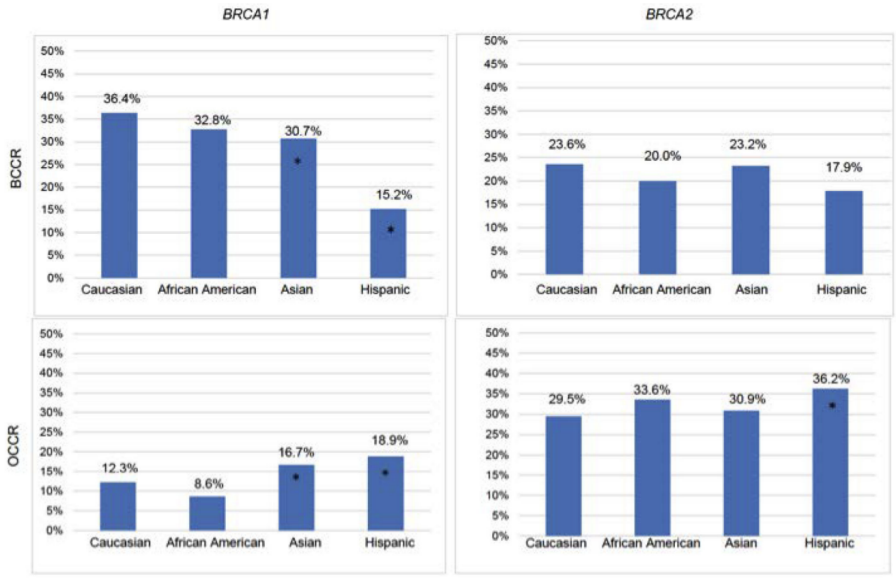
Surveillance, Epidemiology, and End Results (SEER) database: A comprehensive source of cancer statistics in the United States, providing information on cancer incidence, survival, and prevalence.

Penetrance: The proportion of individuals carrying a specific genetic mutation who exhibit the associated trait or condition. High penetrance indicates a strong correlation between the mutation and the trait.

Cited references to follow up on	Sasco AJ, Lowenfels AB, Pasker-De Jong P. Review article: epidemiology of male breast cancer. A meta-analysis of published case–control studies and discussion of selected aetiological factors. Int J Cancer 1993;53:538–549. [PubMed: 8436428] Wooster R, Bignell G, Lancaster J, Swift S, Seal S, Mangion J, et al. Identification of the breast cancer susceptibility gene BRCA2. Nature 1995;378:789–792. [PubMed: 8524414]
Follow up Questions	Should my research project investigate Breast Cancer Mutations and health insurance among just females, or could I be able to do this with males as well?

Article #17: Mutational Spectrum in a Worldwide Study of 29,700 Families with BRCA1 or BRCA2 Mutations

Source Title	Mutational Spectrum in a Worldwide Study of 29,700 Families with BRCA1 or BRCA2 Mutations
Source citation (APA Format)	Rebbeck, T. R., et al. (2018, May). Mutational Spectrum in a Worldwide Study of 29,700 Families with BRCA1 or BRCA2 Mutations. Human Mutation. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5903938/
Original URL	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5903938/pdf/nihms938537.pdf
Source type	Author Manuscript
Keywords	BRCA1; BRCA2; breast cancer; ovarian cancer; mutation; ethnicity; geography
#Tags	#BRCA1 #BRCA2 #Breast-Cancer #Mutation @GWAS
Summary of key points + notes (include methodology)	The Consortium of Investigators of Modifiers of BRCA1/2 (CIMBA) conducted a comprehensive global study on BRCA1 and BRCA2 mutations, analyzing data from 29,700 families across 49 countries. The research identified 1,650 unique BRCA1 and 1,731 unique BRCA2 mutations, revealing significant variation in mutation type and frequency based on geographical region and race/ethnicity. In addition to well-known founder mutations, certain high-frequency mutations were identified in specific racial/ethnic groups, suggesting potential founder effects. The findings underscore the importance of understanding population-specific mutational spectra for efficient genetic testing and targeted screening strategies, especially in diverse populations. The study contributes valuable insights into the worldwide distribution of BRCA1 and BRCA2 mutations, offering implications for risk assessment and medical management in different populations. -ChatGPT
Research Question/Problem/ Need	How do BRCA1 and BRCA2 mutations vary by geographical location and ethnicity?

