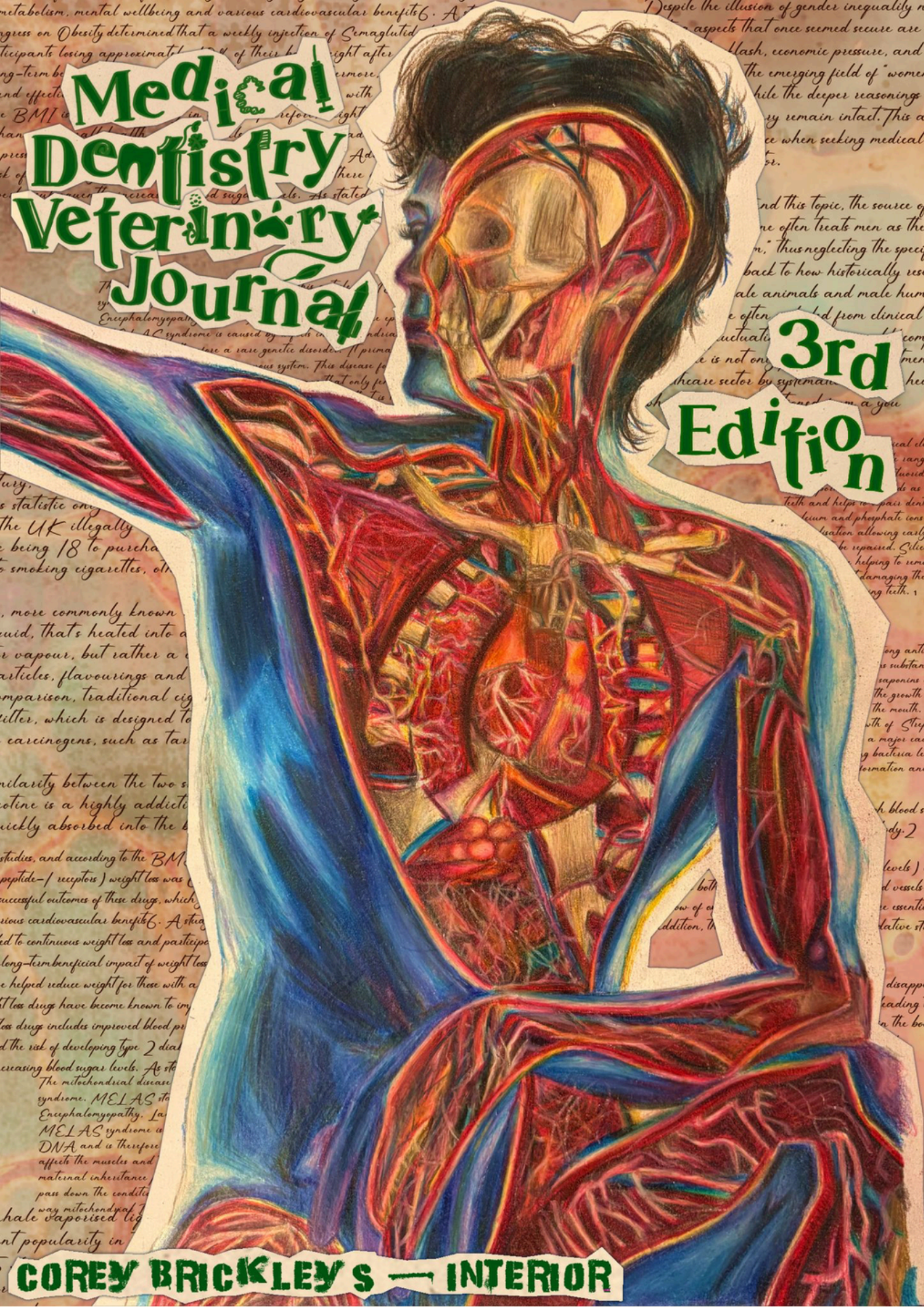
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A WORD FROM THE TEAM

AIZA YOUSAF - HEAD & ILLUSTRATOR

The revival of the MDVJ began with a simple aim: to create a platform where aspiring medics, dentists and vets could explore their academic interests, develop their writing and share their ideas with a wider audience. I am grateful to Bolton School Girls' Division for supporting this initiative and for providing an environment in which students are encouraged to pursue their interests beyond the classroom. I would also like to thank Mrs Furey for her encouragement as the project developed. Over the course of the year, I have had the pleasure of working closely with our contributors, preparing guidance for submissions, coordinating meetings and deadlines, and reviewing each article to ensure clarity and consistency across the publication. Illustrating the cover was another particularly enjoyable part of the process. Bringing the journal together has been both demanding and rewarding. I hope it will encourage future students to engage with academic writing, explore the subjects that interest them and continue building on what has been started this year. My sincere thanks go to our designers, Ivy and Halima; our Chief Editor, Marryum; and our editors, Nikita and Disha, whose time, commitment and support have been greatly appreciated. The MDVJ has been a collective effort, and it has been wonderful to see it take shape.

MARRYUM GUL - CHIEF EDITOR

After a year of hard work, I am so proud to see our vision for the MDVJ come to life. Thank you to all the designers and contributors who helped make this publication possible, and a special thank you to my wonderful editors, Nikita and Disha. I have been extremely fortunate to work alongside them, and this journal would not have been possible without their dedication, perseverance and support, especially amidst the demands of end-of-year exams. Editing these articles has exposed me to a wide range of fascinating topics across the medical, dentistry and veterinary industry, issues I may never have explored without this project. Taking on the role of Chief Editor has been the most rewarding decision I have made this year. While it is bittersweet to see this chapter come to an end, I am excited to pass the journal on to the next generation of students. To the future MDVJ team: good luck! I hope you enjoy the experience as much as we did and cherish the friendships you make along the way. It has been a privilege to work with such an incredible team, and I wish everyone the very best in their future endeavours.

NIKITA DONTULA & DISHA CHALLA - EDITORS

Upon the initial introduction of the MDVJ, we were so excited to contribute articles. So when Aiza broached the question of us becoming editors, we were honoured and eager to accept. Through this role, we have had the privilege to explore various issues that were foreign to us, and editing such a versatile range of topics has been truly eye opening. The whole process has been extremely fun, and we both have thoroughly enjoyed our time. From mastering Vancouver referencing, to finally learning how to use a semicolon, we'll always value this experience and look back on our time fondly. Thank to Aiza for coordinating all of us, illustrating a fantastic cover, and gifting us this opportunity. Thank you to Halima and Ivy for managing to make 18 unique articles, one cohesive journal . Finally, a special thanks goes to Marryum. We have been extremely lucky to have you as our Chief Editor and without your persistent organisation, dedication and emails, we would not have made it this far. Good luck to the future MDVJ team! We hope you all will enjoy the experience like we have - and to the current team we'll miss us all working together.

HALIMA YUSUF & IVY ZHENG - DESIGNERS

We had first been introduced to the MDVJ project when the team were still looking for designers back in January. Upon hearing about it, we both eagerly volunteered and have not regretted the decision since. It has been an honour to have been able to contribute to this project whilst working alongside such a lovely group of illustrators and editors. We must say thank you to the editors; Marryum, Nikita and Disha for all their hard work and support throughout this tedious, stressful process and a huge thank you especially, to our amazing head and illustrator, Aiza. For coordinating this project and constantly providing advice and honest feedback throughout our countless meetings. It has been a long journey; from sketches on pads of paper, to childish year nine-like formats, to finally, our current design. We could not have done this without each other, and the support from the rest of the team, during this busy last half of the year. Thank you to all the contributors, Mrs Furey and the MDVJ team, this process has been a pleasure and one which we will cherish forever, we wish you all the absolute best as you move forward on your paths.

MEDICINE

POLIO RESURFACES :

UNDERSTANDING THE MODERN THREAT

AIZA YOUSAF YEAR 12 – MEDICINE CONTRIBUTOR

Introduction:

Polio is a small, non-enveloped virus containing a single-stranded RNA genome (Figure 1). It is the cause of poliomyelitis, a highly infectious viral disease that can lead to lifelong paralysis and, in rare cases, death. [1] There are three serotypes of poliovirus: Wild Poliovirus (WPV)1, WPV2, and WPV3. [2] As of March 2026, both WPV2 and WPV3 have been eradicated; however, WP1 continues to circulate in a few countries, particularly Pakistan and Afghanistan. For the first time since the last case in 1984, poliovirus was detected in sewage samples around North and East London, raising concerns about possible silent transmission.

Transmission:

Poliovirus is transmitted from person to person through oral and faecal-oral routes. The virus enters through the mouth and multiplies in the throat and gastrointestinal tract. It can be excreted in nasopharyngeal secretions and stool, allowing further spread.
Individuals at highest risk include travellers to countries where polio is endemic, healthcare workers handling poliovirus specimens, and populations with low vaccination coverage. [2]

Symptoms and signs:

Most poliovirus infections are asymptomatic. Approximately one quarter of infected individuals develop a mild, short-term illness, which may include fever, gastrointestinal symptoms, or respiratory symptoms. [3]
A small proportion of infections progress to paralytic disease. Paralysis occurs in approximately 1 in 200 to 1 in 2000 infections, affecting the limbs and sometimes the respiratory muscles, which can be life-threatening (Figure 2).
There is no curative treatment for polio. Management is mainly supportive; therefore, prevention through vaccination remains the most effective strategy.

Polio vaccine:

Two main types of polio vaccine are available:

- Oral poliovirus vaccine (OPV) – a live attenuated vaccine
- Inactivated poliovirus vaccine (IPV) – given by injection. [3]

Because OPV carries a small risk of vaccine-associated paralytic polio, many high-income countries, including the UK, now use IPV in routine immunisation programmes.
In the UK, the vaccine is given at 2, 4, 6, and 18 months with a booster at 40 months and 14 years, as part of the routine childhood immunisation schedule. [4]

The Global Polio Eradication Initiative, launched in 1988, has dramatically reduced the global burden of the disease. Since then, cases of poliovirus have declined by more than 99.9%, and two of the three wild poliovirus serotypes have been eradicated.

Why This Has Become a Critical Issue:

Despite these successes, polio remains a global health concern. Between January 2021 and May 2023, more than 2000 cases of vaccine-derived poliovirus were reported in 36 countries. [3]

In addition, poliovirus has been detected in sewage samples in London for the first time in four decades, and a genetically linked strain was detected in New York. These findings suggest ongoing transmission in the community and highlight how international travel can facilitate the spread of the virus. New WPV1 cases have been reported in Afghanistan and Pakistan.

These strains are particularly concerning because they can lead to paralytic disease in unvaccinated individuals.

Another major challenge is vaccine hesitancy. In some regions, conflict, distrust in healthcare systems, and sociocultural barriers reduce vaccination uptake. [5] A study in 2019 identified concerns related to vaccine safety, distrust of vaccination teams, fear of side effects, and misinformation circulating on social media. [6]

Vaccine hesitancy is also present in some Western countries where anti-vaccination views persist.

To interrupt transmission, vaccination coverage must remain high. The World Health Organisation recommends approximately 95% coverage to achieve herd immunity. However, in some countries, such as Pakistan, vaccination coverage remains lower, around 83%.

Future direction:

Addressing misconceptions about vaccines remains essential for the global eradication of polio. Public health campaigns that engage communities and build trust are crucial.

Initiatives such as the London polio catch-up campaign in 2023, aimed at increasing vaccination among under-immunised children, provide useful models for other countries. [7]

Adults who are unvaccinated or incompletely vaccinated should be offered IPV, particularly if they are travelling to high-risk regions.

Finally, international collaboration is vital. High-risk countries require continued support through funding, technical expertise, and coordinated public health strategies to achieve the final goal of global polio eradication.

REFERENCES:

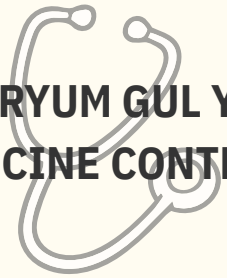
1) Estívariz CF, Kidd S, Kovacs SD. Poliomyelitis. In: CDC Yellow Book: Health Information for International Travel 2026 [Internet]. Atlanta (GA): Centers for Disease Control and Prevention; 2025. (Accessed 5th March 2026) https://www.cdc.gov/yellow-book/hcp/travel-associated-infections-diseases/poliomyelitis.html

2) Kidd, S., Clark, T., Routh, J., Cineas, S., Bahta, L., & Brooks, O. (2023). Use of Inactivated Polio Vaccine Among U.S. Adults: Updated Recommendations of the Advisory Committee on Immunization Practices - United States, 2023. https://doi.org/10.15585/mmwr.mm7249a3

3) Mbani, C. J., Nekoua, M. P., Moukassa, D., & Hober, D. (2023). The Fight against Poliovirus Is Not Over. Microorganisms. 2023;11(5):1323. (Accessed 5th March 2026) https://doi.org/10.3390/microorganisms11051323
4) NHS. Polio. NHS website. 2026 Jan 22. https://www.nhs.uk/conditions/polio/
5) Hill M, Pollard AJ. Detection of poliovirus in London highlights the value of sewage surveillance. Lancet. 2022 Oct 29;400(10362):1491-1492. doi:10.1016/S0140-6736(22)01885-2. (Accessed 5th March 2026) https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(22)01885-2/fulltext
6) Sillab FA, Moghri J, Najar AV, Marvi A, et al. Breaking barriers: a qualitative study on polio vaccine hesitancy in Herat Province, Afghanistan. BMC Public Health. 2025 Aug 18;25(1):2820. doi: 10.1186/s12889-025-23903-w. (Accessed 5th March 2026) https://pubmed.ncbi.nlm.nih.gov/40826048/
7) Abbasi FH, Shaikh AA, Mehraj J, Raza SM, et al. Vaccine Hesitancy and Perceptions of the Community about Polio in High-Risk Areas of Karachi, Sindh, Pakistan. Vaccines (Basel). 2022 Dec 28;11(1):70. doi: 10.3390/vaccines11010070 (Accessed 5th March 2026) https://pubmed.ncbi.nlm.nih.gov/36679915/

SHOULD CRISPR BE USED TO EDIT HUMAN EMBRYOS?

