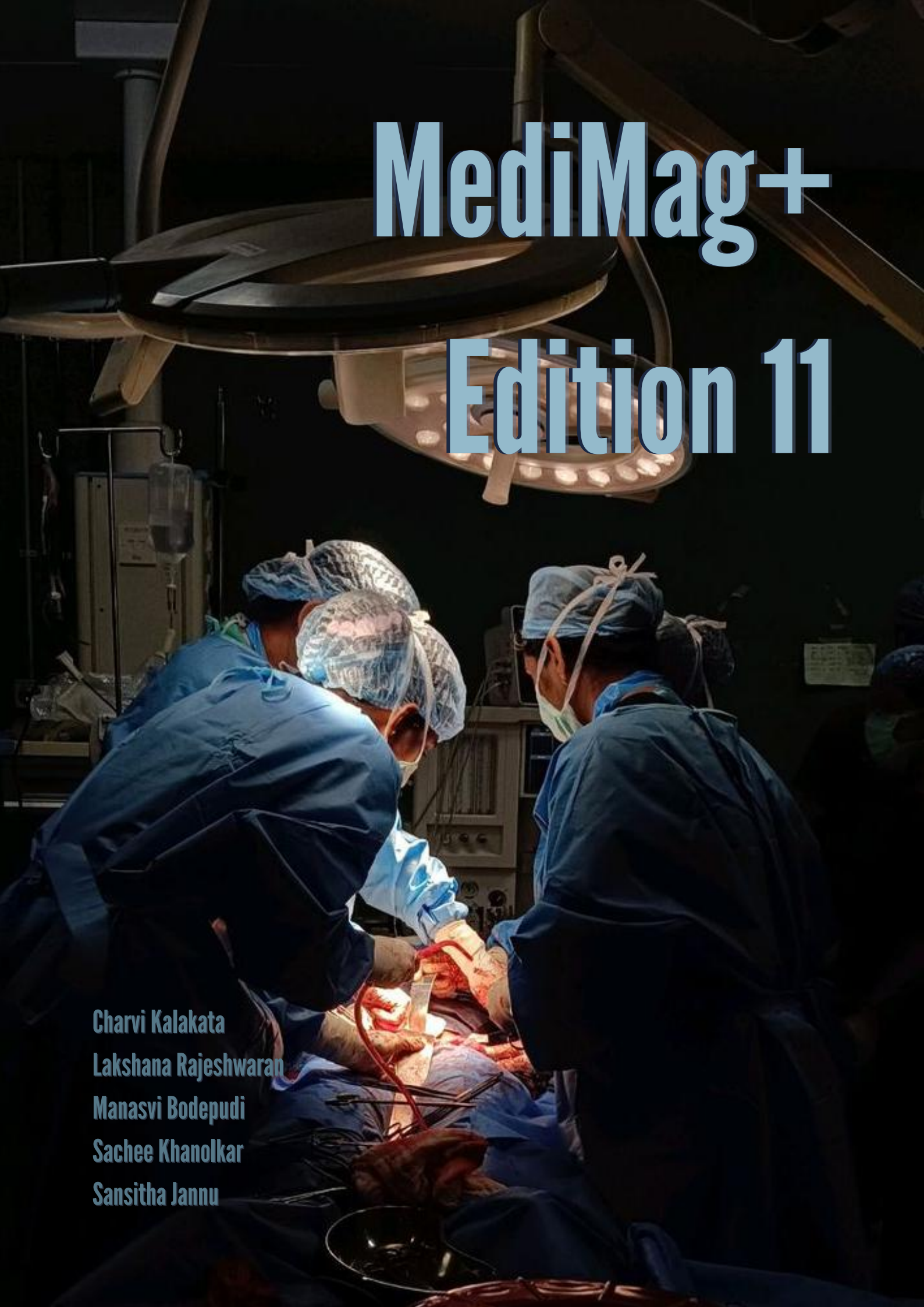


MediMag+ Edition 11

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A good bye from current editors

+

new editors reveal



alternative medicine

Ayurveda vs western



In recent years, Ayurveda has been subject to remarkable global popularity, driven by a growing interest in non-chemical wellness practices. Traditional remedies such as golden milk and herbal infusions, once confined to Indian households , are now becoming popularised worldwide for their perceived health benefits. These trends reflect a broader shift towards minimally processed remedies that support immunity, digestive health, mental wellbeing, and lifestyle balance.

Primarily, Ayurveda manages mild concerns such as slight inflammation with natural remedies such as turmeric which contains the active compound curcumin, that supports the body's natural anti-inflammatory response and promotes overall balance. This approach is rooted in a holistic philosophy that considers digestion, lifestyle, and mental well-being as part of the healing process. Since, ayurvedic remedies are generally plant-based and gentler, they are often preferred for long-term, preventive care and for people seeking a natural approach with fewer everyday side-effects and concerns.



In contrast, Western medicine typically uses non-steroidal, anti-inflammatory drugs such ibuprofen or aspirin, which work by directly blocking the enzymes responsible for pain and inflammation. These medicines are quick-acting and highly effective for acute or severe symptoms, making them vital in many medical situations. However, prolonged use can sometimes lead to side effects such as stomach irritation or increased cardiovascular risk.

For this reason, while Western medicine excels in immediate, targeted relief, Ayurveda is often chosen for its long-term, supportive approach to maintaining overall health without fear of side-effects.

Another ayurvedic remedy is the use of ginger. Ayurveda often uses ginger (fresh or dried) to ease mild nausea and support digestion. Ginger is believed to stimulate digestion, improve gut motility, and calm the stomach through its natural compounds . Because it is a culinary herb as well as a traditional remedy, many people find it gentle, accessible, and suitable for everyday use.

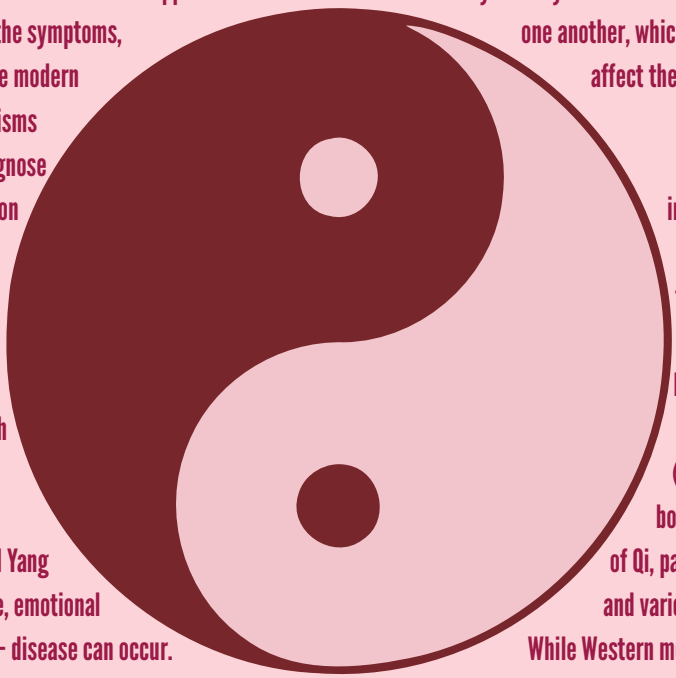
On the contrary, Western medicine typically treats nausea with antiemetic drugs such as dimenhydrinate or ondansetron, which work by blocking specific receptors in the brain responsible for triggering vomiting. These medications are highly effective, especially in cases of severe nausea, motion sickness, or post- operative vomiting where fast, reliable relief is essential. However, some antiemetics can cause side effects like drowsiness or constipation. This contrast highlights why Ayurveda is often chosen for mild, routine digestive issues, while antiemetic drugs such as these remain crucial for strong or clinically significant causes.

In summation, as consumers seek safer, more sustainable alternatives to long-term chemical-based treatments, Ayurveda's time-tested practices are being integrated into modern health routines, bridging ancient wisdom with modern wellness culture.

Deetya N

Traditional chinese medicine

Ancient Chinese Medicine dates back to over 2500 years, originating during the Shang Dynasty, with its roots deeply imbedded in Chinese culture and philosophy. However, what makes Ancient Chinese Medicine different to Western medicine used today? Firstly, while modern medicine focuses on specific symptoms and diseases and how to treat them, TCM perceives the body as a whole, considering the mind, emotions, and environment: this holistic approach treats the whole person instead of just the symptoms, aiming for overall wellness. Where modern medicine uses biological mechanisms and measurable indicators to diagnose and treat diseases, TCM is based on the importance of Qi (the vital energy that flows throughout the body) to maintain balance and healing. TCM also emphasizes the importance of Yin and Yang, which represents opposite but complementary forces; when the dynamic balance between Yin and Yang is disrupted - whether by lifestyle, emotional factors, diet, or external factors – disease can occur. Additionally, there are many, many benefits to TCM including how it brings pain relief without medicine, and how techniques such as Tai Chi and acupuncture not only promote health but also reduce stress and encourage relaxation. In addition to mental and emotional wellbeing, TCM offers herbal medicines and practices to strengthen the body's immune system.



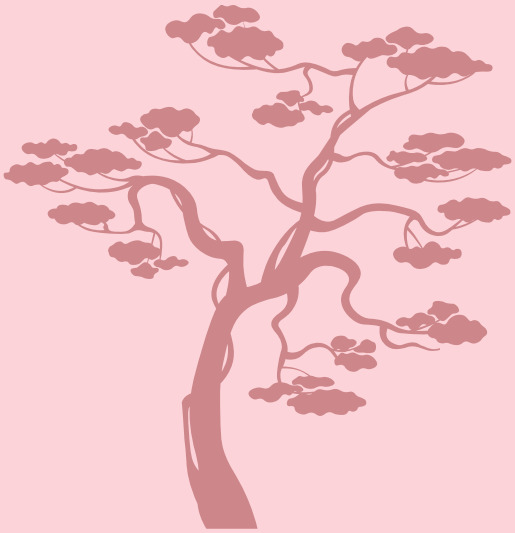
Yin and Yang

In ancient Chinese philosophy, one of the most important concepts, Yin and Yang represent the duality and interconnectedness of all phenomena in life, and they form the foundation of Chinese philosophy and TCM. Where Yin is often associated with qualities such as darkness, feminity and night, Yang is associated with light, masculinity and day. Both forces and interdependent and depend on one another, which means that a change in aspect will affect the other, e.g. if there is no night, there cannot be day. This same concept is represented in TCM, for example insomnia may be viewed as an excess of Yang (activity) which can lead to fatigue (Yin). For the body to remain healthy, Yin and Yang must always be in balance, which can be achieved by ensuring a smooth flow of Qi (energy or life force) throughout the body. When there is a lack of or excess of Qi, pathways in the body become blocked, and various illnesses and ailments can arise. While Western medicine has yet to prove the tangible existence of Qi, studies have linked it to the role of mitochondria in cells. Mitochondria are responsible for providing the energy that cells require to function, and any malfunction or block in the production of that energy can cause symptoms to manifest in those organs or tissues – this is similar to the role played by Qi in sustaining the body's energy flow and overall health.