Important Figures	 Depicts the rates of each ethnicity by location  **Figure 2.** Rates of each Breast Cancer mutation by ethnicity
VOCAB: (w/definition)	Medical Management: The strategies and interventions employed to prevent, diagnose, or treat medical conditions, often informed by genetic information. Mutation: A permanent alteration in the DNA sequence of a gene, which may

	lead to changes in the structure or function of the encoded protein. Founder Effect: A phenomenon where a population is descended from a small number of ancestors, leading to a limited genetic diversity and an increased prevalence of certain genetic traits or disorders. Mutational Spectrum: The range and types of mutations that occur in a particular gene or genetic region.
Cited references to follow up on	Hum Mutat. Author manuscript; available in PMC 2019 May 01.
Follow up Questions	Would this data function as a backup for 23andMe? Is this enough data to run a correlative study on?

Article #19: BOADICEA: a comprehensive breast cancer risk prediction model incorporating genetic and nongenetic risk factors

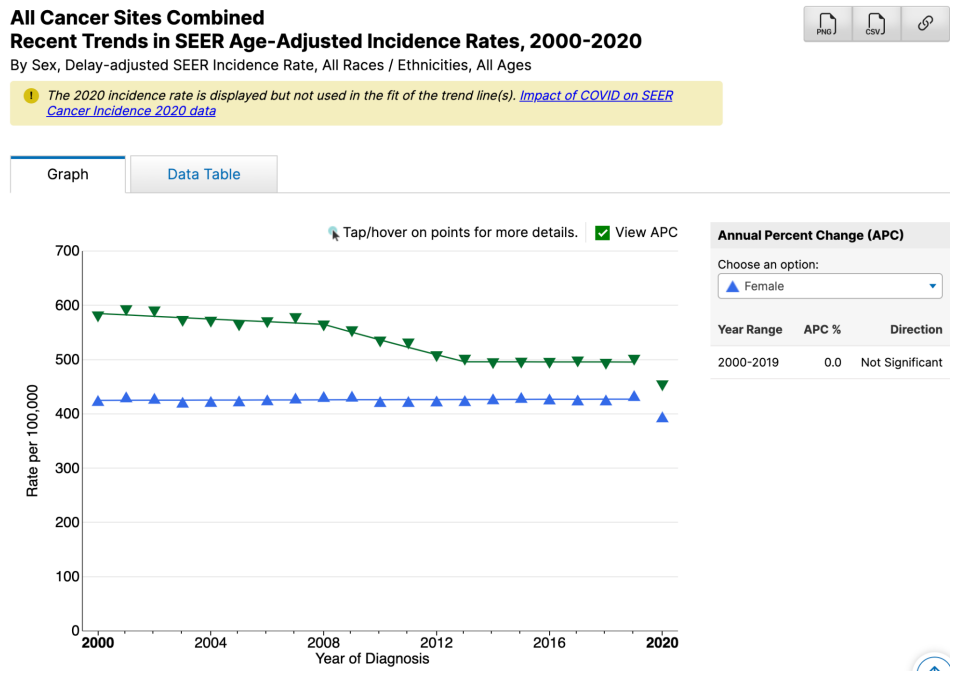
Source Title	BOADICEA: a comprehensive breast cancer risk prediction model incorporating genetic and nongenetic risk factors
Source citation (APA Format)	Lee, A., et al. (2019). Boadicea: A Comprehensive Breast Cancer Risk Prediction Model Incorporating Genetic and Nongenetic Risk Factors. Genetics in Medicine. Advance online publication. https://doi.org/10.1016/j.gim.2018.12.020 (Lee et al., 2019)
Original URL	https://www.sciencedirect.com/science/article/pii/S1098360021015963?via%3Dihub
Source type	Scientific Article
Keywords	breast cancer risk prediction BOADICEA rare variants PRS
#Tags	#Breast-Cancer #Risk-Prediction #GWAS
Summary of key points + notes (include methodology)	BOADICEA (Breast and Ovarian Analysis of Disease Incidence and Carrier Estimation Algorithm) is a comprehensive breast cancer risk prediction model that integrates both genetic and nongenetic risk factors. Developed by a team of researchers led by Antonis C. Antoniou, the model assesses an individual's likelihood of developing breast cancer based on a variety of factors. These include genetic markers, family history of breast cancer, and other relevant demographic and lifestyle information. BOADICEA aims to provide a more accurate and personalized estimation of breast cancer risk, contributing to improved prevention and early detection strategies. The model was described in the article titled "Boadicea: A Comprehensive Breast Cancer Risk Prediction Model Incorporating Genetic and Nongenetic Risk Factors," published in Genetics in Medicine in January 2019. -ChatGPT
Research Question/Problem/ Need	Can you predict how at risk an individual is to develop Breast Cancer given a set of genetic and nongenetic factors?