MARRYUM GUL YEAR 12 – MEDICINE CONTRIBUTOR



What is CRISPR?

The ability to edit the human genome with precision was once confined to the realm of science fiction; however, the development of CRISPR-Cas9 has transformed this into a scientific reality. CRISPR is a gene-editing technology that allows scientists to modify DNA. It is used by microbes to find and eliminate unwanted invaders, offering the potential to correct mutations responsible for genetic disorders[1]. What makes CRISPR revolutionary is its accuracy, effectiveness and relatively low cost compared to previous gene-editing methods. As a result, the prospect of editing human embryos to eliminate hereditary diseases is no longer theoretical. However, this possibility has sparked significant ethical debate. Germline editing would introduce permanent changes that are passed down through generations, raising concerns about safety, consent and the potential for misuse, such as for the selection of non-medical traits. Therefore, whether CRISPR should be used to edit human embryos remains a highly debated issue.

The Debate:

CRISPR has the power to prevent serious genetic diseases before birth, for example, cystic fibrosis, a disease that causes severe damage to the lungs and digestive system.

As a result, long-term care costs could be reduced, preserving NHS resources. Consequently, the financial strain on families affected by severe genetic disorders would also be alleviated, particularly in countries lacking universal healthcare systems. However, there is a considerable distinction between preventing disease and enhancing traits. Germline editing to select characteristics of an embryo is called enhancement and is currently raising significant ethical concerns.

While CRISPR-Cas9 holds great promise and has been successfully used, it is not yet a perfectly safe technology. A key concern is off-target mutagenesis. As well as mutating the correct genes, similar sequences elsewhere in the genome are also mutated irreversibly, leading to unknown long-term consequences[2].

The prospect of this treatment causing harm poses the question: Does CRISPR follow the Hippocratic Oath that states that physicians "do no harm"? Irreversible changes are being made with incomplete data - is CRISPR safe enough to be presented to the public with insufficient testing? Many also have moral and religious obligations to CRISPR, as they feel that it’s wrong to alter God’s creation irreversibly in an attempt to “play” God.

A real life example:

China has been a leading pioneer in the genetic industry. In 2014, they published their results on using CRISPR-Cas9 on monkey embryos, and in 2018, He Jiankui gene-edited twin embryos from couples where the males were HIV carriers to immunise them against HIV. Twin girls were born and media worldwide reported this "experiment." However, China's Ministry of Science and Technology bans research to be performed on human in vitro embryos after the 14th day of existence, so He Jiankui was sentenced to 3 years in prison for performing an experiment without a legal basis[3].
Furthermore, the embryos were at little to no risk of inheriting HIV, reinforcing the case against He Jiankui. He and his collaborators also forged ethical review documents, misleading doctors into implanting gene-edited embryos.
Ultimately, he was fined 3 million Chinese yuan (£323,000) and his collaborators were also sentenced and fined various amounts[4].
While He Jiankui was "successful," his experiment was globally debated, as it was scientifically flawed and deeply unethical, especially since the embryos were at no serious medical risk.

Conclusion:

So where do we draw the line? CRISPR has its benefits, but the boundaries between enhancement and therapy are severely blurred. Scientists argue Human Germline Editing (HGE) is only for severe, life-threatening disorders.

However, enhancement is done for none of these things. If parents are able to personally select the traits of their child, their “designer babies” could lead to a genetic divide. While CRISPR technology is considered cheap and accessible in lab research (roughly £7–£22), clinically, the world’s first approved CRISPR-based cell therapy has been priced at £1.6 million per patient[5]. This may inadvertently transform health inequality to genetic and socioeconomic inequality. HGE may become a privilege, rather than a universal medical right. If the wealthy can eliminate disease and enhance traits such as intelligence, height, and eye colour, society could split into genetically optimised individuals and naturally conceived individuals. This genetic divide could potentially lead to a whole new form of discrimination in later years. But does disability really need preventing? If CRISPR gene editing becomes incrementally normalised in society like IVF and plastic surgery have, disability could be seen as something negative and perceived as necessary to eliminate. Many people live normal lives with genetic disorders; for example, those with autism, ADHD, Down syndrome, and colour blindness can live a healthy, fulfilling life with the correct management.

Scientific progress is historically initially critiqued and resisted, a key example being Darwin’s Theory of Evolution, which is still opposed by some to this day. More often than not, over time, these scientific advancements become increasingly accepted, and their benefits are shown - perhaps human germline editing will save millions of lives and introduce a new form of medical treatment.

However, the use of CRISPR-Cas9 should be regulated so it can only be used to treat life-threatening genetic diseases, as complete bans may be unrealistic and hinder medical progress. Strict criteria and more long-term clinical trials will maximise patient safety and ensure human germline editing is used for preventative or corrective therapy, not unnecessary enhancement. Therefore, while CRISPR-Cas9 holds immense potential to transform medicine, its use must remain carefully controlled to ensure it benefits humanity without compromising ethical boundaries.

clinical trials will maximise patient safety and ensure human germline editing is used for preventative or corrective therapy, not unnecessary enhancement. Therefore, while CRISPR-Cas9 holds immense potential to transform medicine, its use must remain carefully controlled to ensure it benefits humanity without compromising ethical boundaries.

REFERENCES

1) Prillaman M. What is CRISPR? A bioengineer explains [online], Stanford Report, Stanford School of Engineering, 2024 June [Accessed 17th March 2026]. Available at https://news.stanford.edu/stories/2024/06/stanford-explainer-crispr-gene-editing-and-beyond

2) Davies B. *The technical risks of human gene editing* [online], Human Reproduction, Oxford, England, 2019 November [Accessed 19th March 2026). Available at https://pmc.ncbi.nlm.nih.gov/articles/PMC6913216/

3) Raposo VL. The First Chinese Edited Babies: A Leap of Faith in Science [online], JBRA Assisted Reproduction, Brazil, 2019 July-September [Accessed 19th March 2026]. Available at https://pmc.ncbi.nlm.nih.gov/articles/PMC6724388/

4) Normile D. *Chinese scientist who produced genetically altered babies sentenced to 3 years in jail* [online], Science, AAAS, Washingston, D.C, 2019 December [Accessed 19th March 2026]. Available at https://www.science.org/content/article/chinese-scientist-who-produced-genetically-altered-babies-sentenced-3-years-jail

5) Rueda J., Beriain IM., Montoliu L., *Affordable Pricing of CRISPR Treatments is a Pressing Ethical Imperative* [online], Mary Ann Libert, Inc, New York, 2024 October [Accessed 19th March 2026]. Available at https://www.liebertpub.com/doi/10.1089/crispr.2024.0042#

HUNTINGTON'S DISEASE

ALAIA SABIR YEAR 12 – MEDICINE CONTRIBUTOR

What is Huntington's?

Huntington's is a disease caused by an error in DNA, which creates a toxic protein[1].The Huntington gene creates proteins needed for: nerve cells in the brain, transporting materials and to support mitochondria[2]. However, in people with Huntington's, this gene is faulty causing the cytosine-adenine-guanine sequence to repeat excessively creating a mutant huntingtin protein (mHTT). This protein causes damage to the neurones[2]. The main symptoms of Huntington's are: lower concentration levels, personality changes, chorea (uncontrollable movement), difficulty swallowing and trouble focusing eyes[3&4]. Huntington's is genetic meaning if one parent carries this gene, biological children have a 50% chance of inheriting it.

Types of Huntington's

There are two types of Huntington's. The most common is adult-onset Huntington's which is developed between the ages of 30-40 and can be fatal within two decades1. The second type is a rarer form of Huntington's called Juvenile Huntington's. This is developed before the age of 20 and has a quicker progression meaning its mortality rate is within 10-15 years[6]. There are further differences between the two types. For instance, people with Juvenile Huntington's are less likely to experience chorea but have more stiffness and muscle contractions[5].

How does Huntington's Affect Daily Life?

Huntington's can cause problems with swallowing and eating due to chorea and dysphasia. Afflicted individuals often have lower coordination which means choking and spilling food is more common[6]. This means these individuals often lose weight more easily and so need special diets with high calorie food that is easy to eat[6]. As well as physical issues patients often experience changes in behaviour e.g feeling irritable and depressed. This can often cause them to withdraw from everyday society and may even lead to suicidal thoughts[7]. So how can these symptoms be managed? Physical problems such as movement issues can be treated by physical therapy and drugs e.g xenazin. However cognitive difficulties like mood changes can be managed by counselling and medications like antidepressants[8].

What is the New Treatment?

Recently researchers at UCL (sponsored by uniQure) have aided in the creation of a treatment called AMT-1309. The treatment involves delivering specific DNA into the brain, using a virus, during a 12-18 hour brain surgery[1]. This treatment produces RNA that bind to the Huntington RNA leading to its destruction. As a result, there is a decrease in the level of mutant huntingtin (mHTT) protein produced[9]. This is significant as mHTT damages and kills neurones which causes neurofilament light (NFL) protein to be released.

However, there are potential side effects of the treatment. For example, it can cause inflammation leading to headaches. Additionally, the cost is estimated to be in the millions per patient, due to the complex nature of the brain surgery[1].

How did the Trial Work?

29 patients completed 36 months of the first two phases of clinical trial. The patients' progression was compared to others with Huntington's who were part of a study called Enroll – HD (an observational study that gathers data from patients at all stages of Huntington's). This allowed the researchers to compare their results to the expected progression. The results showed that people given high doses of AMT-130 had 75% lower disease progression after 36 months[10]. In addition, the level of NFL protein decreased, which is significant as it acts as a marker of neurodegeneration, demonstrating that neuronal damage may be slower[9].

How Will the Treatment Affect the Future?

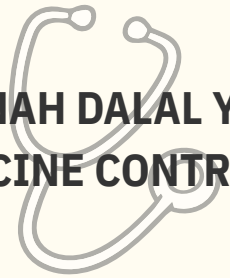
The findings will be presented in Nashville and uniQure seeks accelerated approval from the FDA to begin treating patients as soon as possible[9]. The cost may put some immediate strain on the NHS; however, in the long run it could save money as it means patients will need less care in the future as it's a one – time treatment. Since AMT – 130 is the first treatment for Huntington's it inspires hope of a better quality of life for patients and may lead to more similar gene therapies being created.

REFERENCES

1) James Gallagher, "Huntington's disease successfully treated for the first time", 24/09/25, date accessed: 26/02/26 Huntington's disease successfully treated for first time - BBC News
2) Huntington's Disease Association, "What causes Huntington's", date accessed: 26/02/26 Huntington's Disease Association - What causes Huntington's disease
3) UCLH NHS foundation trust, " Huntington's Disease", 13/03/25, date accessed: 26/02/26 Huntington's disease - NHS
4) Cleveland clinic medical professionals, Adam Margolius, Odinachi Oguh, "Huntington's Disease", 12/12/25, date accessed: 26/02/26 Huntington's Disease: What It Is, Symptoms & Treatment
5) Huntington's Disease Association, "Juvenile Huntington's", date accessed: 02/03/26 Huntington's Disease Association - Juvenile Huntington's disease
6) European Huntington's Disease Network (EHDN) Standards of Care Dietitians Group (Alisa M.Brotherton, Lillian Campos, Arleen Rowell, Vanessa Zoia, Sheila A. Simpson, Daniela Rae), " Huntington's disease and diet issues", 26/02/22, date accessed: 02/03/26 Huntington's disease and diet issues | Better Health Channel
7) Health specialists at NINDS, "Huntington's Disease", April 2025, date accessed: 02/03/26 Huntington's Disease | National Institute of Neurological Disorders and Stroke
8) Tanita Allen, "Living with Huntington's Disease",19/09/24, date accessed: 02/03/26 Living With Huntington's Disease | Huntington's Disease News
9) Open Access Government Staff, prof. Sarah Tabrizi, "Gene therapy shows a breakthrough in slowing Huntingtons disease progression", 09/25/25, date accessed: 02/03/26 Gene therapy shows a breakthrough in slowing Huntington's disease progression
10) prof. Sarah Tabrizi prof. Ed Wild, "Gene therapy appears to slow Huntington's disease progression!", 09/24/25, date accessed: 02/03/26
Gene therapy appears to slow Huntington's disease progression | UCL News - UCL – University College London

ACUTE LYMPHOBLASTIC LEUKAEMIA

AAMINAH DALAL YEAR 12-
MEDICINE CONTRIBUTOR



Acute lymphoblastic leukaemia (ALL) is a type of cancer that occurs within the blood and the bone marrow, the spongy tissue inside of your bones where blood cells are produced. [1] It is the most common cancer in children, especially those aged 4 years and under. It can also occur in adults, but treatments provide a strong chance of cure. [1], [4] This disease develops rapidly and creates blood cells that do not fully develop, leaving them immature cells. [1]
ALL is rare, and the severity of the cancer can vary depending on a range of factors such as general health, age etc. [4]
In a healthy individual, the blood that circulates around the body is formed in the bone marrow. [5] The bone marrow consistently produces blood cells to keep the body functioning properly and stem cells that then differentiate to form either lymphoid (these develop into lymphocytes) cells or myeloid cells. [5] Myeloid cells can then develop into either red blood cells, white blood cells, platelets etc. [5] However, if an individual has ALL, it means an excess of these stem cells differentiate ultimately into lymphocytes which are not fully developed, meaning they cannot function properly. [5] These cells are known as blast cells and can rapidly divide and enter the blood stream where they spread to other parts of the body, including the brain and spinal cord, the central nervous system. [5]