In TCM, body organs can be categorized into Yin and Yang. Yin organs produce, store, and transport vital substances like a person's Qi, blood, and other bodily fluids: the five major Yin organs are the heart, lungs, liver, spleen, and kidney. On the other hand, Yang organs function to transport and digest substances in the body and remove waste products: yang organs include the kidneys, stomach, and intestines. Herbs used in TCM have either Yin-stimulating properties or Yang-stimulating properties. Yin-stimulating herbs are used to treat inflammation or detoxify the body, whereas Yang-stimulating herbs are used to address certain deficiencies. Yin and Yang are key elements in aiding practitioners diagnose and treat patients using Traditional Chinese Medicine – they use these concepts to evaluate any imbalances in the body and develop personalised treatments to restore the body's balance and harmony. During diagnosis, symptoms can be categorized as either Yin or Yang related depending on the patient's condition. For example, Yin-related symptoms usually manifest as fatigue or digestive issues, while Yang-related symptoms include inflammation and fevers. The practitioner will assess whether the condition is caused by too little or too much of Yin or Yang.

The 5 Elements

The 5 elements in TCM are wood, earth, fire, air, and metal. Mentions of the five-element theory (Wu Xing) can be traced as far back as 300BC. The theory describes how different aspects of the natural world interact with another in an ongoing cycle of transformation and balance. The table below illustrates the connections between the five elements and their corresponding organ systems in TCM, demonstrating their relationship to the Yin-Yang philosophy:



Element	Yin Organ	Yang Organ
WOOD	Liver	Gallbladder
FIRE	Heart	Small Intestine
EARTH	Pancreas	Small Intestine
METAL	Lung	Large Intestine
WATER	Kidney	Bladder

The 5 elements are connected by the two cycles of interaction.

In the creative cycle:

- fire generates earth
- earth generates metal
- metal generates water
- water generates wood
- wood generates fire

In the destructive cycle:

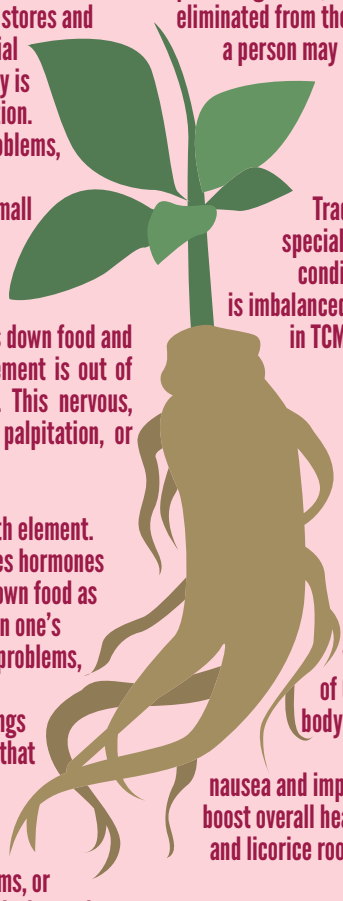
- water controls fire
- fire controls metal
- metal controls wood
- wood controls earth
- earth controls water

When these cycles function properly, the body remains harmonious and healthy. However, imbalances in one element can cause a chain reaction which destabilizes the body's other systems. By using the Five Elements as a framework, practitioners can diagnose imbalances effectively and develop treatment plans that restore the individual's physical, mental, and emotional well-being.

Wood is linked to the liver and the gallbladder. The liver is responsible for the smooth flow of Qi throughout our body. A healthy liver works to process blood, synthesize nutrients, and remove harmful substances from the blood. Meanwhile, the gallbladder stores and releases bile produced by the liver and plays an essential role in digestion.

Wood is linked to the liver and the gallbladder. The liver is responsible for the smooth flow of Qi throughout our body. A healthy liver works to process blood, synthesize nutrients, and remove harmful substances from the blood. Meanwhile, the gallbladder stores and releases bile produced by the liver and plays an essential role in digestion. When the wood element or liver energy is out of balance, it can cause a sense of physical stagnation. The individual may experience headaches, digestive problems, menstrual issues, and often feel angry or irritable.
Fire is paired with the heart and its paired organ, the small intestine. The heart is a crucial part of emotional well-being and in the physiological sense, the heart pumps blood through our vessels, carrying oxygen and vital nutrients to body cells. The small intestine breaks down food and moves it along the digestive tract. When the fire element is out of balance, the person may feel stressed and anxious. This nervous, high-strung energy can cause high blood pressure, palpitation, or digestive issues.

The stomach and the pancreas are governed by the Earth element. While the pancreas supports food digestion and releases hormones that regulate blood sugar levels, the stomach breaks down food as part of the digestive process. When the Earth element in one's body is out of balance, it can lead to fatigue, digestive problems, and overthinking.
Metal governs the large intestine and the lungs. The lungs are detrimentally important as they are the only organ that directly interact with the outside world, absorbing air and Qi energy for the body's benefit. When the metal element is out of balance, the person may experience breathing problems, respiratory infections, skin problems, or difficulty eliminating body waste. As this element is linked to sadness or grief, imbalances can also point to challenges in dealing with one's emotions.



The Kidneys and the Bladder are governed by the Water element. The kidneys filter the blood to remove impurities and excess water, producing urine, which is then stored in the bladder until it is eliminated from the body. When the water element is out of balance, a person may be prone to reproductive problems, stiff joints, and lower back pain. They may also tend to feel fearful or detached.

Overview of treatments used in TCM

Traditional Chinese Medicine uses a various number of specialized treatments and practices to heal the patient's conditions based on which of their elements or Yin-Yang is imbalanced to restore the body's Qi. Treatments are practices in TCM include but are not limited to acupuncture, herbal medicine, cupping therapy, moxibustion, and Tui Na. Acupuncture is a treatment that involves inserting thin needles in specific points on one's body to balance Qi. Herbal medicine uses plants, animals, and mineral products to create medicines such as tonics, soups, and pills. Cupping therapy involves placing heated cups on the skin to create suction and improve blood flow. Moxibustion involves burning dried mugwort near the skin to warm and invigorate the flow of Qi. Tui Na is a form of Chinese therapeutic massage that manipulates the body's energy. Some commonly used herbs are Ginseng, for its energy-boosting properties; Ginger to treat nausea and improve circulation; Goji berries to enhance vision and boost overall health; Astragalus to strengthen the immune system; and licorice root to harmonize other herbs in a formula and soothe the digestive system.

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Ruhani T



Clinical Medicine and Medical Conditions

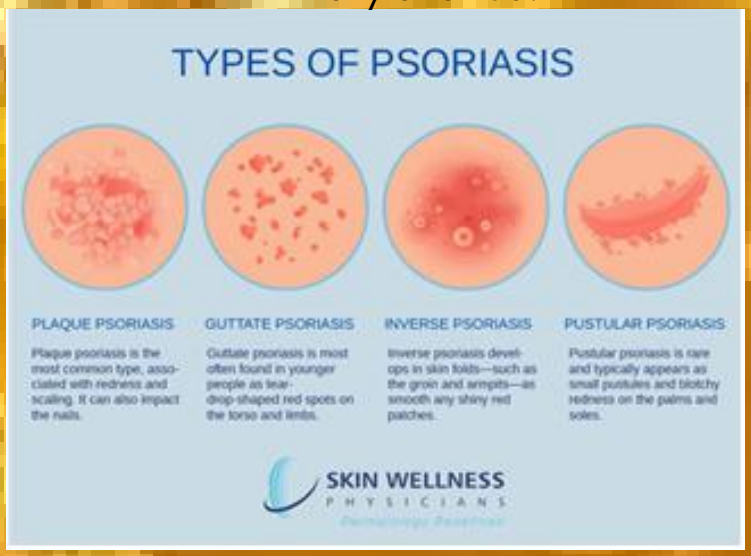
PSORIASIS: AN AUTOIMMUNE DISORDER OF THE SKIN

Psoriasis is a chronic inflammatory skin condition affecting approximately 2-3% of the global population. Unlike many common skin disorders, psoriasis is not caused by infection or poor hygiene. Instead, it is an autoimmune disease in which the immune system mistakenly attacks healthy skin cells, leading to excessive skin cell production and inflammation.



The immune system plays a central role in this condition. T lymphocytes become overactive and release inflammatory cytokines, such as tumour necrosis factor-alpha (TNF-α) and interleukins. These chemical messengers stimulate keratinocyte proliferation and increase blood vessel formation in the dermis, contributing to the redness and swelling seen in psoriatic lesions.

Before being shed, keratinocytes in the epidermis of healthy skin divide and mature over the course of around 28 days. This process is sped up to as short as three to five days in psoriasis sufferers. Immature skin cells build up on the surface as a result, creating thick, scaly plaques that are frequently itchy and red.



Environmental and genetic variables both have an impact on psoriasis. Although some genes make a person more susceptible, flare-ups can be brought on by stress, infections, skin injuries, and certain drugs. This explains why symptoms can change over time and between people. Psoriasis can be classified into numerous forms, the most prevalent of which is plaque psoriasis. Psoriasis can also be guttate, pustular, inverted, or erythrodermic. Psoriasis is sometimes linked to psoriatic arthritis, a condition that causes joint discomfort and stiffness, demonstrating that psoriasis is a systemic illness rather than only a skin disorder.

Treatment aims to reduce inflammation and decrease skin cell turnover. Mild instances can be treated with topical corticosteroids or vitamin D equivalents. More severe cases may need phototherapy or systemic treatments such as biologic medicines that target specific immunological pathways involved in the disease.



In summary, psoriasis is a complicated autoimmune disease characterised by abnormal immune responses and fast skin growth of cells. Many patients' quality of life has been improved as a result of the development of targeted medicines brought about by an understanding of its biological concepts.

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The Resurgence of Diseases: Measles, Tuberculosis, Malaria, Dengue, and Polio in Europe.