Important Figures	$$\lambda^{(i)}(t) = \lambda_0(t)\exp\left(\sum_{\mu=1}^{5}\beta_{MG\mu}(t)\prod_{\nu=1}^{\mu-1}\left(1-G_{\nu}^{(i)}\right)G_{\mu}^{(i)} + \beta_{PG}(t)x_P^{(i)}\right). \quad (1)$$ The Equation used for the modeling method. The model takes into account, where λ0(t) is the baseline incidence and λi(t) is the modeled incidence. This model takes into account 5 separate parameters, "BRCA1, BRCA2, PALB2, CHEK2, and ATM respectively; and βMGμ(t) represents the age-specific logrelative risks (log-RRs) associated with the major genes, relative to the baseline incidence (for a person with more than one rare pathogenic variant, the risks are determined by the lowest μ)"
VOCAB: (w/definition)	BOADICEA (Breast and Ovarian Analysis of Disease Incidence and Carrier Estimation Algorithm): The name of the risk prediction model itself, developed to estimate an individual's risk of developing breast and ovarian cancer based on various factors, including genetic information. Risk Prediction Model: A statistical model that assesses the likelihood or probability of a specific event occurring, such as the development of breast or ovarian cancer in the case of BOADICEA. Genetic Risk Factors: Specific variations or mutations in genes that are associated with an increased risk of developing breast or ovarian cancer. BOADICEA takes into account genetic information to refine risk estimates. Nongenetic Risk Factors: Environmental, lifestyle, and other non-genetic factors that may contribute to an individual's risk of developing breast or ovarian cancer. BOADICEA considers a broad range of factors for a more comprehensive risk assessment. Carrier Estimation Algorithm: Part of BOADICEA that focuses on estimating the likelihood of an individual being a carrier of specific genetic mutations associated with breast and ovarian cancer. Breast Cancer: A type of cancer that originates in the cells of the breast, and is one of the main outcomes considered by BOADICEA. -ChatGPT
Cited references to follow up on	Antoniou AC, Cunningham AP, Peto J, et al. The BOADICEA model of genetic susceptibility to breast and ovarian cancers: updates and extensions. Br J Cancer. 2008;98:1457–1466. Kuchenbaecker KB, Hopper JL, Barnes DR, et al. Risks of breast, ovarian, and contralateral breast cancer for BRCA1 and BRCA2 mutation carriers.

	JAMA. 2017;317:2402–2416
Follow up Questions	Could this model be used in my study? Could the model be adjusted to take into account other non genetic factors?