There are several symptoms of acute lymphoblastic leukaemia, some common ones including a fever, fatigue, feeling lightheaded, and weight loss. [1], [6] However, some symptoms may be more severe, for example bleeding. Bleeding, in this context, encompasses severe nosebleeds, bleeding gums and heavy menstrual bleeding for women. [6] Additionally, parts of your body can swell up due to the spreading of the blast cells that grow and divide at a rapid rate in certain areas. [5]
Leukaemia cells can build up within the liver or spleen, making them appear larger, physically causing swelling or fullness of the body or feeling full after only eating small portions of food. [6] If these cells were to reach the brain or spinal cord, vomiting, seizures, headaches and blurred vision are likely to be present, demonstrating the severity of the effects of acute lymphoblastic leukaemia. [6]
But do not fret! CAR T-cell therapy is a specialised treatment for all those afflicted with ALL which works by converting your T-cells into CAR T-cells through genetic

engineering and placing them back inside the body through a drip which they then can recognise and attack the cancerous lymphocytes. [2]

The treatment works by adding a gene to the T-cell which causes it to produce proteins on its surface called chimeric antigen receptors (CARs) that can then aim for the cancer cells by binding to the surface of them. [2], [3] However, there are potential side effects such as the risk of second cancers, which are new types of cancers, meaning regular checkups are vital after such a treatment. [3]

REFERENCES

1) Mayo Clinic Staff. “Acute lymphocytic leukaemia.” Mayo Clinic. December 20, 2024. Accessed March 24,2026. https://www.mayoclinic.org/diseases-conditions/acute-lymphocytic-leukemia/symptoms-causes/syc-20369077

2) “CAR T-cell therapy.” Cancer Research UK. September 25, 2024. Accessed March 24, 2026. https://www.cancerresearchuk.org/about-cancer/treatment/targeted-cancer-drugs-immunotherapy/car-t-cell-therapy

3) Adult Treatment Editorial Board. PDQ “Acute Lymphoblastic Leukaemia Treatment.” Bethesda, MD: National Cancer Institute. May 12, 2025. Accessed March 24, 2026. https://www.cancer.gov/types/leukemia/patient/adult-all-treatment-pdq

4) NHS. “What is acute lymphoblastic leukaemia?” July 13, 2023. Accessed March 24, 2026 https://www.nhs.uk/conditions/acute-lymphoblastic-leukaemia

5) “What is acute lymphoblastic leukaemia (ALL)?” Cancer Research UK. May 8, 2024. Accessed March 24, 2026. https://www.cancerresearchuk.org/about-cancer/acute-lymphoblastic-leukaemia-all/about

6) American Cancer Society medical and editorial content team with medical review and contribution by the American Society of Clinical Oncology (ASCO). “Signs and Symptoms of Acute Lymphocytic Leukaemia (ALL).” August 13, 2025. Accessed March 24, 2026. https://www.cancer.org/cancer/types/acute-lymphocytic-leukemia/detection-diagnosis-staging/signs-symptoms.html

MITOCHONDRIAL DISEASES:

FATIMA KILINC YEAR 12 – MEDICINE CONTRIBUTOR

SHOWING US HOW IMPORTANT THE ROLE OF MITROCHONDRIA ARE IN OUR FUNCTION

Billions of mitochondria exist inside the cells of us as humans. However, they often complete their role quietly without being recognised for the vital role they play in our function. The significance of mitochondria is only brought to light when something goes wrong.

Function:

There are about a million biology textbooks saying that mitochondria is the powerhouse of the cell, but their role should not be reduced to such a simple sentence. Their most important function is indeed to provide energy for various reactions happening the body; however this goes into a lot more detail.
Mitochondria go through a process called cellular respiration, which also includes the Krebs cycle (also known as the citric acid cycle) and oxidative phosphorylation (which is the final stage of aerobic cellular respiration) to produce ATP (adenosine triphosphate). [1] ATP provides the energy needed for things like nerve signalling and muscle contraction.

MELAS:

The mitochondrial disease discussed in this article is MELAS syndrome. MELAS stands for Mitochondrial Encephalomyopathy, Lactic Acidosis, and Stroke-like episodes. MELAS syndrome is caused by defects in mitochondrial DNA and is therefore a rare genetic disorder. It primarily affects the muscles and the nervous system. This disease follows a maternal inheritance pattern, which means that only females can pass down the condition to their children, because that is the only way mitochondrial DNA can be passed. [3]

In MELAS, the Mitochondrial Encephalomyopathy refers to diseases which affect the brain (given by encephalo-) and muscles (myopathy) which is caused by dysfunctional mitochondria. The Lactic Acidosis is because this disease causes a build-up of lactic acid in the body, which causes several symptoms such as muscle weakness and fatigue, vomiting, and abdominal pain. The last part of the acronym MELAS stands for Stroke-like episodes. This is because MELAS causes recurring episodes which are like strokes. These episodes can cause vision problems, seizures and temporary muscle weakness. [3]

Symptom:

The symptoms of MELAS syndrome usually begin to show between the ages of 4 and 40. Most people with this disease begin to display symptoms before they reach 20. However, there are cases where symptoms have been present before the age of 2 or even after the age of 40. [3]
MELAS syndrome is a progressive condition, thus once the symptoms emerge, they worsen over time, typically causing a continual neurological decline. Most people diagnosed with MELAS syndrome have a projected lifespan of 17 years, after the onset of symptoms and seizures. However, this rate of progression is variable, and the symptoms can affect people differently. [3]

Issues:

The most common mutation that can cause MELAS syndrome is the m.3243A>G mutation in the MT-TL1 gene. Over 80% of cases of MELAS syndrome are caused by this mutation. However, there are several other genes that are affected, for example MT-ND1. Mutations in these genes prevent the mitochondria's ability to make proteins and produce energy, which leads to the symptoms to MELAS syndrome. [3]

Mitochondrial diseases are hard to diagnose for several reasons. Since each mitochondrion needs around 2,000 proteins to function, a defect in any one of these could cause a mitochondrial disease. In addition, these proteins are not all fully understood, therefore it is difficult to identify makes the specific genetic cause. Furthermore, as new mitochondrial disorders and mutations keep being discovered, even advanced genetic testing cannot always provide clear answers.

Getting a diagnosis for a mitochondrial disease is challenging as there isn't a specific test for it. There are often several factors that go into a diagnosis, such as family history, neuroimaging, genetic testing and physical examination. These tests can be expensive and can take many years, which is not ideal. [2]

In conclusion, mitochondria, while tiny, must not be underestimated. Hopefully, in the future, treatments such as gene therapy or "three-parent IVF" will be possible, reducing the number of individuals suffering from mitochondrial diseases today. [4]

REFERENCES

1) Mayo Clinic Staff. "Acute lymphocytic leukaemia." Mayo Clinic. December 20, 2024. Accessed March 24,2026. https://www.mayoclinic.org/diseases-conditions/acute-lymphocytic-leukemia/symptoms-causes/syc-20369077

2) "CAR T-cell therapy." Cancer Research UK. September 25, 2024. Accessed March 24, 2026. https://www.cancerresearchuk.org/about-cancer/treatment/targeted-cancer-drugs-immunotherapy/car-t-cell-therapy

3) Adult Treatment Editorial Board. PDQ "Acute Lymphoblastic Leukaemia Treatment." Bethesda, MD: National Cancer Institute. May 12, 2025. Accessed March 24, 2026. https://www.cancer.gov/types/leukemia/patient/adult-all-treatment-pdq

4) NHS. "What is acute lymphoblastic leukaemia?" July 13, 2023. Accessed March 24, 2026

THE MECHANISM OF ANTIBIOTIC RESISTANCE

WILL IT BE THE MOST PRESSING ISSUE IN THE FUTRE?

RIDAH ABBASI YEAR 12 – MEDICINE CONTRIBUTOR

What are antibiotics?

Antibiotics are pharmaceutical agents that work to treat bacterial infections by either disrupting bacterial replication – bacteriostatic antibiotics, or outright killing bacteria – bactericidal antibiotics. For example, some may work by inhibiting cell wall synthesis by inhibiting enzymes that are needed to make chemical bonds within the murein cell wall of all bacteria, which would cause water to enter by osmosis and the cell to lyse

History:

The history of antibiotic resistance traces back to the discovery of penicillin in 1928 by Alexander Fleming and the subsequent mass production and utilisation of antibiotics in the 1940s. The first cases of penicillin-resistant Staphylococcus aureus were reported in 19421. Bacterial resistance in the case of penicillin occurred due to the enzyme penicillinase that deactivated the antibiotic. However, in many recent cases, resistance seems to stem from random mutations that occur, usually during DNA replication, that alter the sequence of bases within bacterial DNA, and, in turn, change the shape of antibiotic receptors on bacterial cells, meaning the previous antibiotic can no longer bind and work against the bacteria.

Replication of bacteria:

Often, plasmids within bacterial cells carry these genes for resistance and are transferred either by horizontal gene transfer or vertical gene transfer. Horizontal gene transfer is a process in which an organism transfers genetic material to another organism that is not its offspring to gain acquired resistance from one cell to another. This can be done in three ways. Firstly, conjugation, where two bacteria pair up and connect through structures in the cell membranes and then transfer DNA from one bacterial cell to another. Secondly, transduction, where viruses called bacteriophages infect bacteria. These viruses sometimes bring along genes that they picked up during the infection of another bacterium. These genes may then be incorporated into the DNA of the new bacterial host. Finally, transformation, where some bacteria can take pieces of DNA directly from the environment around the cell2.

Vertical gene transfer provides inherent resistance and is often driven by selection pressures, historically overuse of antibiotics means that those bacteria that had the resistant genes were favoured by natural selection, in other words an extreme phenotype was favoured in a process called directional selection. These bacteria were able to outcompete the sensitive ones and survive and reproduce passing on their advantageous genes to their offspring. In this way, over-usage of antibiotics increased the incidence of resistance within bacterial populations.

Interventions:

World organisations such as WHO are supporting antimicrobial stewardship by issuing a practical guide on interventions3. Among the proposals for action are strict controls on antibiotic use, requiring accurate prescriptions (no use of antibiotics to treat colds and other viral infections), no delivery of antibiotics without a doctor's prescription (reducing needless use of antibiotics), and controlled therapeutic use in animal husbandry and agriculture4. According to the CDC, 20-50% of all antibiotic prescriptions in acute care hospitals in the USA are either unnecessary or inappropriate5. International collaboration is also crucial in addressing the global nature of antibiotic resistance. International organisations and stakeholders to collaborate in order to achieve regulatory harmonisation, exchange optimal methodologies, and synchronise endeavours to effectively combat antibiotic resistance. Collaborative endeavours, serve to facilitate the exchange of data and enhance the worldwide response. The exchange of knowledge, resources, and experiences has the potential to facilitate the formulation of comprehensive strategies aimed at addressing antibiotic resistance at a global level[1].

There is also a need to put mitigation measures in place to reduce the harmful effects of antibiotic resistance plaguing healthcare currently. For more funding into research for new antibiotics that target current strains of bacteria and the use of combination therapies which is the use of multiple antibiotics with different mechanisms with a very small likelihood that one specific bacteria would be resistant to all the drugs used. However, with the dynamicness of antibiotic resistance combined with the high expenses and times associated with such methods, it is understandable why medicine and governments have not evolved to compose a plan to combat antibiotic resistance

In conclusion, the prevailing consensus among scientists and healthcare professionals is that AMR represents a substantial and pressing global health issue. In this way, we should all work together to come up with both long-term and short-term solutions so our future generations will not be negatively affected. However, this process will neither be simple nor one- dimensional.

REFERENCES

1) Ahmed, Sirwan Khalid , et al. “Antimicrobial Resistance: Impacts, Challenges, and Future Prospects.” *Journal of Medicine Surgery and Public Health*, vol. 2, no. 100081, 1 Mar. 2024, pp. 100081–100081, www.sciencedirect.com/science/article/pii/S2949916X24000343, https://doi.org/10.1016/j.glmedi.2024.100081. Accessed 20 Mar. 2026.
2) ReAct. “Transfer of Antibiotic Resistance – Antibiotic Resistance – ReAct.” ReAct, 2016, www.reactgroup.org/toolbox/understand/antibiotic-resistance/transfer-of-antibiotic-resistance/. Accessed 20 Mar. 2026.

3) WHO policy guidance on integrated antimicrobial stewardship activities. May 20, 2021. https://iris.who.int/server/api/core/bitstreams/bfc17315-e20c-4e61-8e08-c70d8a349437/content.Accessed 20 Mar.2026.
4) "Origins and Evolution of Antibiotic Resistance." *Microbiology and Molecular Biology Reviews*, vol. 74, no. 3, 30 Aug. 2010, pp. 417–433, pmc.ncbi.nlm.nih.gov/articles/PMC2937522/#sec16. Accessed 20 Mar. 2026.
5) Shrestha, Jishna, et al. "Antimicrobial Stewardship." *PubMed*, StatPearls Publishing, 2023, www.ncbi.nlm.nih.gov/books/NBK572068/. Accessed 20 Mar. 2026.

WEIGHT LOSS DRUGS

UMAYNAH BHALODA & MARIAM BOKHARI YEAR 12 – MEDICINE CONTRIBUTORS

In the 20th century, weight loss drugs have unequivocally revolutionised treatments for conditions such as obesity, type 2 diabetes and cardiovascular disease. In this article, we intend to educate you on the strengths and limitations of these controversial drugs, as well as inform you of the ethical debates concerning their use.