For decades, it was widely assumed that Europe had entered a post-infectious era, where vaccines, antibiotics, strong public health systems, and high living standards had reduced the likelihood of infectious disease. However, across Europe and the UK, measles cases have surged to levels not seen since 2012, tuberculosis diagnoses are climbing sharply, and climate change is driving malaria and dengue, historically tropical diseases, into new regions. Even polio, which was irradicated from Europe in 2002, has re-emerged, highlighting key issues such as vaccine hesitancy, global migration, antimicrobial resistance, and the impact of climate change. Together, these factors place growing pressure on healthcare systems and expose vulnerabilities that were previously overlooked

Measles

What is it?

Measles is a highly contagious viral infection that spreads through respiratory droplets, causing fever, cough, and a characteristic rash, but complications such as pneumonia, encephalitis (brain inflammation), and long-term neurological damage makes it one of the most dangerous childhood diseases, with a fatality rate of up to 1 in 1,000 cases in developed countries and much higher in regions with poor healthcare access.

- England recorded 2,911 confirmed cases in 2024, the highest total since 2012
- The WHO and UNICEF reported 127,350 measles cases globally in 2024, double the number in 2023 and the highest in over 25 years

Reasons for resurgence

The resurgence of measles across Europe and the UK is primarily driven by declining vaccination rates. The measles vaccination coverage in the UK is currently below the 95% target for herd immunity recommended by the World Health Organization (WHO), leaving large groups of children and adults vulnerable to infection. This decline is closely linked to misinformation and vaccine hesitancy, where distrust of medical authorities and the spread of false claims online have persuaded some parents to avoid immunising their children.

Tuberculosis

What is it?

Tuberculosis is a bacterial infection caused by Mycobacterium tuberculosis, primarily affecting the lungs but capable of spreading to other organs, leading to chronic cough, weight loss, fever, and potentially fatal respiratory failure if untreated. It is one of the world's oldest and deadliest infectious diseases, killing over a million people annually.

- In England, TB notifications rose to 5,490 cases in 2024, a 26% increase compared to 2022, with London recording the highest incidence at over 20 per 100,000 population.

Reasons for resurgence

The rise is driven by global migration from high-incidence countries, which introduces new cases into the UK and Europe, where cases were previously declining, making it harder to control the disease. Antimicrobial resistance is another major driver as the rise of drug-resistant TB strains makes it more difficult to treat, requiring longer and more complex courses of medication, which increases the likelihood of transmission during the infectious period.

Polio

What is it?

Poliomyelitis (polio) is a highly infectious viral disease that largely affects children under 5 years of age. It spreads via the faecal-oral route and can invade the nervous system, causing paralysis. According to the WHO, of the 3 strains of wild poliovirus (type 1, type 2 and type 3), wild poliovirus type 2 was eradicated in 1999, wild poliovirus type 3 was eradicated in 2020 and in 2022, endemic wild poliovirus type 1 only remained in two countries: Pakistan and Afghanistan.

- In 2024–2025, vaccine-derived poliovirus type 2 was detected in sewage samples in Spain, Poland, Germany, Finland, and the UK.
- Sewage samples from Leeds, London, and West Sussex confirmed vaccine-derived poliovirus type 2 presence however no clinical cases have been reported, but surveillance continues.
-

Reasons for resurgence

Polio's re-emergence in Europe and the UK is linked to gaps in immunisation coverage. Although wild poliovirus was eliminated from Europe in 2002. Conflict and instability in regions such as Gaza have disrupted vaccination campaigns as incomplete vaccination in some communities has allowed weakened vaccine strains to circulate and mutate, creating vaccine-derived poliovirus, which can spread into Europe through migration.

International travel and population movement further increase the risk of re-importation, making it possible for poliovirus to reappear even in countries with strong healthcare systems.

Wider implications

The reemergence of these diseases not only increases mortality but puts immense pressure on healthcare systems across Europe. Outbreaks demand rapid and resource-intensive interventions such as contact tracing, isolation, enhanced surveillance, and hospital care. This diverts resources from other essential services and heightens workforce pressures. The resurgence of once-controlled diseases demonstrates that public health can be fragile and that sustained investment in vaccination, surveillance, and climate adaptation is essential.

Diabetes

What is Type 1 diabetes?

This condition is where your blood-glucose (sugar) level is too high which is since the body does not have the ability to produce insulin (a hormone).

Insulin is needed to allow glucose into the body cells from the blood stream for respiration for energy however people with this condition have no insulin to allow the glucose into the body cells leading to a glucose build up in the blood stream. The insulin is not produced in people with type 1 diabetes as the body attacks the cells in the pancreas which makes insulin. People can have this at any age in which the risk increases if relatives have the condition.

Symptoms

Needing to urinate more often than usually which is typically during the night

- Constant thirst
- lack of energy, tiredness
- losing weight without actively trying to do so

The 4Ts: Toilet, Thirsty, Tired, Thinner

if type 1 diabetes is undiagnosed it can make you unwell rapidly leading to DKA (Diabetic Ketoacidosis) which is deadly

Causes

The exact causes are not fully understood however, things such as Family history can increase the risk given that there are genes related to this condition. In addition, The body can eradicate the beta cells (insulin producing cells) in the pancreas [autoimmune condition]. The condition is not always about diet however a healthy diet can heavily reduce the risk and manage blood sugar levels

Treatments

As the body cannot produce insulin, insulin can be used to treat type 1 through insulin injections or pumps every day which are devices that can be attached to the body.

Medications can also be taken such as metformin {a tablet) for those with insulin resistance

Moreover, supporting a balanced diet and consistently engaging in physical activity which can reduce the risks of getting diabetes complications (symptoms) and counting carbs to manage blood sugar levels - this can also be done with insulin pump or closed loop system where calculations are done for you.

Using a glucose monitor (CGM) is another common way for monitoring blood sugar levels to avoid having to constantly do finger prick tests (a way of checking the levels) and spotting the low and high blood sugar levels (hypos and hypers) instantly. Furthermore, people with the condition can use a closed loop system (an artificial pancreas)

Menopause

Puberty

Ages 10-16, typically a period starts at 12 years old. The start of menstruation.

The first period is also known as the menarche where the uterus lining is first shed through the vagina caused when the hypothalamus begins to release GnRH, a hormone that starts puberty. It then travels to the pituitary gland which responds by releasing luteinising hormones and follicle stimulating hormones which causes the ovaries to start producing estrogen, causing the first menstrual period when pregnancy doesn't occur. Cycles are often irregular, and ovulation may not occur in every cycle for the first few years.

Reproductive Years
Ages 16- late 40's.

Cycles are more regular and consistent with an average length of 28 days and ovulation occurs monthly typically lasting between 24 and 38 days. Additionally, a period may temporality stop during pregnancy and breastfeeding.

Perimenopause

Ages mid 40's- early 50's, this is the transition period before menopause and lasts an average of 4 years but can be up to 10 years.

Cycles become irregular in flow, frequency and length due to a flucuation in hormone levels.

Menopause

Ages 45-55, menstruation stops permanently.

A woman is considered menopausal after 12 consecutive months without a period.

Post Menopause

The time after menopause when hormone levels remain consistently low, which causes an increased risk for conditions like heart disease and osteoporosis, a condition that makes bones weak and fragile due to low estrogen levels.

What is menopause?

As defined by the NHS, menopause is when your period stops due to low hormone levels and usually affects women between 45 and 55 years old but can happen earlier or later.

It can happen naturally or for reasons such as surgery, to remove ovaries or the uterus, cancer treatments or genetic reasons, such as Turner syndrome where an individual only has 1 X chromosome and can cause a premature menopause.

Most symptoms typically associated with menopause actually begin at perimenopause; the transition before the period stops.

Menopause and Perimenopause

Symptoms include brain fog, hot flushes, anxiety, mood swings, and weight gain. These symptoms typically last 7 years through perimenopause, menopause, and possibly post menopause and are caused by the decline in reproductive hormones, primarily progesterone and estrogen.

Treatments

Chemical treatments include Hormone Replacement Therapy (HRT) which replaces the declining hormones to reduce symptoms and are available as tablets, patches, gels and sprays. There are also chemical treatments that are non-hormonal for those that can't or choose not to use HRT such as oxybutynin which is used for an overactive bladder but can also help with the hot flushes of menopause.

Or non-chemical treatment options include lifestyle changes to relieve symptoms or avoid triggers such as caffeine, alcohol, and spicy foods to manage hot flushes.

Scientific Research

In scientific studies and research there is a lack of knowledge on menopause due to a variety of factors such as the historical sexism in medical research and lack of funding. This has impacted women's health by the lack of support and inadequate treatments for a long time. Shown by a study conducted by UCL in 2023 states that more than 90% of post-menopausal women were never taught about menopause at school and only from 2024 did topics related to women's health such as menopause become part of the mandatory assessments for UK medical students.

Additionally, a survey by the health policy partnership of more than 5,000 women states that 79% visited the GP about menopausal symptoms but only 37% were given hormone treatments. Showing that although it has improved, there is still a long way to go for women's health by making menopause more widely taught and treatments more accessible.

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Drug receptor interactions in regulating cardiovascular systems

Drug-receptor interactions form the foundation of pharmacology, it determines how medicines exert their effects on the human body. One crucial extension of this concept is receptor-second messenger coupling, the intracellular communication system that translates the activation of the receptor into responses. Within the cardiovascular system, these mechanisms regulate heart rate and vascular tone (the constriction in the blood vessel walls). Understanding these pathways helps us understand the basis of physiology.

The Basis of Second Messenger Systems

Receptors on the cell surface are not simple passive docking stations for drugs or hormones. They initiate a cascade of intracellular signals. G protein-coupled receptors are used in cardiovascular pharmacology. When adrenaline binds to a receptor, it triggers activation of adenylyl cyclase, raising cyclic AMP (cAMP) levels. CAMP then activate protein kinase A, leading to increased calcium availability which undergoes a cascade of reactions to cause vasoconstriction (raising vascular tone and blood pressure).

Conversely, parasympathetic stimulation through muscarinic M2 receptors reduces cAMP levels, slowing conduction at the sinoatrial node. Thus, receptor-second messenger coupling ensures a finely tuned balance between sympathetic and parasympathetic influences on the heart.

What happens when there are disruptions in receptor signalling?

In chronic heart failure, prolonged sympathetic stimulation desensitises β_1-adrenergic receptors, reducing cAMP responsiveness and impairing cardiac output. Similarly, in hypertension, too much adrenergic (sympathetic) activity keeps blood vessels narrowed because α_1 receptors activate IP_3 and increase calcium inside smooth muscle cells, causing sustained vasoconstriction. On the metabolic side, problems in receptor-messenger signalling also change how the heart uses energy, making it more prone to reduced blood supply (ischemia).