Article #20: SEER Explorer

Source Title	SEER Explorer
Source citation (APA Format)	National Cancer Institute. (2020). SeerExplorer. SEERExplorer Application. Retrieved from https://seer.cancer.gov/statistics-network/explorer/application.html?site=1&data_type=1&graph_type=2&compareBy=sex&chk_sex_3=3&chk_sex_2=2&rate_type=2&race=1&age_range=1&hdn_stage=101&advopt_precision=1&advopt_show_ci=on&hdn_view=0&advopt_show_apc=on&advopt_display=2
Original URL	https://seer.cancer.gov/statistics-network/explorer/application.html?site=1&data_type=1&graph_type=2&compareBy=sex&chk_sex_3=3&chk_sex_2=2&rate_type=2&race=1&age_range=1&hdn_stage=101&advopt_precision=1&advopt_show_ci=on&hdn_view=0&advopt_show_apc=on&advopt_display=2
Source type	Research Paper
Keywords	SEER, Cancer, Breast Cancer,
#Tags	#Cancer #Breast-Cancer #SEER
Summary of key points + notes (include methodology)	The SEERExplorer, developed by the National Cancer Institute, is a comprehensive online application providing access to cancer statistics based on the Surveillance, Epidemiology, and End Results (SEER) program. This tool allows users to explore cancer incidence, mortality, and survival data for various demographic and clinical factors. The SEERExplorer employs a user-friendly interface, enabling customized data visualization and analysis. Methodologically, the application draws from SEER's extensive cancer registry, covering diverse populations across the United States. Users can navigate through different cancer sites, patient characteristics, and temporal trends. Key features include the ability to compare incidence and mortality rates, explore age-specific and age-adjusted rates, and assess trends over time. This resource proves invaluable for researchers, healthcare professionals, and policymakers seeking detailed insights into cancer epidemiology for informed decision-making and research endeavors. -ChatGPT
Research Question/Problem/ Need	What are the rates of different cancers by demographic?

Important Figures	 This model shows the rates of all cancer sites combined diagnosis for female individuals. This can be adjusted to classify by the type of cancer, age, race, rate type, and precision.
VOCAB: (w/definition)	Epidemiology: The study of patterns, causes, and effects of health-related events and conditions in specific populations, often focusing on the occurrence and distribution of diseases. Incidence: The number of new cases of a specific disease or health condition within a defined population and time period. Mortality Rate: The measure of the number of deaths in a particular population, usually expressed per 1,000 or 100,000 people per year. Survival Rate: The proportion of individuals with a specific disease who are still alive at a given time after diagnosis or treatment, often expressed as a percentage. Demographic Factors: Characteristics such as age, sex, race, ethnicity, and socioeconomic status that are used to describe and categorize populations. Cancer Registry: A systematic collection of data about cancer, including information on the occurrence, type, extent of spread, and outcomes of cancer patients. Age-adjusted Rates: Statistical rates that have been modified to eliminate the influence of age differences in different populations, allowing for better comparison.

	Temporal Trends: Patterns or changes in data over time, often used to identify emerging issues or assess the impact of interventions. Population-based Research: Studies that involve an entire population or a representative subset, aiming to draw conclusions that can be generalized to the broader population. Health Disparities: Differences in health outcomes or access to healthcare services between different population groups, often associated with social, economic, or environmental factors. -ChatGPT
Cited references to follow up on	https://seer.cancer.gov/data/covid-impact.html
Follow up Questions	How accurate is the information? Can I access specific data tables from this source?