Despite their equivalent purpose, there are a multitude of distinct types of weight loss drugs, each targeting a different biological mechanism within the body that contributes to obesity. For instance, drugs such as Semaglutide, Liraglutide and Exenatide (commonly known by brand names Wegovy and Ozempic) are referred to as Glucagon- like peptide-1 receptor agonists. Semaglutide works by increasing the levels of incretin hormones and inhibits both gastric emptying and glucagon secretion[1], whereas Orlistat is a lipase inhibitor which prevents approximately ⅓ of the fat of the meal eaten from being absorbed [2], effectively reducing weight gain. In addition, Phentermine acts on the hypothalamus and stimulates the release of neurotransmitters such as norepinephrine[3] in the brain, suppressing appetite. Interestingly, there are also treatment options available for patients with genetic obesity, such as Setmelanotide, which acts on the MC4R receptor and works by restoring appetite control[4], reducing food intake and consequently, weight gain. To build upon this, the efficacy of weight loss drugs have been demonstrated by numerous studies, and according to the BMJ[5], in studies using only incretin mimetics (drugs which bind to and activate the glucagon-like peptide-1 receptors) weight loss was 6.7kg greater when behavioural support was provided during active treatment, further reinforcing the successful outcomes of these drugs, which go beyond weight loss, including improved blood sugar control, metabolism, mental wellbeing and various cardiovascular benefits[6]. A study presented at the European Congress on Obesity determined that a weekly injection of Semaglutide led to continuous weight loss and participants losing approximately 10% of their body weight after four years[6], undoubtedly highlighting the long-term beneficial impact of weight loss drugs. Furthermore, weight loss drugs have proven to be highly successful and effective; they have helped reduce weight for those with a BMI of 27-29.9, where the average BMI is 18.5 to 24.9 in adults. Therefore, weight loss drugs have become known to improve physique, enhancing overall health of individuals. A significant advantage of weight loss drugs includes improved blood pressure and cholesterol levels as they control appetite. Additionally, weight loss drugs have also lowered the risk of developing type 2 diabetes,

a disease in which there is insufficient insulin or insulin that does not work properly, subsequently increasing blood sugar levels. as stated by Dr Sonya Babu-Narayan: “Nearly two thirds of adults in England are living with excess weight or obesity. In patients also diagnosed with cardiovascular conditions, this large study shows that semaglutides could be a useful addition to medicines they take” [6], strengthening their practicality within medicine.

Although there are many benefits to weight loss drugs, there are also numerous limitations. This is illustrated by the fact that a patient can develop heart disease, diabetes, and in some rare cases, cancer. Thus, healthcare professionals are urging patients to alter their lifestyle to maintain a healthy weight. Contrastingly, limitations may also refer to ethical considerations such as high costs, which restrict access to patients who cannot afford treatment, further widening the socioeconomic divide within healthcare. In relation to this, despite there not being a direct link established between the two, scientists have discovered a relationship between weight loss drugs and their impact on mood; as weight loss drugs act on hormones such as dopamine and serotonin, these drugs can have a deleterious effect on mental wellbeing. The impact of weight loss drugs must be monitored carefully, particularly amongst teenagers, as there is a lack of research regarding the impact of weight loss drugs on physical and neurological development in adolescents,

and these treatments may also induce eating disorders and increased anxiety, exceeding the positive outcomes. Moreover, a weekly dose of semaglutide delays the rate at which food leaves the stomach, causing discomfort and side-effects such as nausea, vomiting, constipation and bloating. According to Dr Vanita Rahman, gastrointestinal problems are the most common side effect of semaglutide[7]. Rare and under-researched side effects of patients taking such drugs include the development of active and chronic pancreatitis; In 2025, 10 patients who reported abnormal reactions to weight loss jabs on the MHRA’s Yellow Card website died from the effects of pancreatitis[8], although it is not clear if there were multiple factors which may have contributed to these deaths. Additionally, students at Trinity College investigated the effects on weight after the cessation of weight loss drugs by conducting a review and meta-analysis of other studies, which enabled them to combine results and obtain an overall view, inspiring the construction of a model which suggests that after 52 weeks of patients stopping treatment, individuals had regained 60% of their original weight loss[9]. Moreover, researchers at the University of Oxford have concluded that weight increased by an average of 0.4kg after weight loss drugs were stopped[10], leading to the prediction that at this rate, people would return to their initial weight within 1.5-2 years. Both studies, amongst many, lead to the question of whether it is the weight loss drugs that are the issue or the complex condition of obesity itself which may be considered problematic to treat.

Fundamentally, it is evident that weight loss drugs present many strengths as well as weaknesses, and it is certainly crucial that researchers continue to scrutinize their effects to ensure safety concerns are addressed before administration to patients.

REFERENCES

1. Department of Medicine, Lunenfeld-Tanenbaum Research Institute. Glucagon-like peptide-1 receptors in the brain: controlling food intake and body weight [Internet]. University of Toronto: The American Society for Clinical Investigation; 2014. Available from: https://www.jci.org/articles/view/78371#SEC4 Date accessed:10/03/2026
2. NHS.Orlistat [Internet]. Scotland: NHS Inform; 2026. Available from: https://www.nhsinform.scot/tests-and-treatments/medicines-and-medical-aids/types-of-medicine/orlistat/ Date accessed:15/03/2026
3. Nguyen A, PharmD, MS, BCPS.How Does Lomaira (Phentermine) Work? [Internet]. New York: Verywell Health; 2025. Available from:https://www.verywellhealth.com/how-does-phentermine-work-7642319#toc-how-does-phentermine-work-in-the-body Date accessed: 15/03/2026
4. Hussain A; Farzam K. Setmelanotide [Internet]. Treasure Island: StatPearls Publishing (National Library of Medicine); 2023. Available from: https://www.ncbi.nlm.nih.gov/books/NBK589641/ Date accessed: 15/03/2026
5. BMJ.Weight regain after cessation of medication for weight management: systematic review and meta-analysis [Internet]. London: BMJ; 2025. Available from: https://www.bmj.com/content/392/bmj-2025-085304 Date accessed:15/03/2026
6.Mehta K. Weight loss drugs could have cardiovascular benefits, new research shows [Internet]. London: British Heart Foundation; 2024. Available from: : https://www.bhf.org.uk/what-we-do/news-from-the-bhf/news-archive/2024/may/weight-loss-drugs-could-have-cardiovascular-benefits-new-research-shows Date accessed:11/03/2026
7.Ceurstemont S. We are finally learning the true side-effects of weight-loss drugs. [Internet]. London: BBC Science Focus; 2026. Available from: https://www.sciencefocus.com/the-human-body/dark-side-of-weight-loss-drugs Date accessed: 11/03/2026
8. Burns J.Weight loss jabs study begins after reports of pancreas issues [Internet]. London: BBC News; 2025. Available from: https://www.bbc.co.uk/news/articles/c4ged0r1n3wo Date accessed: 11/03/2026
9. University of Cambridge. Patients regain weight rapidly after stopping weight loss drugs – but still keep off a quarter of weight lost [Internet]. Cambridge: Trinity College, University of Cambridge; 2026. Available from: https://www.cam.ac.uk/research/news/patients-regain-weight-rapidly-after-stopping-weight-loss-drugs-but-still-keep-off-a-quarter-of#:~:text=These%20drugs%20help%20control%20blood,have%20stopped%20after%20two%20years. Date accessed: 15/03/2026
10. University of Oxford. New study finds that stopping weight-loss drugs is linked to faster regain than ending diet programmes [Internet]. Oxford: Nuffield Department of Primary Care Health Sciences; 2026. Available from: https://www.ox.ac.uk/news/2026-01-08-new-study-finds-stopping-weight-loss-drugs-linked-faster-regain-ending-diet Date accessed: 15/03/2026

NHS: STRUCTURE AND FUNDING

DISHA CHALLA YEAR 12 – MEDICINE CONTRIBUTOR

The structure of the NHS is complex and ever changing and is impacted by government officials, business managers and healthcare professionals. This article will explore how the NHS is structured and how it is funded.

Who is charge of the NHS?

The NHS (National Health Service) is a combination of organisations working together, consisting of doctors, managers and other healthcare professionals. The Secretary of State for Health and Social Care decides how health services are organised by allocating finances, writes the NHS mandate (a set of key aims and expectations for the NHS) and finally develops public health initiatives by ensuring health-related legislation is recognised in parliament. [1]

The Department for Health and Social Care (DHSC) is the central government body responsible for overseeing health and social care policy in England. It ensures the effective functioning for the NHS and other health-related bodies by setting overall health policy and allocating necessary funds. [1] The key roles of the DHSC include formulating health policy, funding allocation, managing the planning and delivery of NHS services, handling public health protection and responses to health threats and finally manage public health initiatives and services.

There are many parts of the NHS that make it the organisation that it is. The NHS is said to be the largest employer in Europe and staff can be directly employed, employed by a service provider, self employed or provide services under a contract with another, non NHS organisation. [2] We will now have a look at the function of the main departments and organisations involved either at a national or local level.
Firstly, there is the government/ Prime minister which hold a national level as they decide how much money is allocated to the NHS. [2] Then there is the Secretary of State for Health and Social Care (SoS) and DHSC. Next, we have the Care Quality Commission (CQC) which hold a national level and are also the independent regulatory body for all health and social care service providers reporting to the SoS. The NHS digital works at a national level and develops and operates the national IT and data services that support clinicians at work, helping patients get the best care and using data to improve health and care.

Now we move onto regional level systems called Integrated Care Systems (ICSs). These are alliances of providers that work together to deliver care by agreeing to collaborate rather than compete. [3] These providers include hospitals, community services, mental health services and GPs.

Then we have Integrated Care Partnerships (ICPs) which are regional and local and they are a statutory committee jointly formed between the NHS integrated care board and all upper -tier local authorities that fall within the ICS area. [2] The ICP will bring together a broad alliance of partners concerned with improving the care, health and wellbeing of the population.

A Primary Care Network (PCNs) is an alliance of GP surgeries that work collaboratively with other health, social care and voluntary organisations to improve patient services. [4] In January 2019, NHS England asked all areas in the UK, including Salford to set up Primary Care Networks as part of the national five year-year framework for GP contract reform. PCNs cover populations of 30-50,000 people and they provide primary care by utilising a wide range of professional skills and community services. [3]

The NHS budget and how it's changed:

The vast majority of public NHS funding comes from general taxation and National Insurance Contributions. [5] A small proportion of funding comes from patient charges for services such as prescriptions and dental treatment. The level of NHS funding in a given year is set by central government through the Spending Review process and annual budgets. Public funding for health services in England comes from Department of Health and Social Care's budget.

The department's spending in 2024/25 was £204.7 billion and the vast majority of this spending was on day-to-day items such as staff salaries and medicines. Since 1955/56, spending on health services has increased by an average of 3.9%. Between 2015/2016 and 2023/24, spending increased by 3.1%. However, it is important to consider the additional investment during the Covid 19 pandemic which lead to this increase. The largest area of NHS day to day spending is typically staff costs, equating to 50% of day-to-day expenditure. Other areas of significant spending include primary came (general practice, dentistry etc), procurement (supplies and services to deliver health care) and non-NHS health care.

Thank you for reading my article. I hope it has provided a brief overview on the structure and funding of the NHS.

REFERENCES:

1) Suhaani S. Structure of the NHS in 2025- How The NHS In England Works. The UKCAT People. June 13, 2024. Accessed 22nd March 2026. https://www.theukcatpeople.co.uk/post/structure-of-the-nhs-how-the-nhs-in-england-works-health-and-care-systems

2) NHS England. Structure of the NHS. 9th November 2022. Accessed 17th March 2026 https://www.england.nhs.uk/long-read/structure-of-the-nhs/

3) Smith S. How is the NHS structured. Kingsfund.org.uk. 8th April 2020 Accessed 22nd March 2026 https://www.kingsfund.org.uk/insight-and-analysis/animations/how-nhs-structured

4) What is a Primary Care Network. Salford South East. January 14th 2019 Accessed 22nd March 2026 https://www.salfordsoutheastpcn.nhs.uk/about-us/primary-care-networks/
5) Jefferies D., Thompson K.P. The NHS budget and how it's changed. Kingsfund.org.uk. 16th December 2025. Accessed 18th March 2026 https://www.kingsfund.org.uk/insight-and-analysis/data-and-charts/nhs-budget-nutshell

SHOULD HOME GENETIC TESTING BE BANNED?

NIKITA DONTULA YEAR 12 – MEDICINE CONTRIBUTOR

What is home-genetic testing?

Home-genetic testing, often called direct-to-consumer (DTC) testing, allows individuals to explore their DNA without consulting a healthcare provider[1]. These tests can be purchased either online or in store[1]. To carry out the test, a sample of DNA is collected at home, conventionally in the form of saliva, and mailed back to a private laboratory[1]. These tests are designed to provide insights into ancestry, kinship, health predispositions, and lifestyle[2], with results delivered directly via email or an app[1]. Depending on the company, there may be an opportunity to speak to a genetic counsellor to explain results, and answer follow-up questions; however, this is not mandatory[3]. While a variety of companies offer home-genetic testing, a couple of the major market leaders are AncestryDNA (the market leader in ancestry) and 23andMe[4].
The benefits and limitations of home-genetic testing will be discussed to form a conclusion.

Advantages:

First, DTC testing is convenient and accessible for anyone to carry out. Testing can be done in the privacy of a home, through a cheek-swab, a simple, non-invasive procedure to collect saliva. Also, a health care professional's approval is nonessential to order a test. Then, this testing enables ancestry discovery.

Once a DNA sample is obtained by a DTC genetic company, hundreds of thousands of DNA makers called SNPs (single nucleotide polymorphisms) (places in DNA where people commonly differ) are examined[5]. After, SNPs are compared to a large database to identify patterns, which leads to the reveal of ancestry, ethnic origin, and potential relatives[5]. This has enabled many of individuals to connect with previously unknown relatives.

Finally, many of these tests have the ability to inform people on their general health predispositions. Through the process outlined above, these tests can identify if a person is more susceptible to illnesses, for instance: celiac disease, Alzheimer's disease, and Parkinson's disease[2]. This allows individuals to take proactive, personalised steps towards better health, preventing or delaying the onset of a potential disease.

Disadvantages:

First, at many home-genetic tests, provide health insights without comprehensive testing of specific conditions, leading to the potential underestimation of risk. For instance, 23andMe offer to test for BRCA1 and BRCA 2 gene variations, as part of their 23andMe Health + Ancestry Service, as a variation in the BRCA1 and BRCA 2 gene can significantly increase the likelihood of a female developing breast and ovarian cancer, and a male developing male breast cancer and prostate cancer[6].