Therapeutic Implications

Modern medicines for heart and blood vessel problems work by targeting the signalling pathways that control cardiovascular function. Beta-blockers (like metoprolol) block β-adrenergic receptors in the heart, which lowers cAMP levels and reduces calcium entry, so the heart beats more gently and uses less oxygen. Nitrates act by releasing nitric oxide (NO), which increases cGMP inside smooth muscle cells and causes blood vessels to relax and widen, improving blood flow and easing angina (chest pain). ACE inhibitors and ARBs reduce the effects of angiotensin II, a hormone that normally causes vasoconstriction; by lowering this signal, they relax blood vessels and reduce blood pressure.

Receptor–second messenger coupling illustrates how a molecular event at the cell surface translates into complex cardiovascular effects. By linking drug-receptor theory with intracellular signalling and clinical practice. As research advances, targeting these signalling networks with greater precision will remain the focus to develop safer and more effective cardiovascular medicines.

Medicine in Space

1961; the year humans first proved that the sky wasn't the limit, by sending the first person into space. In 2026, the number has now risen to 642. With many people having been sent into such an unfamiliar environment, it is important to consider the effects that space can have on the human body and how the astronauts' general health is looked after (especially on longer missions which can last for months). This comes under the branch of space medicine: the specialised branch of medicine concerned with the effects on the body from being in outer space.

Effects of space on the body

Space is a harsh environment, even with precautions, so there are many effects on the human body, some of which are outlined below:

- Astronauts have higher risk of cancer - on Earth, we are protected by the atmosphere and our planet's magnetic field for the majority of harmful cosmic radiation, but once the space crew leaves the atmosphere, they no longer have that protective shield. This means they have higher exposure to radiation, from many sources such as from the Sun, galactic cosmic rays, and any particles in the Earth's magnetic field, increasing their risk of cancer.
- Muscle and bone weakness - in microgravity, muscles and bones have less work to do, causing their masses to decrease. After 2 weeks, muscle mass can fall by 20%, and on longer missions, it can fall by 30%. Bones demineralise, with loss of 1-2% of bone mass per month spent in space.
- Fluid shifts - in space, you're in a constant state of freefall, so gravity is no longer pulling the blood flow down; this means that fluid shifts upwards, leading to a build-up of fluid in the head, putting pressure behind the eyes and causing the face to go puffy. After a long period of time though, the fluids balance out, reducing the puffiness again.
- Cardiovascular changes - in microgravity, there is less work needed to be done by the heart to create the same force to pump the blood all the way around the body. Over time, this can cause the heart to weaken, causing it to become deconditioned and lead to a decrease in size. Upon return to Earth, the heart may overexert itself, and this can cause astronauts to feel dizzy.
- Effects on mental health - living in space can be stressful for astronauts, as they are in isolated and confined spaces for long periods of time, as well as being extremely far from Earth, with limited contact with their family.

How the health and safety of astronauts are managed

Astronauts aren't destined for doom. Space organisations, such as NASA, make sure to manage the astronauts' health before, during and after spaceflight. A team of physicians who have specialised in training in space medicine, called flight surgeons, maintain contact with the astronauts from Earth, and monitor their health throughout their journey. Each astronaut will have slightly different needs, so their health management plans are individualised, with some aspects outlined below:

- Exercise - to help combat the muscle and bone loss, astronauts exercise for up to 2 hours a day on the International Space Station (ISS). The type of exercises involved are generally 'resistive', meaning they pull themselves against the exercise machines. Other exercises include cycling on exercise bikes or running on a treadmill.
- Nutrition - being in space means the menu is a bit more limited than here on Earth. Food not only has physical benefits, but also mental benefits too, making sure the astronauts can work at their optimum. The Space Food Research Facility produces heat-stabilised and appetising foods which support the nutritional needs of the astronauts during spaceflight, whilst also maintaining a long shelf-life.
- Looking after mental and emotional wellbeing in space - in addition to lots of intense training for adaptability, NASA has a behavioural health team who provide support services individualised for crew members and their families for every mission. Astronauts also have the opportunity to communicate with family via email or video conferencing.
- Medical help on board - astronauts all have medical training and have close contact with doctors on Earth, so any medical conditions that arise can be dealt with locally. NASA also has a pharmacy on the ISS as well as a range of medical equipment for treating a variety of conditions or any injuries. In the case of an emergency, the astronauts will be safely brought back to Earth for urgent medical attention from doctors.

Scientists and researchers have a good understanding on how the human body fares in space, but there's still more research that needs to be done to fully understand how we can cope in such a severe environment. Advancements in space medicine may facilitate living for longer periods of time in extraterrestrial conditions, which could be the next step for sending astronauts on deeper space exploration missions, allowing the collection of valuable data about our cosmic neighbourhood.

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Lighting the Way to a Cancer-Free Future: One Stride at a Time

Every autumn, Cancer Research UK hosts its annual Shine Night Walk. Participants wear neon outfits and glowing accessories to fundraise for this vibrant nighttime charity walk in the name of research. In 16 different locations - in London, Glasgow, Cambridge and Cardiff - volunteers are guided past unique landmarks for one common goal. "Together we light up our city streets, beating cancer one stride at a time."

Walking with Goals

This year, the Shine Night Walk saw 1,500 cancer survivors, researchers and people who have lost loved ones to the disease, dressed in fairy lights, tutus and flashing headbands. Starting at 19:00 in Battersea Park, London on the 20th September 2025, volunteers made their way round the iconic capital before landing back in their starting place.

Why it Matters

Walkers come from all across the UK, making the Shine Night Walk more than just a fundraiser, but a chance for victims and survivors of cancer to bond over shared experiences and wacky outfits. Participants can take part in walks of varying length, whether tackling a 10k, half marathon or even full marathon route, each step moves towards something greater for everyone involved.

Medical Benefits and Funds

Over the years of this stunning tradition, the funds raised have truly gone through the roof this year-round! A whopping total of £1,788,759 has been raised in 2025 all across the UK. These community-based walks have truly evolved into something bigger, causing benefits for millions of cancer patients across the region.

Getting Involved

Getting involved in this spectacular event is easy and accessible for everyone across the UK. Check out Cancer Research UK's website for more information on fundraisers and charity events in your area. Remember no step, no matter how small, is unimportant when it comes to something as influential as cancer. While it will be another year before the next event, it's never too early to start planning. Go with friends, family or even solo! No matter when you go, it truly is a beautiful sight to behold. Happy walking!

Cardiological chaos: how your choices can make or break your heart

Introduction

Beating around 2.5 million times on average, one fascinating and complex organ strives to keep the human body functioning: the heart. Ensuring that each cell in your body receives enough oxygen and all essential molecules needed for the human body throughout your lifetime, the heart tirelessly beats to sustain human life- therefore is it not our responsibility to treat the heart well? More that 50 million people around the world have some type of cardiovascular disease with an estimated 240 million people having coronary heart disease and stroke affecting 94 million survivors. Cardiovascular disease globally being the #1 cause of death with a death rate of 20.5 million in 2021, it is highlighted that heart health is a major topic must be discussed urgently.

How diet and excercise impact heart health:

Importance of a healthy diet

One of the main factors that affect heart health is the type of food that you fuel your body with. This is essential because there is a obvious and direct correlation betweeen your diet quality and your heart health- healthy eating habitats lead to a strong heart while unhealthy eating habitats lead to a heart that Is at risk of CVD. Oneof the most harmful food categories that harm your heart are high saturated fats and added sugar. This is because fat raises your LDL which when in excess begins to build up in your arteries. This decreases the the amount of blood flow has the artery becomes narrower, straining the heart and leading to risk of CVD. This however does not mean that you should avoid fat completely- tiny amounts of all food categories are essential to maintain good health. “You should not get on average higher than 25% to 30% of your daily calories from fat,” states Medline Plus, “and you should limit saturared fat to less than 10% of your daily average calories. Increasing blood pressure and contributing to weight gain, if your diet is uncontrolled your heart will begin to struggle.

So, what is a “healthy diet”?

According to the National Health Service healthy diet (also known as balanced diet) means eating a wide variety of foods in the right proportion and consuming the right amount of food and drink to achieve and maintain a healthy body weight.

To be able to have a balanced diet you would need to eat at least 5 portions of a variety of fruits and vegetables, base meals higher fibre starchy foods, some dairy, protein and small amounts of fats- these are the 5 food groups that must be consumed in appropriate quantities daily.