Article #21: The Marketplace in your state

Source Title	The Marketplace in your state
Source citation (APA Format)	United States (2023). The marketplace in your State. HealthCare.gov. https://www.healthcare.gov/marketplace-in-your-state/
Original URL	https://www.healthcare.gov/marketplace-in-your-state/
Source type	Professional Report
Keywords	United States, HealthCare.gov
#Tags	#Health-Insurance, Health-Care
Summary of key points + notes (include methodology)	The text is an informational announcement from the official website of the U.S. Centers for Medicare & Medicaid Services, guiding individuals on health coverage enrollment. It emphasizes that, regardless of the state, individuals can enroll in affordable health coverage. The notice informs Virginia residents of changes for 2024 coverage and directs them to use Virginia's Insurance Marketplace for enrollment starting November 1, 2023. The methodology is not explicitly outlined, as the content serves as a directive and informational guide for users seeking health coverage. Key points include details on Medicaid expansion, instructions on how to apply for health coverage, and a list of state-specific marketplaces with corresponding links. -ChatGPT
Research Question/Problem/ Need	Where can people access e-commerce health insurance marketplaces depending on their location?
Important Figures	How to apply for health coverage Pick your state to apply for health coverage. We'll send you to the right place. Or, if your state is listed below, select it from this list to go directly to it's own Marketplace website where you can apply:
VOCAB: (w/definition)	Marketplace: A platform or system where individuals and families can compare and purchase health insurance plans. In the context of the text, each state has its own marketplace for health coverage. Centers for Medicare & Medicaid Services (CMS): A federal agency within the United States Department of Health and Human Services that administers programs covering health care services for eligible individuals. Marketplace Website: The online platform specific to each state where

	individuals can explore, compare, and purchase health insurance plans. Health Connector: A term used in the text to refer to the marketplace in Massachusetts where residents can access and enroll in health coverage. Premium: The amount of money an individual or family pays for their health insurance plan, typically on a monthly basis. -ChatGPT
Cited references to follow up on	Center for Medicare and Medicaid Services Annual Transcripts
Follow up Questions	If different health insurance plans are differently determined by location, how might I respond during my data calculation and collection?

Patent #1: Method for providing current assessments of genetic risk

Source Title	Method for providing current assessments of genetic risk
Source citation (APA Format)	Ledley, F. D. (2019, August 15). Method for providing current assessments of genetic risk.
Original URL	https://patents.google.com/patent/US20190252050A1/en?q=(genetic+testing)&oq=genetic+testing
Source type	Patent
Keywords	Genetic Risk, Genetic Testing
#Tags	#Genetic-Testing #Risk-Assessment
Summary of key points + notes (include methodology)	The patent, titled "Method for providing current assessments of genetic risk" by Fred David Ledley, introduces an integrated approach to offer individuals up-to-date evaluations of their genetic risk by incorporating genetic tests and advancements in genomic research. While existing genetic tests can estimate risk for common diseases, the invention anticipates the emergence of new genetic tests from genomic research, allowing for more precise risk assessments. The integrated method and systems proposed by the patent aim to furnish individuals with current genetic risk assessments, empowering both individuals and healthcare professionals in making informed decisions related to healthcare and lifestyle. This innovation represents a comprehensive strategy that leverages emerging genomic insights for a more nuanced understanding of an individual's susceptibility to various health conditions. -ChatGPT
Research Question/Problem/ Need	Can genetic risk assessment based off of genetic testing results be improved with modern advances

Important Figures

I,_____, hereby agree to participate in testing for using a DNA-based test. I understand that samples of blood will be drawn from me and/or members of my family by removing blood from a vein, a procedure which carries very little risk. In addition, if prenatal diagnosis is involved, fetal cells obtained by amniocentesis or chorion villus sampling will be used. I understand that the blood and fetal samples will be used for the purpose of attempting to determine if I and members of my family are carriers of the disease gene, or are affected with, or at increased risk to someday be affected with this genetic disease.

I understand that:

1. In some cases the DNA test directly detects an abnormality, called a mutation, in the _____ gene, and the test is >99% accurate. In other cases, an indirect method called linkage analysis is used If linkage analysis is being used, naturally occurring rearrangements in the DNA (recombination) may produce an uncertainty in predicting carrier status or diagnosis. Rare variations in the DNA of individuals can also cause uncertainty in the results. In other words, the test is not 100% accurate, and the results will be reported as a probability.

2. In some families, the markers may not be informative. If this is the case, this DNA test can not provide results for that family, or for some members of that family.

3. An error in the diagnosis may occur if the true biological relationships of the family members involved in this study are not as I have stated. For example, nonpaternity means that the father of an individual is not the person stated to be the father. This test may detect nonpaternity and it may be necessary to report this finding to the individual who requested testing.