However, only 44 variants of these genes, out of the 4000 variants known to increase cancer are tested for[6]. Additionally, 23andMe states on their website that these tests are not intended to diagnose any disease[7]. Therefore, DTC health-related genetic tests can provide a false sense of security to a user.

In addition, at home-genetic tests carry significant privacy and legal concerns, regarding the use, ownership, and security of genetic data and personal details. Between April and September 2023, a credential surfing attack occurred on 23andMe's platform, through exploiting reused login credentials that were stolen from previous, unrelated data breaches[8]. This led to the unauthorised access of around 160,000 UK residents' personal information, potentially revealing: names, birth years, self-reported cities or postcode-level locations, profile images, race, ethnicity, family trees, and health reports[8]. Although a fine of £2.31 million was imposed on 23andMe[8], it highlighted long-term security risks associated with genetic data. Unlike credit card numbers or passwords, which can be changed, a person's DNA is static, and cannot be changed, leading to concerns that a data breach of genetic data would cause users to be permanently at threat of extortion, identity theft, and discrimination.

Finally, many health insights provided by home genetic tests lack actionable value, leading to health anxiety in users. For instance, the 23AndMe Health + Ancestry Service reveals how likely you are to develop Alzheimer's disease[9].

To conclude, home-genetic should not be banned, but well regulated, to adequately protect users. More legislation must be put in place to protect users' genetic data. Furthermore, customers should take it upon themselves to weigh the potential risks and benefits of these tests, and should consider alternatives such as clinical genetic testing, which is tighter regulated, and always includes genetic counselling. Consulting with a healthcare professional may help for a user to come to a decision. Fundamentally, the decision should rest with the user to decide for themselves, within the context of their own life.

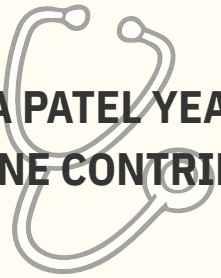
REFERENCES:

1) What is direct-to-consumer genetic testing? MedlinePlus. Accessed March 21st, 2026. https://medlineplus.gov/genetics/understanding/dtcgenetictesting/directtoconsumer/
2) What kinds of direct-to-consumer genetic tests are available? MedlinePlus. Accessed March 21st, 2026. https://medlineplus.gov/genetics/understanding/dtcgenetictesting/dtctesttype
3) Direct-to-consumer genetic testing. Genetic Alliance UK. Accessed March 21st, 2026. https://geneticalliance.org.uk/direct-to-consumer-genetic-testing/
4) 10 Leafing Direct-to-Consumer Genetic Testing Companies Shaping the Market to 2030. Research and Markets. Accessed March 21st, 2026. https://www.researchandmarkets.com/articles/key-companies-in-direct-to-consumer-genetic-testing
5) How does AncetryDNA work? Ancestry. Accessed March 21st, 2026. https://www.ancestry.co.uk/c/dna-learning-hub/how-does-ancestrydna-work
6) 23andMe Genetic Health Risk Reports: What you should know. 23andMe. Accessed March 21st, 2026. https://www.23andme.com/en-gb/test-info/genetic-health/

7) What Health-Related Information Can I Learn From 23andMe? 23andMe. Accessed March 21st, 2026. https://customercare.23andme.com/hc/en-us/articles/115013843028-What-Health-Related-Information-Can-I-Learn-From-23andMe
8) 23andMe fined £2.31 million for failing to protect UK users' genetic data. ico. Accessed March 21st, 2026. https://ico.org.uk/about-the-ico/media-centre/news-and-blogs/2025/06/23andme-fined-for-failing-to-protect-uk-users-genetic-data/
9) Noura Abul-Husn, What is Alzheimer's disease and how common is it? 23andMe. Accessed March 21st, 2026. https://www.23andme.com/en-gb/topics/health-predispositions/late-onset-alzheimers/

WHY HEALTHCARE FAILS WOMEN

AMEENA PATEL YEAR 12 – MEDICINE CONTRIBUTOR



Despite the illusion of gender inequality no longer existing, aspects that once seemed secure are being eroded by political backlash, economic pressure, and complacency. Investments in the emerging field of "women's health innovation" are celebrated while the deeper reasonings that make such innovation necessary remain intact. This article will explore the realities women face when seeking medical attention throughout the healthcare sector.

To fully understand this topic, the source of this issue will be outlined. Medicine often treats men as the default, labelling them as the "norm," thus neglecting the specific needs of women. This issue roots back to how historically research and clinical studies used male animals and male human subjects.[1] Women were often excluded from clinical trials due to concerns that their fluctuating hormones would 'complicate' data[2,3]. This issue is not only prevalent in treatment but also within the healthcare sector by systematic sexism in healthcare careers, where men are conditioned from a young age to dream of being doctors and dentists, whereas young girls are discouraged as it's seemed to be "unladylike".

Why is this the case?

In reality, only 5% of research funding is dedicated to women's health. This lack of data has life-or-death consequences. For example, women are more likely to experience 'atypical' heart attack symptoms, such as nausea or jaw pain, rather than the textbook 'crushing chest pain' observed in men.

Therefore women are over 50% more likely to be misdiagnosed following a heart attack.[4] The gender health gap is perhaps most visible in the diagnosis of ADHD and Autism as historically, these were viewed as 'male conditions.' Therefore, the criteria for diagnosing neurodivergence were built on observations of young boys. Women and girls often present differently and are said to be better at masking[5]. For instance, a girl with ADHD may not run around the classroom, but instead be a 'daydreamer,' talkative or struggle with internal emotional regulation.[5] Similarly, autistic women often develop sophisticated social mimicry to blend in with society, leading to exhaustion and burnout rather than an early diagnosis[6]. Because they don't fit the male-centric stereotype, they are often mislabelled with anxiety or personality disorders, missing out on crucial support for decades.

Endometriosis:

If heart attacks represent a lack of data, endometriosis represents a lack of empathy. Endometriosis is a condition where tissue similar to the lining of the womb grows elsewhere,

affecting roughly 1 in 10 women.[7] Despite its prevalence and the debilitating pain it causes, it takes an average of eight years to diagnose.[8]

This delay is rooted in the normalisation of female pain. When women seek help for pelvic pain, they are frequently told their symptoms are simply due to heavy periods or that they have a low pain tolerance.[9] This systematic gaslighting stems from a long-standing medical bias where women's reports of pain are taken less seriously than men's. In emergency rooms, women wait longer for pain medication and are more likely to be prescribed sedatives rather than treatment for the cause of the pain.

Factors affected by the gender health gap:

The gender health gap isn't just a matter of discomfort; it is an economic and social crisis. Delayed diagnoses lead to more invasive treatments and even permanent loss of fertility. Furthermore, women are 60% more susceptible to autoimmune diseases, yet these conditions remain underfunded and under-researched, compared to conditions that affect men more frequently.[10]

The gender health gap also intersects with race and class. Black women, for instance, face even higher rates of maternal mortality and are even less likely to have their pain validated by clinicians due to the systemic failures of the healthcare system.[11]

Resolution:

Closing the gap requires more than just research, it requires a structural change in medical education and research. Funding must be allocated for studies that include female-specific data and account for hormonal cycles. Screening tools for neurodivergence must be updated to recognise the female traits of ADHD and ASD. Additionally, medical training must address unconscious biases, teaching healthcare providers to treat patient testimony as primary evidence rather than subjective exaggeration.

Healthcare cannot be truly effective until it stops treating half the population as 'special cases.' By dismantling the male-centric model, we can move to a future where a patient's gender, race or class no longer determines the quality of their care or the length of their life.

REFERENCES

1) Weise C. Gross C. H. PMC PubMedCentral. September 30, 2024. Accessed March 24, 2026. https://pmc.ncbi.nlm.nih.gov/articles/PMC11636745/

2) Zucker I. The history of women in clinical trials. NIH Medidata. May 8, 2025. Accessed March 24, 2026. https://www.medidata.com/en/life-science-resources/medidata-blog/women-in-clinical-trials-history/

3) Gender bias in medical diagnosis: Revision history Wikipedia. September 28, 2025. Accessed March 24, 2026. https://en.wikipedia.org/wiki/Gender_bias_in_medical_diagnosis

4) British heart foundation: Women and heart attack misdiagnosis. BHF Press Office. August 30, 2026. Accessed March 24, 2026. https://www.bhf.org.uk/what-we-do/news-from-the-bhf/news-archive/2016/august/women-are-50-per-cent-more-likely-than-men-to-be-given-incorrect-diagnosis-following-a-heart-attack

5) Nadeau K. ADHD in women and girls. CHADD. June 2023. Accessed MARCH 24, 2026. https://chadd.org/for-adults/women-and-girls/
6) Loomes R. Hull L. Mandy W. P. L. Journal of Child Psychology and Psychiatry: Gender ratios in ASD. NIH PubMed. April 5, 2017. Accessed March 24, 2026. https://pubmed.ncbi.nlm.nih.gov/28545751/
7) Salas J. The Lancet: The impact of endometriosis on women's lives. El Sevier ltd. October 5, 2024. March 24, 2026. https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(24)02179-2/fulltext
8) Endometriosis UK: Diagnosis Facts and Figures. Accessed March 24, 2026. https://www.endometriosis-uk.org/endometriosis-facts-and-figures
9) Coady R. The Gender Pay Gap report. HM Treasury. December 16, 2025. Accessed March 24, 2026. https://www.gov.uk/government/publications/hm-treasurys-gender-pay-gap-report-2024-to-2025/2025-gender-pay-gap-report
10) Goulmamine S. Chew S. Aninye I. O. Funding disparities in autoimmune research. PMC PubMed Central. October 10, 2024. Accessed March 24, 2026. https://pmc.ncbi.nlm.nih.gov/articles/PMC11506982/
11) Tran P. Jreij B. Sistani F. Shaya F. T. Maternal mortality and racial disparities in healthcare. NIH PMC PubMed Central. April 20, 2017. Accessed March 24, 2026. https://pmc.ncbi.nlm.nih.gov/articles/PMC10514681/

HENRIETTA LACKS AND MODERN GENOMIC PRIVACY

ORALIA HO YEAR 12 – MEDICINE CONTRIBUTOR

How were modern technologies to treat cancer first developed? Most of the credit lies heavily on one woman: Henrietta Lacks. In 1951, a woman named Henrietta Lacks walked into John Hopkins Hospital complaining of a "knot" in her womb. She did not know that the cells a doctor snipped from her cervix that day would eventually become the most important tool in medical history[1]. She also did not know that they were taken, stored, and used without her permission. When Henrietta passed away shortly after, from the cancer and lack of care from the hospital, her cells – aka. HeLa – became immortal and unprecedented, fuelling everything from polio vaccines to COVID-19 research[2].

For decades, **Henrietta Lacks** was a ghost in medicine: a woman whose biological content built a multi-million dollar industry while her family lived in poverty, unbeknownst to her global legacy, due to their lack of information and the abbreviated name of the cells. The cells were falsely identified for the longest time as coming from patients named "Helen Lane" or "Helen Larson", depriving the actual Henrietta Lacks and their family her credit. But in 2026, this is not a history lesson anymore. The "theft" of Henrietta's cells has become the blueprint for one of the biggest debates in 21st century medicine: **Genomic Privacy.**

Today, we are not just worried about physical tissue; but rather, digital data. When we upload our DNA to a database, we are not just sharing our own secrets, but also those of our parents, children, cousins. As the legal battles of 2023 and 2026 have shown, the world is finally forced to answer a question the Lacks were never allowed to ask: Who owns our bodies once they become data?[3] In 2013, it was clear that all the progressive cancer treatment breakthroughs came at the cost of privacy, when a major ethical controversy erupted when researchers published the full HeLa genome online. This act didn't just expose Henrietta's data; it potentially revealed the private medical predispositions of her living descendants without their permission, highlighting the unique "family" nature of genetic information[4]. We are currently witnessing a massive shift from medical history to corporate accountability. The Lacks, after the discovery that Henrietta, who was an influential figure in their family, had cells that lived on past their mourning, sought to seek justice, for their financials and for recognition[1] . In 2023, the family estate reached a landmark settlement with Thermo Fisher Scientific, successfully arguing "unjust enrichment" – the idea that a company cannot legally profit from stolen biological material [3].

This momentum has surged in 2026. Just last month, in February, pharmaceutical giant Novartis settled its own litigation regarding HeLa use[5], whilst ongoing cases against companies like Ultragenyx challenge the use of these cells in modern gene-therapy "factories"[6].

The **"digital HeLa"** of today is found in direct-to-consumer DNA databases such as 23andMe. The risks are no longer theoretical; with the "two percent rule," a genetic database only needs a tiny fraction of the population to identify almost anyone through kinship identification. This "two percent rule" creates a collective vulnerability when a few individuals surrender their data they inadvertently strip the anonymity of their entirely extended family tree. In response, the WHO released 2024 guidelines mandating "granular consent" to prevent future exploitations[7]. We are finally entering an era of genomic sovereignty, where individuals – not corporations – control their biological data. This shift is a necessary correction to decades of extractive science that prioritise data acquisition over human rights and ethics.

Science should not have to choose between progress and privacy; the two must co-exist. Henrietta Lacks had given an immortal gift but was denied the basic dignity of being asked first. Her story serves as the ultimate cautionary tale of what happens when medical advancement outpaces more oversight. By implementing strict granular consent, we ensure that the immortality of scientific discovery is never again built upon the silence of the subject.

In my opinion, I wish to thrive in the future, in a medical system where informed consent is as immortal and regarded, as the HeLa cell line itself. Only then can we achieve a truly equitable landscape where patient trust is the foundation of every breakthrough.