Exercise

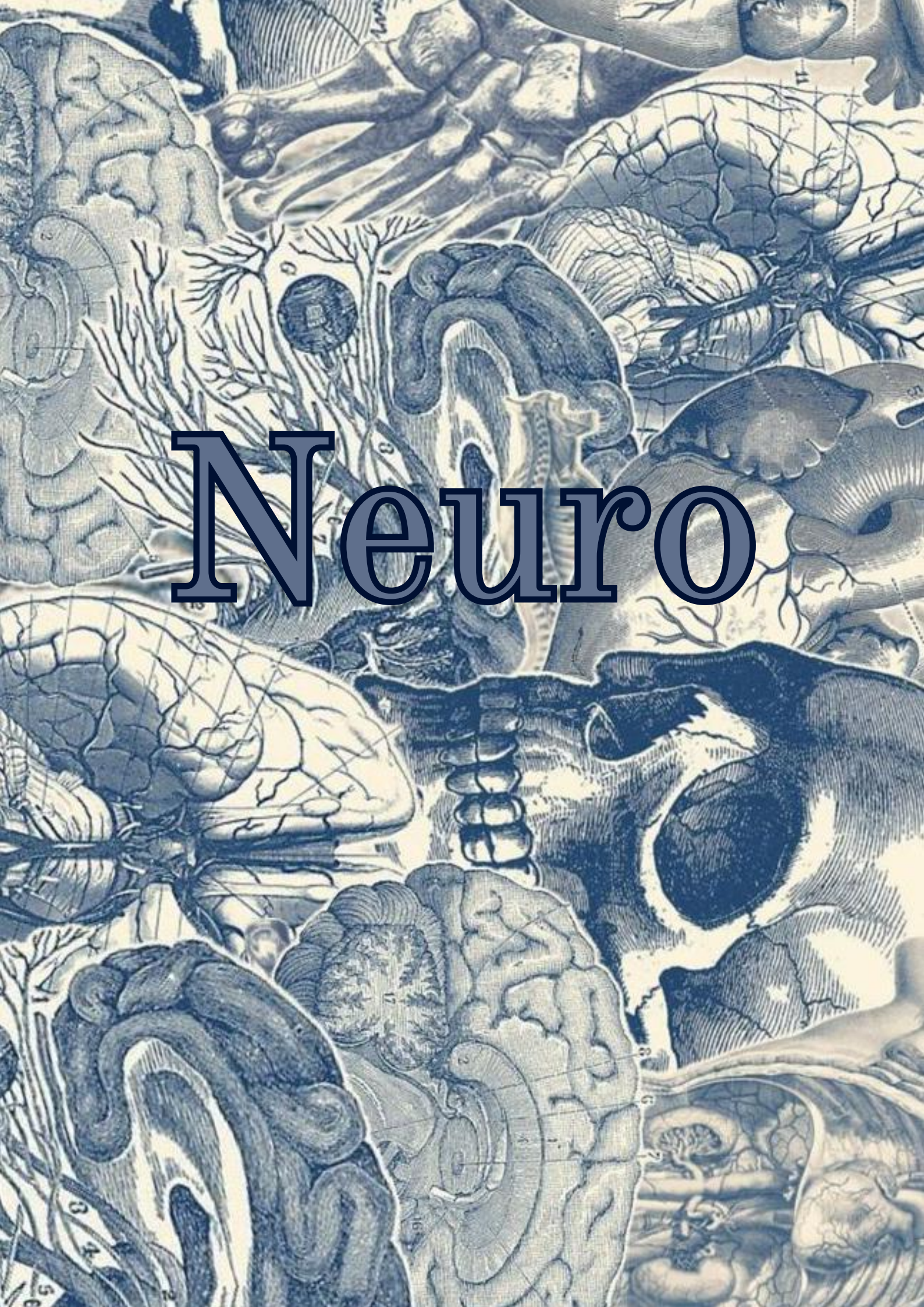
During exercise, glucose is broken down into energy, carbon dioxide, and water through the process of respiration which requires a good supply of oxygen. The required oxygen is therefore transported through the blood by the heart which pumps oxygenated blood to the cells and deoxygenated blood back to the heart. Consequently, when a person exercise, the heart rate increases which over time leads to more powerful pumps that can pump the same amount of blood with less effort. Therefore, the more powerful pumps mean the number of pumps needed for the heart decrease therefore less strain is needed. This decreases the risk of CVD as the heart of a person who exercises is stronger but also because more HDL (good cholesterol) is released compared to LDL.

Alcohol consumption

The consumption of alcohol is another major cause for the increased risk of cardiovascular heart disease because this may lead to hypertension (high blood pressure) which weakens the heart muscles and strains the vessels. This leads to an increased risk of cardiovascular disease because the heart faces an inability to pump blood efficiently. Moreover, consuming alcohol increases stress hormones such as cortisol which increases boood pressure heart rate and hormones that tighten arteries and lead to them constricting. Moreover, over a longer period of time higher blood pressure due to alcohol consumption strains the heart which leads to plaque build up n blood vessels, which narrow the vessels decreasing blood flow mind may even lead to blockage. This is fatal because blockage will lead to vital organs such as brain and other vitals parts of your body not relieving enough blood.

Conclusion

Diets, exercise and alcohol are a few of the many factors that impact a person's heart health through impacting the hearts muscles, blood pressure and strains.The heart is a complex and unique structure in the human body that is affected by individuals lifestyle choices- therefore everyone has an opportunity to choose: to make or break.


Neuro

Neuroplasticity_

Have you ever wondered why some people learn a new skill quickly, while others take more time? Or why stroke patients can sometimes relearn how to walk and speak? The answer lies in one of the brain's most powerful abilities: neuroplasticity

What is Neuroplasticity?

Neuroplasticity is the brain's ability to change, adapt, and reorganize its neural connections throughout life in response to experiences, learning, or injury.

Whenever you learn something new, practice a skill, or recover from injury, your brain is physically changing. It is dynamic, constantly reshaping itself in response to your experiences and environment.Brains stop changing at age 25" is a common misconceptions that is FALSE

How does it work?

There are 3 ways in which the brain changes to help us learn:

Chemical –

• Chemical signals are transferred between neurons to trigger a series of reactions.

• This helps us increase the amount of concentration by chemical signalling.

•The stronger or more frequent the signals, the better we remember.

•This helps with short-term learning and quick reactions.

Structure-

• The brain changes connections between neurons to trigger a specific part of the brain to help with the task at hand.

•New connections form and weak or unused connections fade away.

Fun fact! =London Taxi drivers have to memorise the whole map of London to get a taxi/cab license, which led to them having a larger hippocampi (devoted to spatial or mapping memories) compared to regular drivers.

Function-

• This is the brain's ability to move tasks or functions to different areas when needed.

5 Ways to Improve Your Brain's Plasticity

1. Alertness and focus triggers plasticity.

•It releases chemicals necessary for strengthening neural connections
•Learning happens best when you are actively paying attention.
•Brief, focused learning sessions are more effective than long periods of passive studying.

1. Acetylcholine, which is released from a particular nucleus in the rain (nucleus basalis) ,this is permissive for plasticity.

•This chemical essentially marks experiences as meaningful, making it easier to remember them.

1. Pharmacologically to enhance the opportunity of neuroplasticity
2. Physical Exercise

•increases blood flow and neurochemicals that boost brain health from neurons growth to form new connections

1. Sleep which consolidates information

•Memories are replayed and strengthened for the important ones to be stored in long-term memory store



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Ishika V

Dementia



What is Dementia?

What is this condition? Dementia is a syndrome linked to a progressive process of cognitive decline - there are many different causes and many different types

Symptoms

Here are a list of Dementia Symptoms

- Loss of memory
- Mental sharpness and fastness
- Reduced Mood
- Affected movement
- Finding it harder to do daily activities
- Poor Judgment and understanding
- Trouble with speaking Psychological symptoms
- Depression • Anxiety
- Inappropriate behaviour
- Paranoia
- Agitation

There are many different things that a person with dementia may experience such as hallucinations and hearing voices which are not there. Symptoms of dementia only get worse over time and unfortunately a person suffering from this condition will have trouble with communication and being independent. According to existing research, dementia affects more than 944,000 people in the UK (1 in 11 people over 65 have dementia in the United Kingdom). In addition, these numbers are gradually increasing as people are now starting to live a lot longer, thus by estimation, over 1 million people may have dementia in the UK by 2030.



Causes

Dementia is caused by a damage to or loss of nerve cells thus the symptoms that a person suffering from the condition may face depend on the area of the brain affected Progressive Dementias Alzheimer's disease This is the most common cause of dementia and part of it is genetic - a gene that increases the risk is apolipoprotein E(APOE) People with dementia have the build of of the protein called beta-amyloid Vascular Dementia This is caused by the damage of blood vessels that supply blood to the brain. This could be a huge risk factor for stroke and affect the brain by for example damaging fibres in white matter of the brain. Symptoms include issues with problem solving and cognitive decline Lewy Body Dementia This is a very common type of dementia Lewy bodies - round bits of protein which is found in the brains of people suffering from Lewy body dementia,

Alzheimer’s disease

This is the most common cause of dementia and part of it is genetic - a gene that increases the risk is apolipoprotein E(APOE) People with dementia have the build of of the protein called beta-amyloid Vascular Dementia This is caused by the damage of blood vessels that supply blood to the brain. This could be a huge risk factor for stroke and affect the brain by for example damaging fibres in white matter of the brain. Symptoms include issues with problem solving and cognitive decline

Lewy Body Dementia

This is a very common type of dementia Lewy bodies - round bits of protein which is found in the brains of people suffering from Lewy body dementia, Alzheimer’s disease and Parkinson’s. People with this condition may have trouble focusing and issues with movement such as tremors and stiffness (Parkinsonism) Frontotemporal dementia These type of dementia are caused by the breakdown of nerve cells and the connection that they have with the frontal and temporal lobes of the brain

Risk Factors

• Age - after the age of 65, the risk increases although dementia can still occur in young people

• Down Syndrome - Many people with Down syndrome are affected by early onset Alzheimer’s disease by the time they reach middle age

• Family History - If previous family members have a history of dementia your risk can increase and tests can determine wether genetic changes you have can increase your risk

Ways developing dementia can be prevented:

• Consistently do mentally stimulating activities such as chess

• Be physically active

• Refrain from smoking

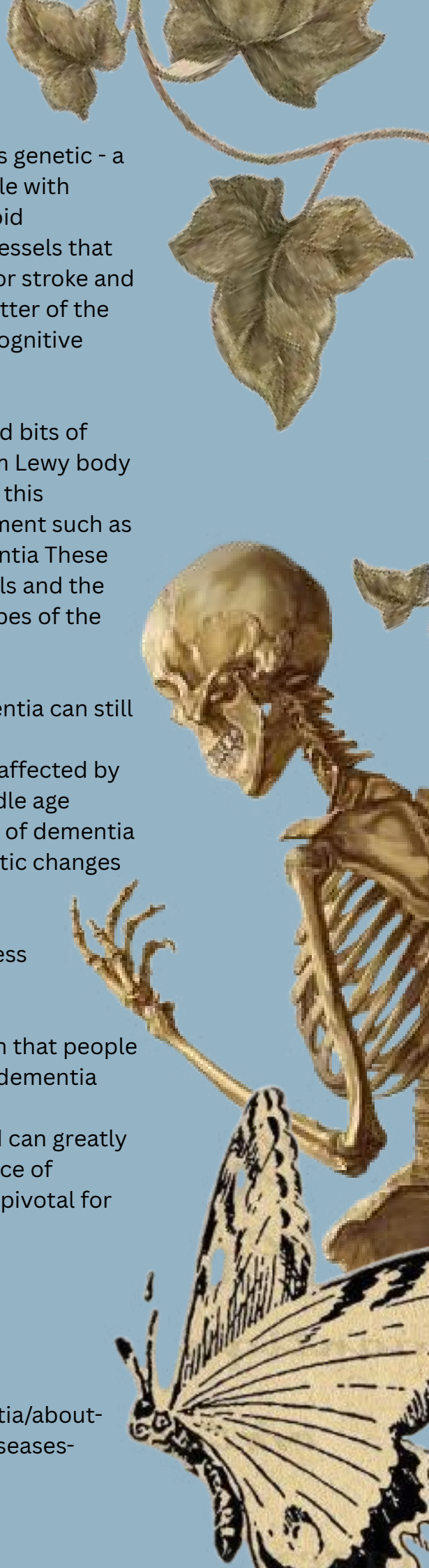
• Make sure vitamin intake is adequate - studies have shown that people with low vitamin D blood levels are at higher risk of getting dementia