4. Any erroneous clinical diagnosis in a family member can lead to an incorrect diagnosis for other related individuals in question. I understand that the DNA analysis performed at the University of Pennsylvania Diagnostic Laboratory for this disease is specific only with respect to it and in no way guarantees my health or the health of my unborn child. The accuracy of DNA analysis is entirely dependent on the clinical diagnosis made elsewhere, and University of Pennsylvania cannot be responsible for erroneous clinical diagnosis made at other centers.

5. Generally, these tests are relatively new and are being improved and expanded continuously. The tests are not considered research but are considered to be the best and newest laboratory service which can be offered. This testing is often complex and utilizes specialized materials so that there is always some small possibility that the test will not work properly or that an error will occur. There is a low error rate (perhaps 1 in 1000 samples) even in the best laboratories. My signature below acknowledges my voluntary

participation in this test, but in no way releases the laboratory and staff from their professional and ethical responsibility to me.

6. In some cases it may be possible for the laboratory to reanalyze leftover DNA samples in the future using new and improved methods. However, I understand that this is not a DNA banking facility and my DNA sample may not be available for future clinical studies.

7. Because of the complexity of DNA based testing and the important implications of the test results, results will be reported to me only through a physician or genetic counselor who I designate. The results are confidential; they will only be released to other medical professionals or other parties with my written consent. Participation in DNA testing is completely voluntary.

_____ _____
Signature of Participant Date

_____ _____
Signature of Witness Date

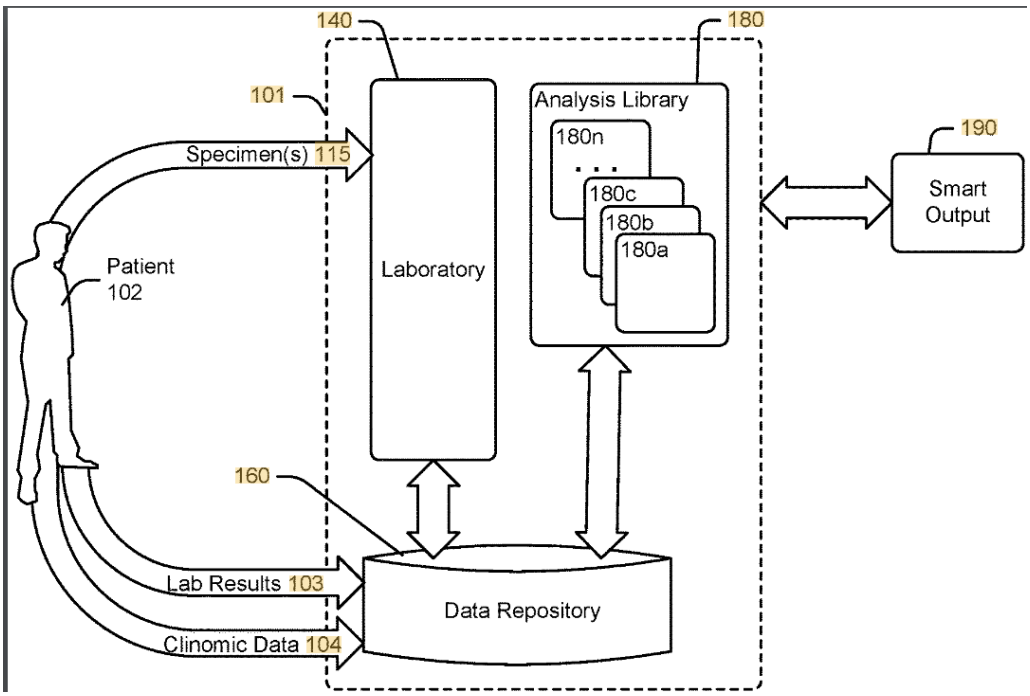
Physician's/Counselor's Statement: I have explained DNA testing to this individual. I have addressed the limitations outlined above, and I have answered this person's questions.