REFERENCES

1) Skloot R. (2010) The Immortal Life of Henrietta Lacks. New York: Crown Publishers. Access date: 06/03/2026

2) Gey GO, Coffman WD, Kubicek MT. Tissue culture studies of the proliferative capacity of cervical carcinoma and normal epithelium. Cancer Res. 1952;12:264-5. Access date: 14/03/2026 https://cir.nii.ac.jp/crid/1573105974076643712?lang=en -:~:text=%22Tissue%20culture%20studies%20of%20the%20proliferative%20capacity,BibTeX%20*%20TSV%20*%20CSV%20*%20JSON%2DLD

3) Li V. (2023) Lacks v. Thermo Fisher Scientific Inc.—An Extraordinary Event from More than 70 Years Ago That Led to a Lawsuit, Resulting in a Settlement.Publsihed by Food & Drug Law Institute. Access date: 14/03/2026 https://www.fdli.org/2023/08/lacks-v-thermo-fisher-scientific-inc-an-extraordinary-event-from-more-than-70-years-ago/

4) National Institutes of Health. HeLa Cell Genome Data Control and Access Update. (2024) Access date: 14/03/2026 https://acd.od.nih.gov/working-groups/hlgda.html

5) Matza M. (28/02/2026) Henrietta Lacks: Family of woman whose cells were 'stolen' settles second lawsuit. Published by BBC news. Access date: 14/03/2026 https://www.bbc.co.uk/news/articles/czj1pw0rmmgo

6) Lacks v. Ultragenyx Pharmaceutical, Inc. No. 1:23-cv-02171 (D. Md. 2023) Access date: 14/03/2026 https://www.govinfo.gov/content/pkg/USCOURTS-mdd-1_23-cv-02171/pdf/USCOURTS-mdd-1_23-cv-02171-1.pdf
7) WHO. Guidance for human genome data collection, access, use and sharing. Geneva: WHO;2024. Access date: 14/03/2026 https://www.who.int/publications/i/item/9789240102149

CAUSES OF ASTHMA & ALLERGIES IN MODERN TIMES

HUSNA JAVID YEAR 12 – MEDICINE CONTRIBUTOR

Asthma and allergic diseases are among the most common chronic conditions worldwide, affecting hundreds of millions of people[1]. Their rapid increase since the mid-20th century suggests that environmental and behavioural changes are key drivers. While genetics influence susceptibility, it has been found that modern environmental exposures are the primary contributors.

Urbanisation has been strongly linked to increased asthma occurrence. Exposure to outdoor pollutants such as particulates, nitrogen dioxide, and ozone contributes to airway inflammation and reduced lung function[1]. Children living near major roadways exhibit higher rates of asthma symptoms and hospitalisations. Indoor pollutants, including mould, combustion by-products, and volatile organic compounds, further exacerbate respiratory irritation[2]. As urban populations expand, pollution remains a significant influence of respiratory disease.

The hygiene hypothesis proposes that reduced microbial exposure in early childhood leads to immune dysregulation and increased allergic sensitisation[3]. Modern lifestyles characterised by improved sanitation, smaller family sizes, and reduced contact with animals limit microbial diversity.

The microbiome hypothesis expands on this by emphasising the role of gut microbial composition in immune development. Disruptions caused by antibiotics, caesarean delivery, reduced breastfeeding, and low fibre diets have been associated with increased allergy risk[4]. Evidence indicates that children who develop allergies often display an altered or reduced gut microbiome before they start displaying symptoms[4].

Climate change has adjusted pollen levels, contributing to rising allergy rates. Warmer temperatures and rising atmospheric CO_2 levels extend pollen seasons and increase pollen production[5]. Long-term analyses show that pollen seasons in North America and Europe have lengthened significantly over recent decades[5]. Increased pollen exposure is associated with higher rates of allergic rhinitis and asthma exacerbations. Extreme weather events such as heatwaves and wildfires further worsen air quality and respiratory outcomes. Modern populations spend most of their time indoors, increasing exposure to indoor allergens such as dust mites, pet hair, mould spores, and chemical irritants. Energy-efficient housing reduces ventilation, trapping allergens and moisture.

Dampness and mould growth are strongly associated with asthma development, particularly in children[6]. The changes towards indoor lifestyles, combined with tightly sealed buildings, has created environments that allow allergens to accumulate and respiratory sensitisation.

Dietary changes in industrialised societies have been associated with the rise of allergic diseases. Western diets high in processed foods, sugars, and omega-6 fatty acids, and low in fibre and antioxidants, may promote systemic inflammation and damage immune regulation[7]. Reduced intake of fruits and vegetables lowers antioxidant availability, increasing susceptibility to airway inflammation. Low fibre diets negatively affect the gut microbiome, reducing production of short chain fatty acids that support immune tolerance[7].

Overall, these factors show that the rise in asthma and allergies is strongly linked to modern environmental and lifestyle changes. Understanding these influences helps explain current trends and highlights where improvements can be made to protect respiratory health.

REFERENCES

1) World Health Organization. Asthma: Key facts. Geneva: WHO; 2023. Published 2023. Accessed 24 March 2026. URL: https://www.who.int/news-room/factsheets/detail/asthma
2) World Health Organization. Household air pollution and health. Geneva: WHO; 2023. Published 2023. Accessed 24 March 2026. URL: https://www.who.int/news-room/fact-sheets/detail/household-air-pollution-and-health
3) Bloomfield SF, et al. Time to abandon the hygiene hypothesis. Clin Exp Allergy. 2016;46(3):443-53. Published 2016. Accessed 24 March 2026. URL: https://doi.org/10.1111/cea.12780
4) Renz H, Skevaki C. Early life microbial exposures and allergy risks. Nat Rev Immunol. 2021;21(3):177-91. Published 2021. Accessed 24 March 2026. URL: https://doi.org/10.1038/s41577-020-00413-0
5) Ziska LH, et al. Temperature-related changes in airborne allergenic pollen. Lancet Planet Health. 2019;3(3): e124-31. Published 2019. Accessed 24 March 2026. URL: https://doi.org/10.1016/S2542-5196(19)30015-4
6) Mendell MJ, et al. Respiratory and allergic health effects of dampness and mould. Environ Health Perspect. 2011;119(6):748-56. Published 2011. Accessed 24 March 2026. URL (PubMed): https://pubmed.ncbi.nlm.nih.gov/21269928/
7) Berthon BS, Wood LG. Nutrition and respiratory health. Nutrients. 2015;7(3):1618-43. Published 2015. Accessed 24 March 2026. URL: https://doi.org/10.3390/nu7031618

PREVENTION VS TREATMENT

OF DIABETES

CHRISTINE EKWEOGU
YEAR 12 –
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Fundamentally, diabetes is when blood glucose is too high. This could be due to the lack of, or lack of use of insulin (glucose inhibition hormone).
With over 800,000,000 people diagnosed with diabetes (affecting 14% of adults), diabetes has made its way to becoming an ubiquitous part of society to which we must be more educated on[1].
Often recognised are its risk factors; lack of exercise, obesity, and unhealthy eating. However, the majority of people do not understand exactly what diabetes is.
As expected, with high blood sugar comes quite a few complications, which can be just as serious as diabetes itself. For instance, heart disease, stroke, kidney failure (nephropathy), vision loss (retinopathy), and nerve damage, also known as neuropathy.
Diabetic neuropathy is in fact one of the most common of these complications. It is notorious for causing numbness, tingling, loss of sensation and hot flashes, especially around the feet. As suggested, its impact on the lives of people who suffer from it is detrimental, in some cases causing the inability to do certain tasks (like sitting down, exercise etc) as well as increasing the chance of injuries and long-term health issues.
Whilst treatment does exist to manage the symptoms, the damage left by neuropathy is usually irreversible.
This raises the question, "To what extent is the prevention of diabetic neuropathy effective?"

A deeper dive on Diabetic Neuropathy:

The cause of this type of nerve damage is from long-term high blood sugar levels, which damages the small blood vessels that supply the nerves in the body.[2]
The prolonged hyperglycaemia (consistently high blood sugar levels) causes excess glucose in the bloodstream to damage both the nerves and the small blood vessels that supply them over time. This reduces the flow of oxygen and nutrients - which are essential for nerve function - to the nerves. In addition, the high glucose levels trigger oxidative stress therefore damaging cells.[3]
As a result, the nerve fibres become damaged and may even disappear. This results in burning, numb, and tingling sensations across the body, even leading to loss of sensation overall. This is where the possibility of missing serious injuries in the body lies as a person unable to feel will not feel the pain of a foot bruise, which could become infected.[2] The ability to recognise the symptoms of diabetic neuropathy early is essential to be able to manage such a disease, as early signs are often ignored.[3]

Prevention vs treatment:

The most effective prevention strategy is managing blood glucose, the most crucial risk factor. The basics: a healthy diet, exercise, are shown to have heavy benefits for especially type 1 diabetes sufferers. A trend in research which is stressed often is the importance of early detection, as identifying diabetes sooner is crucial to preventing the development of neuropathy into its irreversible stages.[3] Furthermore, controlling other risk factors such as high blood pressure, cholesterol levels, and nicotine use further prevents nerve deterioration, by addressing the root causes of neuropathy rather than treating the symptoms.
On the other hand, due to only a few advancements in reversing the condition, the treatments available mostly focus on managing the pain of diabetic neuropathy. Combination therapy and other therapies exist to improve the quality of life of the patient rather than address the root cause of diabetic neuropathy.[4] Research published in the BMJ shows that even advanced treatments tend to reduce pain rather than repair damaged nerves.[5] This means that patients may still experience long-term effects despite receiving treatment. Therefore, treatment is largely reactive, addressing the result of neuropathy rather than its underlying causes. This adds to the reason treatment is largely less effective than prevention.

Overall, through analysis, it is shown that for now, diabetic neuropathy cannot be fully reversed or treated. Whilst good management of diabetes is highly effective, it does not completely eliminate the possibility of developing neuropathy. As opposed to treatment, prevention is, in my opinion, more desirable, as most would rather prefer to never have to deal with the symptoms over having temporary relief. Thus, this highlights the high impact and importance of prevention of the development of diabetic neuropathy on the mental health and wellbeing of the person, leaving early intervention as the most crucial factor.

REFERENCES:

1) The Guardian. Diabetes rates increase world study. The Guardian. November 13, 2024. Accessed March 19 2026. https://www.theguardian.com/society/2024/nov/13/diabetes-rates-increase-world-study
2) Diabetes UK. Diabetic neuropathy. Diabetes UK. Accessed March 19, 2026. https://www.diabetes.org.uk/about-diabetes/looking-after-diabetes/complications/nerves-neuropathy#causes
3) BMJ Best Practice. Diabetic neuropathy. BMJ Best Practice. Accessed March 19, 2026. https://bestpractice.bmj.com/topics/en-us/531
4) Saul H, et al. Combination therapy for painful diabetic neuropathy is safe and effective. The BMJ. April 21, 2023. Accessed March 19, 2026. https://www.bmj.com/content/381/bmj.p866
5) Peltier A, Goutman S, Callaghan B. Painful diabetic neuropathy. The BMJ. May 10, 2014. Accessed March 19, 2026. https://www.bmj.com/content/348/bmj.g1799

FROM COVID-19 TO KENT:

WHAT THE MENINGITIS OUTBREAK REVEALS ABOUT THE NHS

AISHA RAHAT YEAR 13 – MEDICINE CONTRIBUTOR

The recent meningitis outbreak in Kent, involving multiple hospitalisations and reported deaths, was quickly contained through antibiotics and targeted vaccination. On the surface, this reflects an effective public health response. However, a closer look suggests something more concerning: the NHS remains structurally reactive, despite the lessons of COVID-19.[1]
This is not a failure of science or clinical knowledge. Meningococcal disease is well understood. It spreads through close contact, with carriage rates highest in adolescents and young adults, particularly in environments like universities.[2] These are predictable risk settings.
The issue is that intervention still occurs after cases appear, rather than before risk translates into disease.

A Familiar Pattern: COVID-19 and Delayed Intervention

The early stages of COVID-19 revealed a similar pattern. Transmission initially accelerated in identifiable high-risk environments: households, workplaces, and universities — yet intervention often lagged behind spread.
Meningitis operates differently in scale but not in structure:
· COVID-19: airborne, widespread transmission
· Meningitis: close-contact, cluster-based transmission
Despite this difference, both highlight the same underlying weakness: public health systems are better at **responding to outbreaks than preventing them.**
In both cases, early symptoms are non-specific, delaying recognition. However, meningitis progresses far more rapidly, often within hours, making delayed intervention even more consequential.[3]

Prevention in Theory, Reaction in Practice:

The NHS has repeatedly emphasised a shift "from treatment to prevention."[4] However, funding patterns suggest otherwise.
Over the past decade, spending on prevention has effectively decreased in real terms per person.[5] At the same time, the system faces increasing pressure from waiting lists, workforce shortages, and rising demand.
This creates a structural imbalance:
· Resources are prioritised towards managing existing illness
· Preventative strategies such as targeted vaccination or early risk identification, are comparatively underdeveloped
The Kent outbreak reflects this. The response was rapid and effective, but only once the outbreak had already developed.[1]

Vaccination Strategy: A Misalignment of Risk

Unlike COVID-19 at the start of the pandemic, meningitis is largely preventable through vaccination.[1] The MenB vaccine is included in the UK childhood immunisation schedule.
However, transmission risk peaks in teenagers and young adults, not infants.[2]
This creates a dilemma because the group most at risk of spreading the disease is not the group most protected.
During COVID-19, vaccination strategies were adapted dynamically — prioritising both vulnerability and exposure. In contrast, meningitis vaccination policy remains relatively fixed, suggesting limited flexibility in responding to changing epidemiological patterns.