• Maintain a Healthy diet

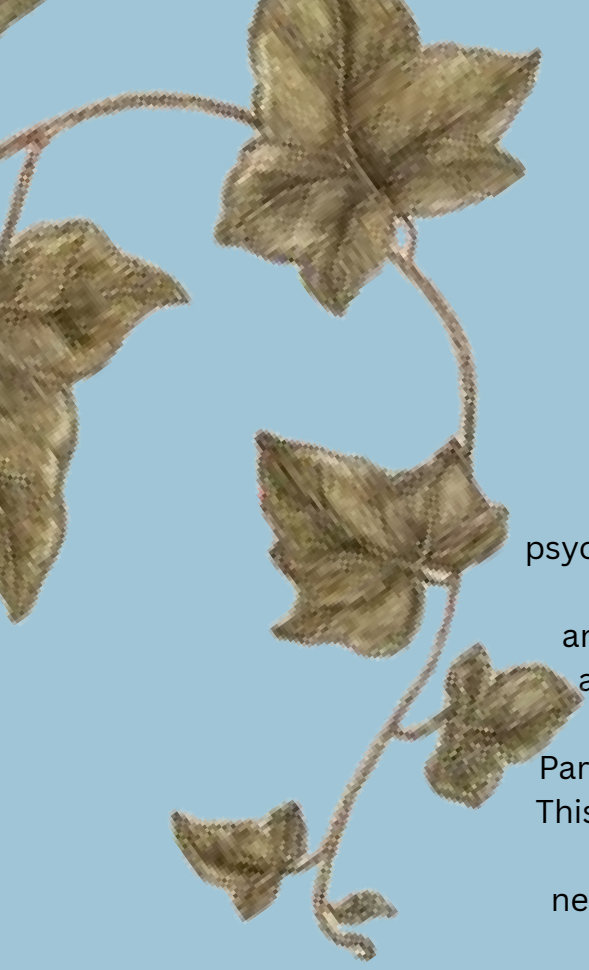
- Mediterranean diets promote brain health immensely and can greatly lower a person’s risk. Mediterranean diets have an abundance of omega 3 fatty acids, vegetables and whole grains which are pivotal for having a healthy brain in the long term

Angelle I

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Parkinson's Disease



Parkinson's disease is a progressive disease where, over time, more and more parts of the brain become damaged.

What are the symptoms?

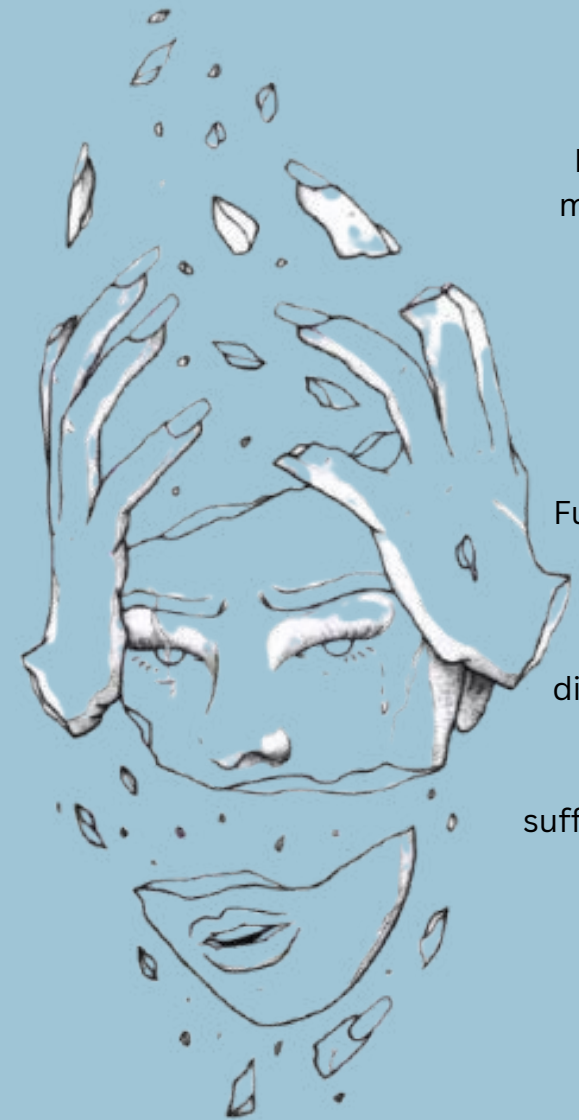
The symptoms of Parkinson's can be both physical and psychological. These include involuntary tremors in specific parts of the body, slower movements, inflexible and stiff muscles, anxiety and depression, problems balancing (which means they are more likely to fall), anosmia, insomnia, and memory issues.

What causes Parkinson's?

Parkinson's is caused by nerve cells in the substantia nigra dying. This reduces the amount of dopamine produced within the brain. Unfortunately, scientists are unsure what causes these dying nerve cells, but they are considering the possibility that it is due to both genetic and environmental factors.

What is dopamine?

Dopamine is a hormone which is involved in regulating body movement. This is why a lower dopamine rate (as happens in Parkinson's disease) creates so many mobility issues.



Who does it affect?

Did you know that Parkinson's disease statistically affects men more than women? Although it primarily affects people over 50 years of age, people can begin to develop symptoms from 40.

How can Parkinson's disease be treated?

Unfortunately, there is currently no cure, like many other neurodegenerative diseases. However, physiotherapy and occupational therapy can be used to treat symptoms. Furthermore, medication and, in severe cases, brain surgery can be used to relieve symptoms

Currently, there are 166,000 people in the UK who have been diagnosed with Parkinson's disease. Who knows how many more people are yet to be diagnosed? Moreover, scientists and researchers alike have predicted that the number of people suffering from Parkinson's disease will only increase, with 173,000 people predicted to be diagnosed with Parkinson's by 2030.

Parkinson's disease: https://www.parkinsons.org.uk/information/about-parkinsons/statistics

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How can we help?

As a society, we can help by learning about Parkinson's disease and its symptoms, who it is more likely to affect, and how to help those who are struggling with it.

For example, helping them with mobility or other physical tasks if it is required, and showing that you care and understand. This will make a big difference for many people. To read more about how to help, please visit the following website:

https://www.parkinsons.org.uk/support/caring-for-someone

Moreover, there are many charities you can donate to help with research and care, such as Parkinson's UK and many others.

Elizabeth C



Alzheimer's

What is Alzheimer's?
Alzheimer's disease is a progressive brain disorder that slowly destroys memory and thinking skills which makes it the most common cause of dementia

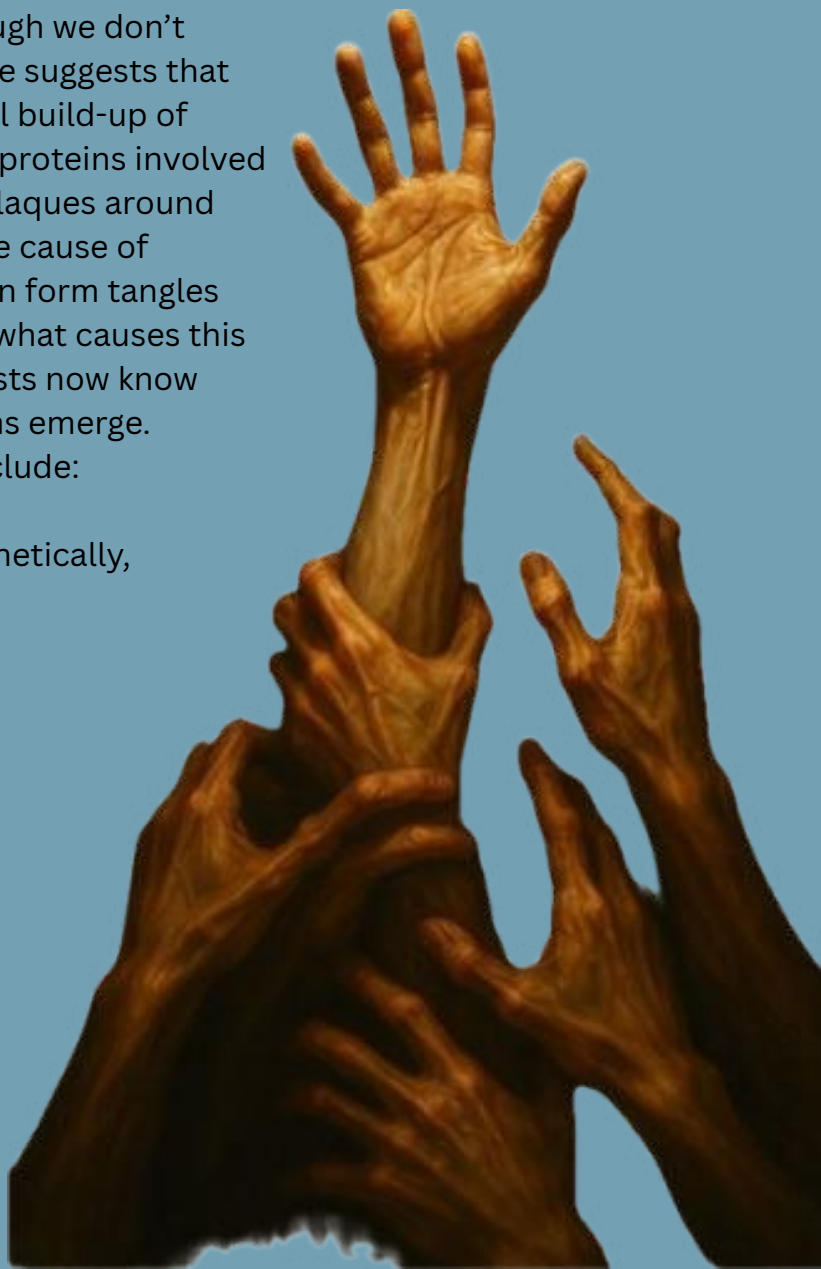
Symptoms
Early Symptoms= Misplacing items, asking questions repeatedly, lack of coordination, mood swings, agitation, anxiety

Middle Stage Symptoms =Problems with speech or language, delusions, paranoia, disturbed sleep, impulsive or obsessive behavior

Later Symptoms= Aggression, difficulty eating and swallowing, gradual loss of speech, significant problems with short and long term memory.