_____ _____
Signature of Physician Date

	Ensures that the client taking the genetic testing is informed of the risks prior to testing.
VOCAB: (w/definition)	Genetic Risk Assessment: The process of evaluating an individual's likelihood of developing certain diseases or conditions based on their genetic information. Genomic Research: The study of the entire set of genes (genome) in an organism, including interactions between genes and the environment. Integrated Method: A comprehensive and unified approach that combines various elements or techniques to achieve a specific goal, as in the integration of genetic tests and genomic research in this patent. -ChatGPT
Cited references to follow up on	US8719045B2
Follow up Questions	This patent's status is currently abandoned, but are its ideas still applicable today?

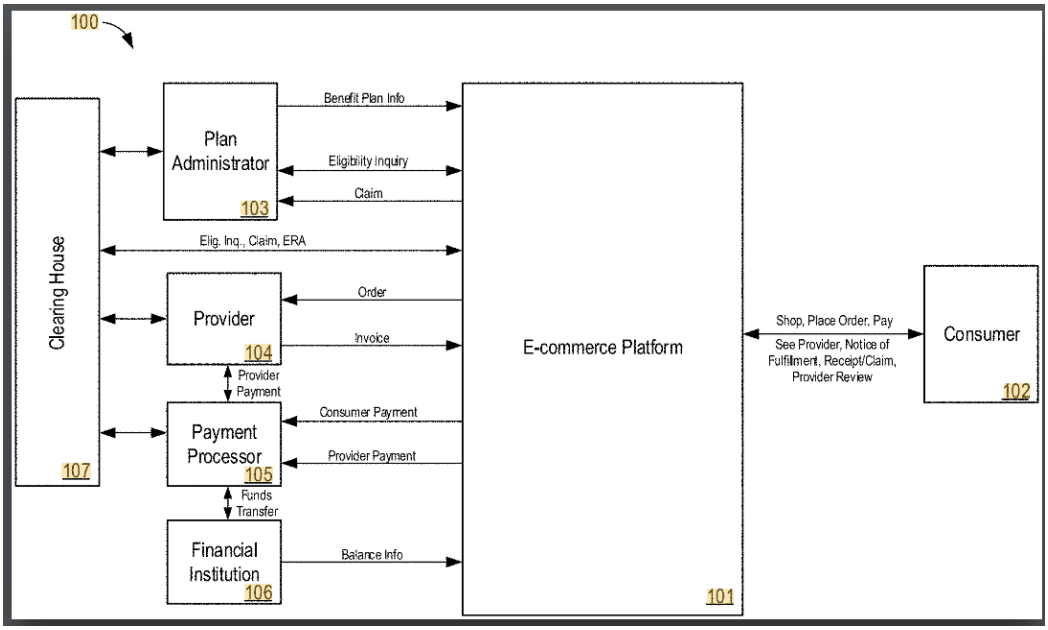
Patent #2: Artificial intelligence assisted precision medicine enhancements to standardized laboratory diagnostic testing

Source Title	Artificial intelligence assisted precision medicine enhancements to standardized laboratory diagnostic testing
Source citation (APA Format)	Lefkofsky, E. (n.d.). Artificial intelligence assisted precision medicine enhancements to standardized laboratory diagnostic testing.
Original URL	https://patents.google.com/patent/US20210118559A1/en?q=(genetic+testing)&oq=genetic+testing
Source type	Patent
Keywords	AI, Genetic-Testing
#Tags	#Genetic-Testing #Development
Summary of key points + notes (include methodology)	The patent titled "Artificial Intelligence Assisted Precision Medicine Enhancements to Standardized Laboratory Diagnostic Testing" introduces a system and method that involves receiving laboratory diagnostic testing results linked to a subject's specimen. The method incorporates the reception of a clinomic profile of the subject, the identification of a cohort of similar subjects using the clinomic profile, and the provision of diagnostic testing results, clinomic profile, and the identified cohort to a smart output module. This module generates a personalized, precision medicine-based laboratory diagnostic testing result, referred to as a smart output, which is then displayed to a user. The innovation combines artificial intelligence and clinomic data to enhance the accuracy and personalization of laboratory diagnostic testing, offering a valuable tool for informed medical decision-making. -ChatGPT
Research Question/Problem/ Need	Can Artificial Intelligence use genetic testing results as a basis for medicine enhancements outputs