Funding and Capacity: The Bigger Constraint

These issues are not just strategic — they are structural.
Compared with other healthcare systems, the NHS operates with relatively constrained resources:
· The UK has fewer hospital beds per capita than the OECD average.
· Health spending per person is lower than in countries such as Germany.[6]
· Public health budgets are spread across a wide range of responsibilities.
For example, countries like Germany combine higher health spending with greater hospital capacity, while Japan and South Korea maintain significantly higher bed availability, allowing greater resilience to surges.[7]

By contrast, the NHS is required to deliver universal care with comparatively limited capacity. This makes it more dependent on efficient response, but less able to invest consistently in preventative infrastructure.
The United States, despite much higher spending, demonstrates that funding alone is not sufficient — but the UK example shows that limited funding constrains strategic flexibility, particularly in prevention.

What This Actually Shows:

The Kent outbreak is not significant because of its scale, but because of what it reveals.
Even after COVID-19, three issues remain:
1. **Predictable risk is not proactively managed**
High-risk environments are well known, yet intervention is not implemented until cases emerge.
2. **Prevention is underfunded relative to treatment**
Policy emphasises prevention, but resource allocation does not fully support it.
3. **Public health remains reactive**
Systems are designed to respond efficiently, but not necessarily to anticipate risk.

Conclusion:

The NHS handled the meningitis outbreak effectively — but only after it began.[1] This reflects a broader pattern also seen during COVID-19: **intervention follows transmission, rather than preventing it**.
The tools for earlier action already exist — vaccination, epidemiological data, and risk modelling.[3]

The challenge lies in how they are applied. Ultimately, the issue is not whether the NHS can respond to crises. It clearly can. The more important question is whether it can **shift towards preventing them.**

REFERENCES:

1) NHS England. Urgent vaccination response to outbreak of meningococcal disease. London: NHS England; 2026. Available at: https://www.england.nhs.uk (Accessed 12th March 2026).
2) UK Health Security Agency. Meningococcal disease: guidance, data and analysis. London: UKHSA; 2025. Available at: https://www.gov.uk/government/collections/meningococcal-disease-guidance-data-and-analysis (Accessed 8th March 2026). 3) World Health Organization. Meningitis. Geneva: World Health Organization; 2024. Available at: https://www.who.int/news-room/fact-sheets/detail/meningitis (Accessed 5th March 2026).
4) NHS England. The NHS Long Term Plan. London: NHS England; 2019 (updated 2024). Available at: https://www.longtermplan.nhs.uk (Accessed 7th March 2026).
5) Department of Health and Social Care. Fit for the Future: 10 Year Health Plan for England. London: DHSC; 2025. Available at: https://www.gov.uk/government/publications/10-year-health-plan-for-england (Accessed 10th March 2026).
6) OECD. Health expenditure and financing statistics. Paris: OECD; 2025. Available at: https://www.oecd.org/health/health-expenditure.htm (Accessed 18th March 2026).
7) OECD. Health at a Glance 2025: OECD Indicators. Paris: Organisation for Economic Co-operation and Development; 2025. Available at: https://www.oecd.org/health/health-at-a-glance (Accessed 15th March 2026).

VAPING:

A SAFER ALTERNATIVE OR A NEW PUBLIC HEALTH CRISIS?

AANYA AGRAWAL YEAR 12 – MEDICINE CONTRIBUTOR

Vaping is the use of e- cigarettes to inhale vaporised liquid containing a plethora of chemicals. Vaping gained significant popularity in the United Kingdom during the 21stcentury, with an estimated 5.6 million adult users in 2024. [1] However, this statistic only accounts for the adult users, and not the vast number of the youth in the UK illegally buying and using vapes, despite the laws around the minimum age being 18 to purchase a vape. Whilst some see vaping as a safer alternative to smoking cigarettes, others view it as a growing public health concern. [2]

E-Cigarettes, more commonly known as vapes, are battery powered devices, that contain a liquid, that's heated into an aerosol, which is then inhaled. The liquid is not a water vapour, but rather a chemical based aerosol containing nicotine, ultra-fine particles, flavourings and even heavy metals, such as nickel, tin and lead. [3] In comparison, traditional cigarettes arethin cylinders of finely cut tobacco, featuring a filter, which is designed to deliver nicotine via inhaled smoke. They also contain other carcinogens, such as tar and carbon monoxide. [4] The main similarity between the two smoking components is the use of the chemical nicotine. Nicotine is a highly addictive stimulants drug, found primarily in tobacco plants.

The stimulant is provided by the surge of adrenaline, causing an immediate release of glucose, increasing the heart rate, breathing activity and blood pressure. [5] It also decreases insulin production from the pancreas glands, causing an increase in blood glucose levels. Its sedative properties are due to the fact that it can trigger the release of the hormone beta endorphin, which ions known to reduce anxiety, ease distress and create a false sense of emotional well being, aiding sleep. Nicotine also has an indirect impact on the brain. The drug is recognised for its addictive properties, as it releases the hormone dopamine, a chemical that is responsible for the feelings of pleasure and reward. However, as one builds up more of an intolerance to the nicotine, over time, they will need a higher dose of the drug to enjoy the same effects. [6]

It has been recognised that using a vape is a safer alternative to smoking a cigarette. The NHS website states that its one of the "most effective tools to quit smoking". It's also found that you're approximately twice as likely to quit smoking if a nicotine vape is used as a replacement. [7] Despite nicotine being a highly addictive drug, and in the aerosol of the vape, it doesn't contain the toxic chemicals found in cigarettes, such as tar, produced when tobacco is burned. These chemicals are carcinogens, cancer causing stimulants, which coat the lungs in the thick, sticky tar residue.

This tar also increases the risk of lung diseases, such as emphysema and chronic obstructive pulmonary disease. Additionally, carbon monoxide, the product of partially combusted tobacco, is a toxic gas, that can't be smelt or tasted. CO prevents the red blood cells from carrying as much oxygen, meaning organs have a reduced supply of oxygen, increasing the risk of heart disease and strokes. [8] As a result of vapes not containing such chemicals, there is a much lower risk of cancer caused by exposure to these carcinogens.

Conversely, the recent influx in popularity in vapes may highlight a new public health problem. Whilst it is acknowledged that vapes pose less harm to your health than cigarettes, vaping is not risk free. Unlike cigarettes, vapes have not been around for long enough for health professionals and researchers to know the full risks of long-term usage. It's unlikely that they are totally harmless, as chemicals are still being inhaled directly to the lungs upon each usage. Some commonly recognised side effects of vaping include coughing, mouth and throat irritation and headaches. [7]

It's highly advised that non-smokers and, especially, children under the age of 18 should not use a vape. Despite there is a minimum age of sale for vaping products in the UK, it's estimated that as of 2025, approximately 1.1 million young people aged 11-17 in Great Britain have tried vaping. This is dangerously, because their brains and lungs are still developing, meaning they're more sensitive to the side effects, which have not been completely identified. The increased attraction between the youth and vaping has ultimately caused a decline in the rates of youth smoking. This attraction is partially due to the high expose young people have to vaping culture currently. They are being advertised on the media, bought to schools and are displayed in shops. This increased peer pressure on young people could also cause mental health issues in the youth, as they feel forced to try vaping. This increased promotion and idolisation has increased the appeal. Additionally, the brightly coloured packaging also entices young people, as well as the playful names and depicted characters. The sweet and exciting flavours are also a large contributor to the attraction. [9]

In conclusion, I think that whilst vaping may be a safer alternative instead of smoking cigarettes, in terms of physical health, as there is a much lower risk of cancer, it could be a new rising health issue. Similar to how the damaging effects of smoking were unknown previously, the long-term effects of vaping are uncertain to us now. I think that vapes should be used as a treatment to stop smoking in the short term, and eventually stop using a vape too, and should be prescribed by a health professional, so that they cannot be accessed by the public, such as by children.

REFERENCES:

1. Electric Tobacconist, Vaping, E cigarettes statistics, https://www.electrictobacconist.co.uk/vaping-statistics, Accessed: 10th March 2026
2. Cleveland Clinic, Vaping (E Cigarettes), 22/08/2022, https://my.clevelandclinic.org/health/treatments/21162-vaping, Accessed: 10th March 2026
3. CDC, About E Cigarettes (Vapes), 24/10/2024, https://www.cdc.gov/tobacco/e-cigarettes/about.html, Accessed: 10th March 2026
4. National Cancer Institute, Cigarette, https://www.cancer.gov/publications/dictionaries/cancer-terms/def/cigarette, Accessed: 10th March 2026
5. Smoke Free Hampshire, https://smokefreehampshire.co.uk/nicotine-and-quitting-what-you-need-to-know, Accessed: 10th March 2026
6. Echelon Health, Nicotine: The Good, The Bad & The Ugly, 29/03/2026, Ms Lucy Holl, https://www.echelon.health/nicotine-the-good-the-bad-and-the-ugly/ Accessed: 10th March 2026
7. NHS, Vaping to Quit Smoking, https://www.nhs.uk/better-health/quit-smoking/ready-to-quit-smoking/vaping-to-quit-smoking/#:~:text=patches%20or%20gum.-,Is%20vaping%20harmful?,up%20to%2070%20cause%20cancer., Accessed: 10th March 2026
8. Cancer Research UK, What's in a Cigarette, https://www.cancerresearchuk.org/about-cancer/causes-of-cancer/smoking-and-cancer/whats-in-a-cigarette, Accessed: 10th March 2026
9. Action on Smoking and Health (ASH), Youth Vaping: The Facts, https://ash.org.uk/key-topics/youth-vaping, Accessed: 14th March 2026

DENTISTRY

FLUORIDATED WATER: SAVING THE FUTURE OR A VIOLATION OF RIGHTS?

HALIMA YUSUF - YEAR 12
DENTISTRY CONTRIBUTOR

Fluoridated water. What is it and is it something to worry about?
Dr Niger Carter, Oral Health Foundation said:
"We believe that water fluoridation is the single most effective public health measure there is for reducing oral health inequalities and tooth decay rates, especially amongst children. We welcome these proposals and believe they represent an opportunity to take a big step forward in not only improving this generation's oral health, but those for decades to come."[4]

Upon recent years there has been a growing distribution of fluoridated water, however due to the lack of information readily available regarding this, I am sure many of you are oblivious to what this entails and if it is something we should consider as a safety risk. Therefore, through this article I hope to inform you about what fluoridation is, why it is happening and the advantages and disadvantages of this process, allowing you to make your own informed opinion on this matter.

What is fluoride and how does it work?

What is fluoride and how does it work? Fluoride is a naturally occurring mineral which occurs in soil, rock and water that has been proven to strengthen tooth enamel and reduce the development of decay. To understand how fluoride works let's start off by understanding what causes decay. Tooth decay is the process where the tooth tissue is destroyed by the acids made by the bacteria in dental plaque, which is a sticky film which forms over the teeth.

This can lead to cavities, abscesses, and an overall reduced quality of life[1]. In order to reduce the rate of decay, fluoride can displace hydroxyl ions in the tooth's enamel with fluoride hydroxyapatite to produce fluorapatite or fluorohydroxyapatite[2]. This process makes the enamel more resistant to acid attacks and promotes the rebuilding of enamel.

What is fluoridation and the process?

According to the Drinking Water Inspectorate, fluoridation is the dosing of water supplies in order to bring up the fluoride level by 1milligram per litre. Despite many conspiracies we come across today, this is said to be a safe dosage which has little to no risks. This is reinforced by it being carried out in a controlled and extensive manner. Firstly, the initial decision to undergo fluoridation is made by the Secretary of State, then the actual process is carried out under the contract of the Department of Health and Social Care.

Finally, this is then regularly inspected by the DWI to ensure that it follows the Code Of Practice On The Technical Aspects Of The Fluoridation Of Water Supplies 2021(3). This therefore proves that the process should not cause any worry or concern.

Why is fluoridation carried out?

Overall, fluoridation is proven by 2013 studies to reduce the rate of tooth decay by strengthening enamel, consequentially reducing cavities and possible oral infections[4]. Therefore, this process acts as a public health preventative measure of dental caries at a widespread scale, whilst specifically targeting disadvantaged communities where dental care and treatments may not be readily available or affordable.

Why are people against this process?

Despite all these positives there have been many concerns which have arisen regarding this process. Examples include health risks like fluoride toxication, as a result of excessive fluoride intake. The adequate intake for fluoride is 0.7 mg daily for toddlers, rising to 3 mg daily for adult women and 4 mg daily for adult men[6]. The worry of possibly exceeding this limit has led to the ban of this procedure in many European countries such as Germany and Austria. Another health concern is the possibility of Dental Fluorosis, causing white/brown streaks on the enamel of kids aged 7 years and older, leaving them stained for life, consequentially resulting in mental health problems or insecurities. Overall, this stems the question of 'Is it ethical to treat water with fluoride without people's say or consent, despite knowing the possible risks?'

Conclusion:

Ultimately, fluoridated water is a revolutionising process which has changed many countries such as the US, Canada, and Chile where more than 50% of their water is treated with fluoride, reducing tooth decay and cavities[5], yet still raising concern over health risks and ethical issues. Therefore, today the public are still divided on whether this process should or should not be normalised and widespread across the UK and the world. I hope you now have a well-rounded understanding of fluoridated water, what it is and how it affects us lay people.