What are the causes of Alzheimer's?
Now we all know what Alzheimer's disease is, and what the symptoms are, what actually causes it? Although we don't know for sure, scientific research and evidence suggests that Alzheimer's disease is caused by the abnormal build-up of proteins in and around brain cells. One of the proteins involved is called Amyloid. Deposits of Amyloid form plaques around the brain cells. Another protein involved in the cause of Alzheimer's is Tau, which, when it deposits, can form tangles within the brain cells. However, it is unknown what causes this process to begin in the first place, and scientists now know that it begins many years before the symptoms emerge.

Key risk factors for developing Alzheimer's include:
-Increasing age
-Family history (Alzheimer's can be passed genetically, although this is rare)
-Past severe head injuries
-Physical inactivity
-Smoking
-High blood pressure
-Poor sleep
-Unhealthy diet



Treatments: Although there in currently no cure, scientists have developed treatments which can help to relieve some of the symptoms of Alzheimer's, or even slow down the progression of this disease. However, the symptoms will only be reduced temporarily.
Chemical treatments:
Acetylcholineterase (AChE) inhibitors – these medicines increase levels of Acetylcholine, a substance in the brain that helps nerve cells communicate with each other. Memantine - it works by blocking the effects of an excessive amount of a chemical in the brain called Glutamate

Non-chemical treatments:
Cognitive stimulation therapy – cognitive stimulation therapy (CST) involves taking part in group activities and exercises designed to improve memory and problem-solving skills. Reminiscence and life story work – Reminiscence work involves talking about things and events from your past. It usually involves using props such as photos, favourite possessions or music etc.

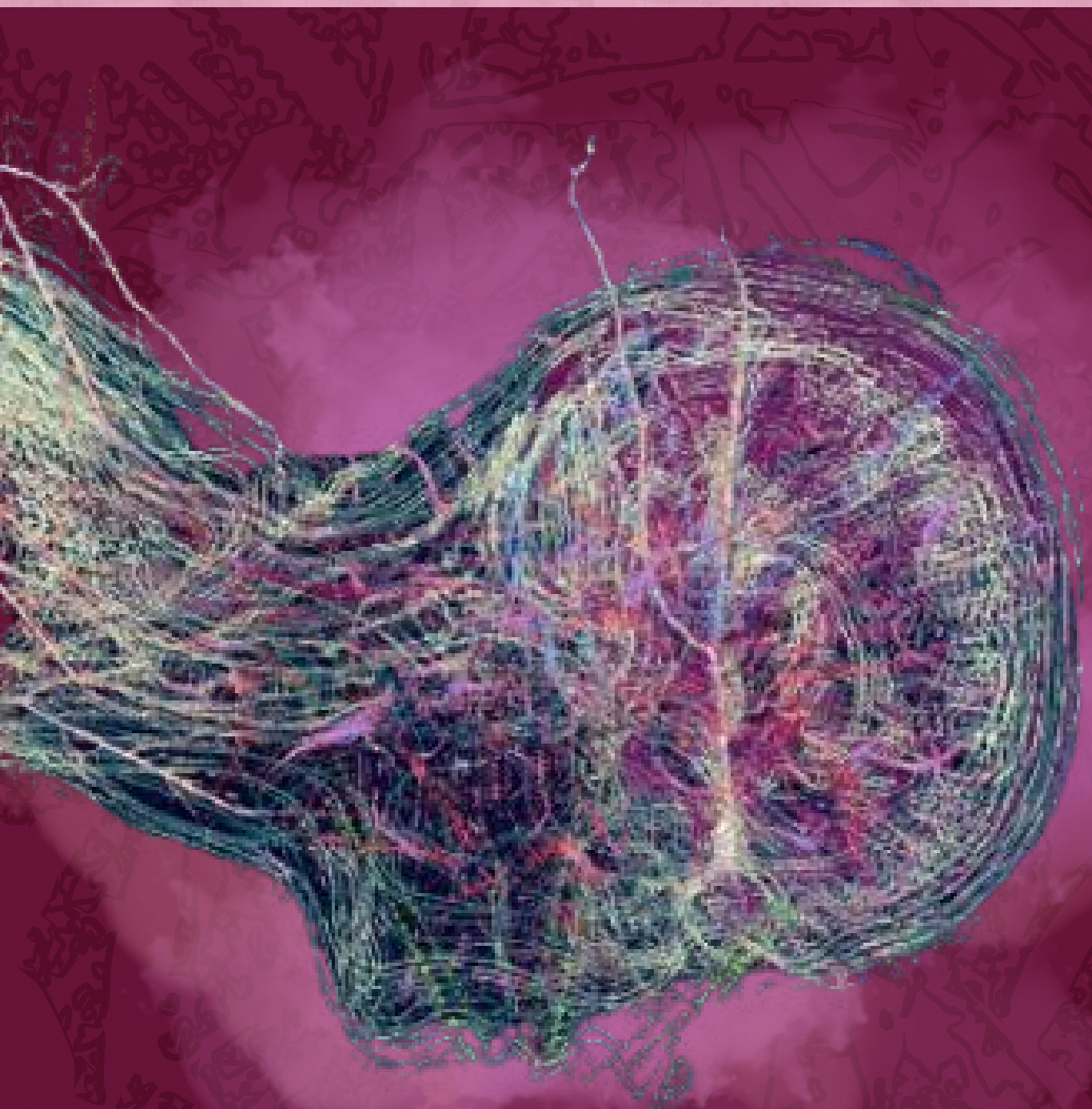
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Angelle I, Eva R and Elizabeth C





Psychology



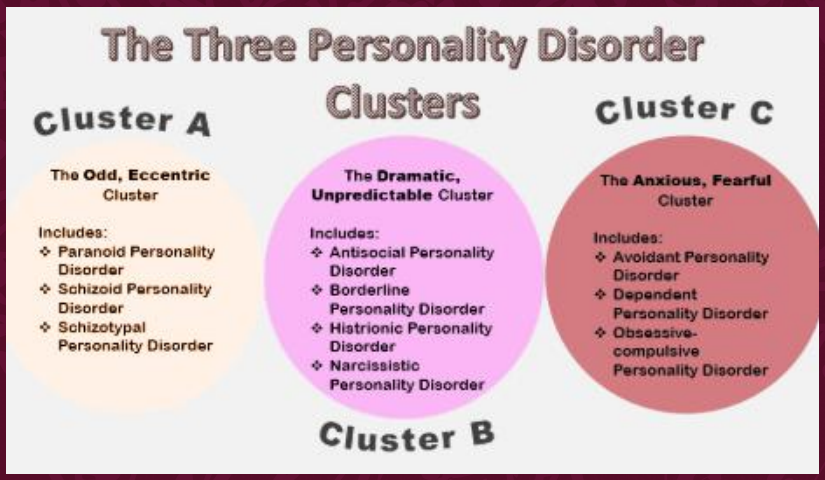
Avoidant Personality Disorder

Nowadays on social media, it has become increasingly more common for people to use the descriptor 'avoidant' to outline their behaviour, especially in the context of relationships. Some people may find their ability to form relationships to be subpar; they believe there may be an aspect of their personality that renders them incapable to retain one. It is this idea that we potentially liken to being avoidant. But considering its newfound spotlight, what does it really mean to be 'avoidant'?

AN INTRODUCTION TO PERSONALITY DISORDERS

One way that this behaviour can be described, as done by the NHS, is Avoidant Personality Disorder (AvPD). This is a psychiatric disorder that is commonly recognised by its symptoms of poor self-esteem and an intense fear of social rejection.

The cluster system of Personality Disorders showcases 10 different conditions sorted into categories with others that exhibit similar tendencies.



Cluster A refers to disorders that involve "eccentric" thinking, or behaviour that others may perceive to be peculiar. This may include social withdrawal, or difficulty in initiating new relationships. This may even be an issue with maintaining a level of communication that helps to maintain a healthy connection.

Cluster B is used to describe disorders that are "dramatic", with a tendency to be immediate or even intense. This includes behaviour that others may perceive to be harmful or unstable; individuals will usually have a difficult time in dealing with their emotions and may act erratically towards their peers.

Therefore, based upon this brief explanation, we may expect AvPD to be located within Cluster A. Its name suggests that an individual may find it tricky to form long-term relationships because of their abnormal thinking patterns. However, this indicates exactly how complex the word "avoidant" is. It is not only used to describe a pattern of unsuccessful relationships; AvPD actually belongs to cluster C.

Cluster C personality disorders are associated with states of high anxiety. The fact that AvPD has been sorted here implies that not only do patients simply cut off or neglect their social relationships; this action itself originates from them feeling fearful of rejection. In this way of self- isolation, they believe that they retain some social control.

SYMPTOMS AND CRITERIA

The fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) outlines all criteria that an individual must meet to receive a diagnosis for a specific mental disorder.

There are 7 criteria or symptoms that may be prevalent in a person with AvPD, as stated by Rogge and Kirkland (2014). The individual must exhibit at least 4 of these symptoms to meet the diagnostic requirement:

1. **AVOIDING OCCUPATIONAL ACTIVITIES** – This stems from an innate fear of rejection. Patients are likely to avoid any situation where there may be a lot of interpersonal contact.
2. **UNWILLINGNESS** – They must be adamant that they will be accepted before they interact with someone.
3. **RESTRAINT** – Within intimate relationships. Concern that they will be shamed.
4. **PREOCCUPATION** – Conscious of receiving criticism.
5. SOCIAL INHIBITION – Inability to interact comfortably with others due to a feeling of personal inadequacy.
6. **DISTORTED SELF PERCEPTION** – Belief of inferiority to others.
7. **RELUCTANCE** – To step outside of their comfort zone for fear of humiliation.

A few of these criteria may appear quite similar, however this is because they all majorly stem from an individual's view that they are incompetent. This in turn feeds into the poor self-image that is at the centre of AvPD, which consequently infiltrates daily social interactions that others without the disorder may view as simple to manoeuvre.

THE BIOLOGICAL EXPLANATION

In general, personality disorders can be the result of a mixture of genetic and environmental elements. It is suggested that they are 30-60% heritable, but how exactly does AvPD emerge within the body?

- The foundation for this is the disruption of genes that deal with serotonin transporters and dopamine receptors; a commonly recognised cause of this disruption is childhood trauma.
- These childhood or nerve-inducing life experiences encourage chronic stress which then can interact with genetic predispositions (genetic characteristics that affect the phenotype of an organism, such as behaviour)
- An epigenetic modification occurs, such as the altering of histones, therefore affecting how chromatin is remodelled. This means the subsequent gene expression may change.