Important Figures	 A graphical abstract of the patent's function. An individual patient will take genetic testing, then the lab results will be compounded with a library of data and information. Using these two datasets, the Artificial Intelligence would provide a projection for medicine enhancements.
VOCAB: (w/definition)	Clinomic Profile: A comprehensive profile that encompasses clinical information and factors relevant to an individual's health, often including genetic, medical, and lifestyle data. Smart Output Module: A component or system utilizing artificial intelligence to process and analyze data, generating intelligent and personalized results or recommendations based on the input data. Standardized Laboratory Testing: Consistent and uniform procedures for conducting laboratory tests to ensure accuracy, reliability, and comparability of results across different settings. Personalized Medicine: Another term for precision medicine, emphasizing the customization of healthcare based on an individual's unique characteristics and medical history. -ChatGPT
Cited references to follow up on	IT202100031331A1 US20210111936A1
Follow up Questions	Is this a possible additional factor for clients interested in genetic testing to consider, given that there may be a risk associated with health insurance providers?

Patents #3: Systems and methods for a health care e-commerce marketplace

Source Title	Systems and methods for a health care e-commerce marketplace
Source citation (APA Format)	Chmait, M., Cooper, W., CooganElizabeth, C., & Berselli, E. A. (2019, September 9). Systems and methods for a health care e-commerce marketplace.
Original URL	https://patents.google.com/patent/US11763277B2/en?q=(health+insurance+marketplace)&oq=health+insurance+marketplace
Source type	Patent
Keywords	Health Insurance, E-Commerce marketplace
#Tags	#Health-Insurance #Health-Care-Access #Marketplace
Summary of key points + notes (include methodology)	The patent discloses innovative systems and methods for a health care e-commerce marketplace, revolutionizing the way health care services are accessed and transacted. Users can submit queries, prompting the system to retrieve a list of healthcare providers and services with associated prices from a database. The list is then filtered based on the user's geographical location, providing a tailored selection. Users can make payments for selected services, initiating notifications to the chosen provider. Upon receiving order fulfillment notifications from providers, the system automatically processes payments, ensuring prompt and efficient transactions. This approach empowers health care consumers to make informed decisions while offering health care providers a streamlined and timely payment process for their services, thus enhancing the overall health care marketplace experience. -ChatGPT
Research Question/Problem/ Need	Can there be a resource created for an online health insurance marketplace?

Important Figures	 Graphical Abstract of the E-commerce marketplace system design. Consumers input information on their location, age, sex, and income into an E-commerce platform. The E-commerce platform compiles data from plan administrators, providers, payment processors and financial institutions in order to make it so that the consumers can shop for and purchase health insurance after inputting their information.
VOCAB: (w/definition)	E-commerce Health Care Marketplace: An online platform facilitating the buying and selling of health care services, allowing users to browse, select, and pay for various health care offerings from providers. Geographic Filtering: The process of narrowing down or refining information based on the geographical location specified, ensuring that the presented options are relevant and applicable to the user's location. Prompt Payment: Timely and immediate processing of payments upon user selection and confirmation of a health care service, ensuring efficient and seamless financial transactions between consumers and providers. Database Retrieval: The action of obtaining information from a structured collection of data (a database) in response to a user query, ensuring that relevant and up-to-date information is presented. Smart Output Module: A component of the system that processes diagnostic testing results, clinomic profiles, and cohort information to generate personalized, precision medicine-based laboratory diagnostic testing results for users. User Query: An inquiry or request submitted by a user seeking specific information or services within the health care e-commerce marketplace, initiating the retrieval and presentation of relevant data.

	-ChatGPT
Cited references to follow up on	US11763277B2 US20140006055A1
Follow up Questions	How easily can this system be updated? How does it compare to current systems in place? What are some restraints associated with this system?