REFERENCES:

1) Scottish Government. Tooth Decay [Internet]. NHS inform. October 2025. Accessed on 25/02/2026 https://www.nhsinform.scot/illnesses-and-conditions/mouth/tooth-decay/
2) Aoun A et al. The Fluoride Debate: The Pros and Cons of Fluoridation. Preventive Nutrition and Food Science [Internet] The fluoride debate, September 30, 2018. Accessed on: 25/02/2026 https://pmc.ncbi.nlm.nih.gov/articles/PMC6195894/#sec1
3) Drinking Water Inspectorate. Fluoridation of Drinking Water [Internet]. Drinking Water Inspectorate, N/A. Accessed on: 26/02/2026 https://www.dwi.gov.uk/
4) Department of Health and Social Care. Health and Care Bill: Water Fluoridation [Internet]. GOV.UK. March 10, 2022. Accessed on: 26/02/2026 https://www.gov.uk/government/publications/health-and-care-bill-factsheets/health-and-care-bill-water-fluoridation
5) Wikipedia. Water Fluoridation by Country [Internet]. Wikipedia. 2020-March 2026. Accessed on: 27/02/2026 https://en.wikipedia.org/wiki/Water_fluoridation_by_country

6) Aoun A et al. The Fluoride Debate: The Pros and Cons of Fluoridation. Preventive Nutrition and Food Science [Internet] The fluoride debate, September 30, 2018. Accessed on: 25/02/2026 https://pmc.ncbi.nlm.nih.gov/articles/PMC6195894/#sec1

THE BENEFITS OF THE MISWAK IN ORAL HEALTH

ABIDA BAREE - YEAR 12
DENTISTRY CONTRIBUTOR

Miswak is a natural chewing stick obtained by the Salvador persica tree and has been used for centuries as a method of cleaning teeth. It is widely used in parts of Africa the Middle East and South Asia and is still relevant today. Modern research shows that miswak is not just a traditional tool but an effective method for maintaining oral hygiene. [1,2]

Benefits:

When the end of the stick is chewed, it forms soft fibres that act like the bristles of a toothbrush these fibres help to remove plaque, food particles and debris from the surface of the teeth reducing the chance gingivitis. They can also reach between teeth along the gum line where plaque tends to accumulate. In addition, the gentle action of the fibres stimulates the gums improving blood circulation and helping to maintain healthy tissue. [2]

In addition to its physical cleaning ability, miswak contains a wide range of natural chemical compounds. Fluoride is one of the most important compounds as it strengthens teeth and helps to repair dental caries. Calcium and phosphate ions support mineralisation allowing early enamel damage to be repaired. Silica acts as a mild abrasive helping to remove stains and plaque without damaging the enamel assisting to whitening teeth. [1]

Miswak also has strong antimicrobial properties. It contains substances such as tannins, flavonoid, saponins and alkaloids which help reduce the growth of the harmful microorganisms in the mouth. For instance, it inhibits the growth of Streptococcus mutans, which is a major cause of tooth decay by lowering bacteria level. Miswak reduces plaque formation and the risk of cavities. Additional studies have shown that miswak has anti-fungal effects, which helps to control organisms such as Candida which can cause oral infections. [3,5]

Another important benefit of Miswak is its protective effect on oral tissues. Tannins can form a protective coating over the enamel making it harder for bacteria to attach. Miswak also contains vitamin vitamin C, which is essential for maintaining healthy gums and preventing inflammation. Furthermore, antioxidants present in miswak also help to reduce oxidative stress in the oral cavity protecting tissues from damage. [1]

Limitations:

Despite these benefits miswak does have some limitations. Its effectiveness depends on proper use, and without correct technique it may not remove

plaque as effective as modern toothbrushes do. The concentration of fluoride in the miswak can vary meaning it may not always provide the same level of protection as fluoride toothpaste in addition excessive or improper use may gum irritation and for this reason many dental professionals suggest that miswak should be used alongside modern oral health practices rather than a complete replacement.

Toothbrushes vs Miswak:

Toothbrushes are designed with uniform bristles and usually used with fluoride toothpaste which has strong clinical evidence for preventing tooth decay however miswak has both mechanical and chemical properties in a single tool and does not require additional products. Research shows that when used correctly and frequently miswak achieve similar reductions in plaque and improvements in gum health as toothbrushing. This makes it a useful alternative. [4]

Worldwide effects and roots:

Miswak has important applications in public health. Many low-income regions have limited access to toothbrushes and toothpaste is limited due to cost and availability, whereas miswak is inexpensive widely available and environmentally friendly, making it a sustainable option for overall hygiene. Thus, organisation such as world health organisation have recognised the value of traditional oral hygiene methods like miswak in promoting dental health worldwide. [1]

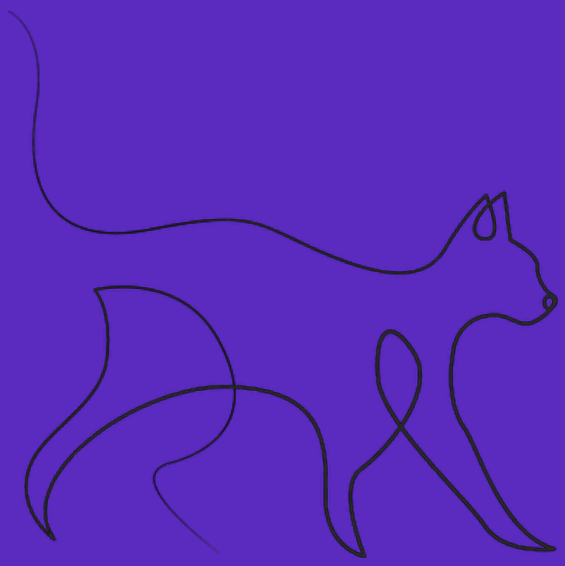
In addition to its clinical benefits this walk also has many cultural and historical significance. It is commonly used in the Islamic practice as a part of daily hygiene which encourages frequent cleaning of the teeth throughout the day. This increased frequency abuse may improve over health outcomes compared to brushing only twice daily.

Conclusion:

In conclusion, miswak is an effective natural tool for maintaining oral hygiene. It's combination of mechanical cleaning anti-microbe action and protective chemical properties help helps to prevent plaque 2 to K and gum disease. However, it's effectiveness depends on correct use, and it may be beneficial and combine combined with modern dental practices so overall this work represents a viable accessible sustainable approach to improving oral health.

REFERENCES:

1) Haque MM, Alsareii SA. *A review of the therapeutic effects of using miswak (Salvadora persica) on oral health.*PubMed Central. May 15, 2015. (Accessed March 20, 2026) https://pmc.ncbi.nlm.nih.gov/articles/PMC4436748/
2) Listerine Arabia. *How to use a miswak.* Listerine Middle East. 2024. (Accessed March 20, 2026) https://www.listerine-me.com/bad-breath/how-to-use-miswak 3) Niazi F, Naseem M, Khurshid Z, et al. *Role of Salvadora persica chewing stick (miswak) as an antimicrobial agent: A review.* PubMed. Feb 15, 2016. (Accessed March 20, 2026) https://pubmed.ncbi.nlm.nih.gov/23432926/
4) Al-Otaibi M, Al-Harthy M, Soder B, et al. *The effect of brushing with Salvadora persica (miswak) sticks on salivary Streptococcus mutans and plaque levels in children: a clinical trial.* PubMed. Feb 13, 2020. (Accessed March 20, 2026) https://pubmed.ncbi.nlm.nih.gov/32054468/
5) Malik AS, Al-Manei KK, Al-Manei MK, et al. *Miswak and oral health: An evidence-based review.* PubMed. July 15, 2020. (Accessed March 20, 2026) https://pubmed.ncbi.nlm.nih.gov/32565699/



VETERINARY

A NEW HOPE?

Stem cells and the fight against cancer in animals

HAFSA ALI YEAR 12 – VETERINARY CONTRIBUTOR

Advancements in technology today are providing a gateway into new medical advancements and treatment, such as regenerative therapies and further oncology research. But how could stem cells transform cancer treatment in animals?

Stem cells are unique cells that can develop into distinct types of specialised cells, allowing other cell types to arise[1]. Unlike most cells, which have a specific function, stem cells can both renew themselves and transform into other cells, such as muscle, blood, or nerve cells. This makes stem cells useful, as they have a regenerative ability, allowing them to act as a natural repair system within an animal's body. This is done by stem cells using the body's own, or donor stem cells to repair, replace or renew damaged tissues and organs[2]. Due to this innovative ability, scientists are investigating whether this power could be harnessed to target specific cancer cells and support recovery during cancer treatments in animals.

Many veterinary clinics are now primarily focusing on earlier and more precise diagnostics and treatments that rely on the body's own, natural healing processes providing an improved quality of life and survival. The main topics of advancements include liquid biopsies, personalised immunotherapy, and regenerative stem cell therapy. While current treatments of cancer such as surgery, chemotherapy and radiotherapy, are widely used in veterinary medicine, they are not always effective and can sometimes impact an animal's quality of life.

As a result, researchers are now exploring whether stem cells could offer an innovative approach to revolutionise the treatment of cancer within animals[3].

Stem cell therapy is emerging as a revolutionary approach to treating cancer in animals in several ways such as, by targeting tumours directly, boosting the immune system and delivering therapeutic agents specifically to cancer cells. Studies have shown that stem cells can inhibit tumour growth through mechanisms such as cell death and reducing cancer growth. Additionally, another approach is boosting the immune system, using mesenchymal stem cells (MSCs - a type of adult stem cell, found in bone marrow) which can regulate the immune system[4], potentially leading to tumour regression. Researchers have also developed methods to genetically modify mesenchymal stem cells (MSCs) to carry anti-cancer agents, such as cytokines (cells that stimulate the immune system) or pro-drugs, directly to tumour sites[1]. Once there, these modified cells release substances that kill tumour cells, therefore controlling cancer growth in the body. While these methods are still largely experimental, early studies suggest that stem cells could be a crucial tool in veterinary oncology in the future.

Although stem cell therapy shows promising results, it is still largely experimental in the treatment of cancer in animals. There are also some potential risks, such as uncontrolled cell growth, ethical problems, and excessive costs. Uncontrolled stem cell growth often results in the accumulation of genetic mutations, therefore causing animals to lose the ability to regenerate[5]. This poses a problem, as this uncontrolled cell growth can lead to tumour formation driving tumour initiation and treatment resistance, making the cancer far worse. Another issue is the ethical problems that arise[6]. As owners may not fully understand the experimental nature of stem cell therapy, leading to a 'false hope' of a cure for their beloved pets[7]. Also, stem cell treatment for cancer is often complex, high-cost procedures often exceeding £100,000-300,000; therefore, it is unrealistic for most owners to undergo stem cell therapy for their animals, limiting widespread usage[8].

These challenges mean that, while stem cells may offer vast possibilities in cancer treatments for animals, they are not yet a replacement for conventional treatments – like surgery or chemotherapy.

Stem cell therapy offers exciting new insights in cancer treatments for animals, thanks to its ability to regenerate damaged tissues and support the immune system. As research continues to develop, it may provide more personalised and less invasive treatment options in veterinary medicine. However, this research is still in the initial stages, and it is still experimental. Therefore, more research is needed to ensure it is safe and effective.

While not a replacement for current, established treatments, stem cells could be the future of veterinary cancer care, offering new hope for both animals and their owners.

REFERENCES

1. NHS, "Stem cells and bone marrow transplants" 7th September 2022, accessed at https://www.nhs.uk/tests-and-treatments/stem-cell-transplant/
2. Cancer research UK. What is a stem cell or bone marrow transplant. Cancer research UK. November 9, 2022. Accessed February 22, 2026. https://www.cancerresearchuk.org/about-cancer/treatment/bone-marrow-stem-cell-transplants/what-is
3. NHS. Stem cells and bone marrow transplants. NHS. September 7, 2022. Accessed February 21, 2026. https://www.nhs.uk/tests-and-treatments/stem-cell-transplant/
4. Jeung S. et al. Exploring the Tumour-associates risks of Mesenchymal stem cell therapy in veterinary medicine. National library of medicine. March 2024. Accessed February 23, 2026. https://pmc.ncbi.nlm.nih.gov/articles/PMC11010833/
5. Chen H., Thakur A. How stem cell therapies can provide new ways to stop tumours from spreading or growing back. The university of Chicago. January 11, 2023. Accessed February 23, 2026. https://pme.uchicago.edu/news/how-stem-cell-therapies-can-provide-new-ways-stop-tumors-spreading-or-growing-back
6. Volarevic V. et al. Ethical and safety issues of stem-cell based therapy. National library of medicine. January 2018. Accessed February 24, 2026. https://pmc.ncbi.nlm.nih.gov/articles/PMC5765738/
7. Kang M., Park H. Challenges of stem cell therapies in companion animal practise. National library of medicine. April 2021. Accessed February 26, 2026. https://pmc.ncbi.nlm.nih.gov/articles/PMC7263915/
8. Swiss medica. How much does a stem cell transplant cost in 2024? Swiss Medica. November 15, 2024. Accessed February 28, 2026. https://www.startstemcells.com/stem-cell-transplant-cost.html

6. Volarevic V. et al. Ethical and safety issues of stem-cell based therapy. National library of medicine. January 2018. Accessed February 24, 2026. https://pmc.ncbi.nlm.nih.gov/articles/PMC5765738/
7. Kang M., Park H. Challenges of stem cell therapies in companion animal practise. National library of medicine. April 2021. Accessed February 26, 2026. https://pmc.ncbi.nlm.nih.gov/articles/PMC7263915/
8. Swiss medica. How much does a stem cell transplant cost in 2024? Swiss Medica. November 15, 2024. Accessed February 28, 2026. https://www.startstemcells.com/stem-cell-transplant-cost.html

The mitochondrial disease discussed in this article is MELAS syndrome. MELAS stands for Mitochondrial Encephalomyopathy, Lactic Acidosis, and Stroke-like episodes. MELAS syndrome is caused by defects in mitochondrial DNA and is therefore a rare genetic disorder. It primarily affects the muscles and the nervous system. This disease follows a maternal inheritance pattern, which means that only females can pass down the condition to their children, because that is the only way mitochondrial DNA can be passed. 3

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The cause of this type of nerve damage is from long-term high blood s damages the small blood vessels that supply the nerves in the body. 2

The prolonged hyperglycaemia (consistently high blood sugar levels) the bloodstream to damage both the nerves and the small blood vessels time. This reduces the flow of oxygen and nutrients – which are essenti – to the nerves. In addition, the high glucose levels trigger oxidative st damaging cells. 3

As a result, the nerve fibres become damaged and may even disapp burning, numb and tingling sensations across the body, even leading possib of more serious injuries in the fo a foot bruise, which could

Vaping is the use of e-
containing a plethora of c
popularity in the United K
an estimated 5.6 million adu
statistic only accounts for the adult