COMORBIDITIES

A comorbidity refers to the presence of two or more distinct illnesses within an individual, or mental disorders. This could be a mixture of anxiety disorders, eating disorders or even a coexistence of multiple personality disorders, all within one person.

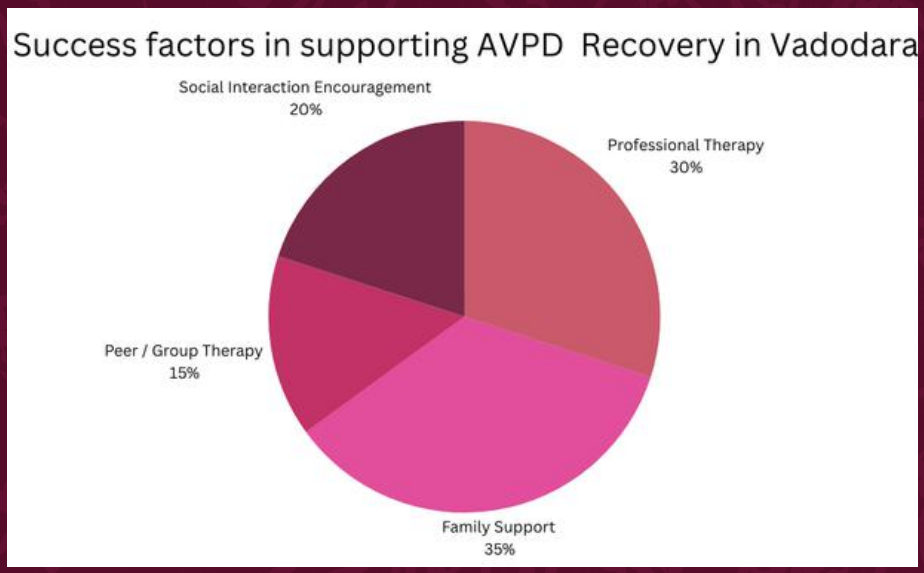
One comorbidity that is commonly present in those with AvPD is the combination of AvPD and Social Anxiety Disorder (SAD). It is a regular misconception that AvPD only occurs in combination with SAD, however it has been revealed that approximately 66% of individuals with AvPD do not meet other criteria for SAD. For example, whilst individuals with both conditions tend to avoid social situations, those with SAD only do so for specific situations in which they believe embarrassment is inevitable. Those with AvPD avoid social interactions altogether due to a deeply-rooted sense of inadequacy; it is pervasive and affects all areas of life whereas SAD is often situational.

A second comorbidity is AvPD and Major Depressive Disorder (MDD). This affects a range of 40 – 80% of people with AvPD and is relatively common due to the chronic isolation and internalisation of hopelessness that comes with AvPD itself. Therefore, AvPD can act as a risk factor for the beginning and the consistency of depression.

TREATMENT

Many psychological disorders are combatted using psychotherapy, which is the use of talking therapy to communicate a person's respective struggles and to uncover their behaviours. There are two types of psychotherapy used to treat AvPD:

1. **PSYCHODYNAMIC THERAPY -** Involves self-reflection and identifying the psychological roots of emotional pain.
2. **COGNITIVE BEHAVIOURAL THERAPY (CBT) -** Helps with understanding the correlation between thoughts and one's actions. Focusses on unlearning these negative behaviours.



Despite this, due to AvPD's nature as a psychiatric disorder, medication may be necessary, and therapeutic techniques often do not suffice. There is not one designated medication for AvPD, but psychiatrists focus upon relieving specific symptoms. For example, selective serotonin reuptake inhibitors (SSRIs), such as Fluoxetine, can be prescribed to relieve depressive symptoms which, as explored above, often emerge with the failure to interact socially.

CONCLUSION

Overall, AvPD is an intricate and frequently misunderstood condition that affects from 2.1 – 2.6% of the adult population worldwide. It is a disorder which lacks a significant amount of research compared to other Personality Disorders. However, as scientific breakthroughs become more common, further understanding AvPD and psychiatric disorders can help us to appreciate the challenges faced by others and how their lives are impacted, even if it is not always noticeable. This is an important step in boosting how we function as a society, as only when we understand from another's perspective can we improve how we socialise.

- Evie W

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Borderline Personality Disorder

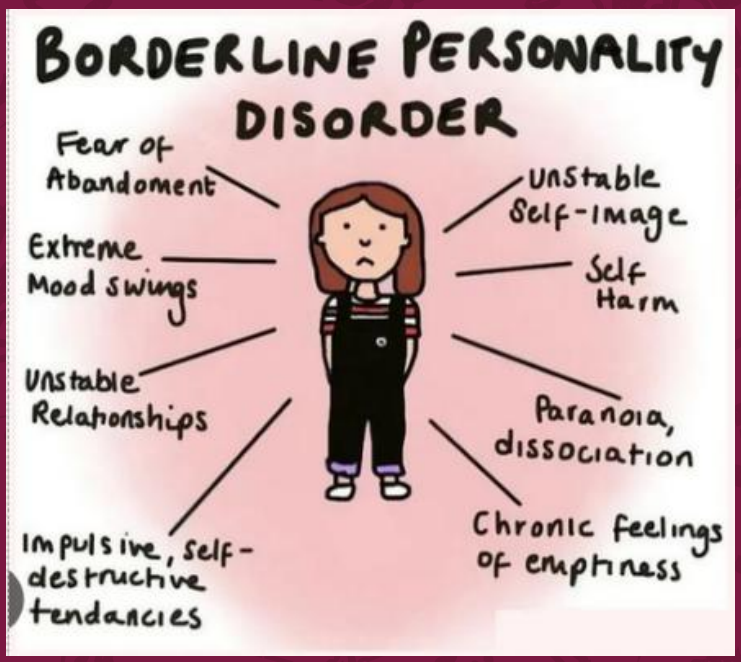
BPD is a personality disorder that is characterised by intense emotional instability, difficulty with relationships and impulsive behaviour. People usually experience overwhelming emotions that change rapidly and are out of their control. Not to be confused with bipolar disorder, these changes in emotion are triggered by stress rather than in episodes.

CAUSES

Unfortunately, the root cause of borderline personality disorder is not yet fully understood. However, there are multiple indicators that can suggest that somebody is at risk of it. For example, strong family history of BPD is the strongest indicator. The disease is most likely heritable but is due to multiple genes, so having parents with it does not guarantee that you will. Also, emotional trauma is a key factor. For example, childhood trauma: experiences like abuse, neglect, or the death of a parent can increase the risk of developing the disorder. Not only this, but stressful life events can lead to a risk of BPD. Major life stressors such as a relationship breakdown, financial difficulties, or the loss of a loved one can trigger an episode of the illness. In addition to this, using drugs like cannabis or cocaine can be linked to the onset or relapse of bipolar disorder. Finally, chemical neurotransmitters are believed by scientists to have roles in mood regulation. Therefore, imbalances in transmitters such as serotonin may be linked to BPD. Also, some research has found differences in brain structure and function in people with borderline personality disorder, but more research is needed to understand how these differences contribute to the illness.

SYMPTOMS

Although these may differ according to factors such as gender and age but in general, these are the most common and prominent symptoms. People with BPD may have intense yet volatile relationships, a deep fear of abandonment and extreme emotional instability with rapid and intense mood swings. Common signs include impulsive and self-destructive behaviours, as well as intense anger, and even chronic feelings of emptiness. In certain cases, stress-related paranoia or dissociation can also be present. This impulsive behaviour can lead to deeper issues such as self-harm or suicidal behaviour.



TREATMENT

Although there is no cure, BPD symptoms can be managed with drug and psychological treatments, allowing those living with it to have happy and fulfilling lives. While no medication is a long-term or direct cure for BPD, certain drugs can be used in different situations to manage symptoms.

Antidepressants like Fluoxetine (Prozac) or Sertraline (Zoloft) are the most commonly prescribed medications. They help with symptoms like depression, mood swings, impulsions and aggression, all of which can have a major impact on the regular life of someone with BPD.

Mood stabilisers can help to manage mood swings and impulsive behaviour. For example, Lithium, Valproate and Lamotrigine. However, it is important to note that the NHS states that no medication is licensed to specifically treat BPD, instead these medications aim to alleviate symptoms also linked to other conditions such as depression.

Instead, the NHS recommends the use of therapy, most notably psychotherapy or 'talking therapy' which involves taking time to understand how someone thinks and feels. There are two main types:
Dialectical Behaviour Therapy (DBT): Developed specifically for BPD, DBT uses mindfulness to help individuals manage intense emotions, reduce self-harm, and improve relationships. It involves both individual and group sessions to learn practical skills.

Mentalisation-Based Therapy (MBT): Focuses on improving the ability to "mentalise," which is the capacity to understand one's own and others' thoughts, feelings, and intentions.

- Ishya S

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Depression: The Chemical Imbalance & The Drugs That Treat It

Depressive disorder (depression) is defined by the NHS as a low mood that can last a long time or keep returning, affecting your everyday life. Anyone can experience depression and it is a common mental disorder; approximately 332 million people in the world have depression (WHO 2025). It can affect a person's relationships and everyday life, such as at work or school.

Symptoms include poor concentration, feelings of excessive guilt or low self-worth, thoughts about dying or suicide, disrupted sleep, and feeling tired or lacking energy.

There are various types of depression: for example, psychotic depression, where people with severe depression may also experience hallucinations and delusional thinking, or post-natal depression which many parents experience after the birth of a baby.



Depression can also worsen other health conditions such as arthritis, asthma, cardiovascular disease, cancer, diabetes, and obesity.

Depressive disorder is also believed to be caused by a chemical imbalance in the brain's chemistry – too much or too little of a neurotransmitter can cause depression. Anti-depressants were created on this belief to restore the chemical balance; other treatments include therapy and self-care.

HOW DID ANTI-DEPRESSANTS DEVELOP?

Before modern medicine, the ancient remedies for depression included St. John's wort, a flowering plant believed to have mood-enhancing properties in ancient Greek and Roman times. Similarly, traditional Chinese medicine involved using herbs such as ginseng and licorice to relieve symptoms.

During the 19th century there were significant developments in modern psychiatry, but depression treatment often involved alcohol and opiates which had a high risk of addiction and only provided a temporary relief.

In the 1950's there was a significant accidental breakthrough for antidepressants with the discovery of Iproniazid, which was originally a treatment for tuberculosis but had mood-lifting effects on patients.

30 years later, in the 1980's, came the discovery of Selective Serotonin Reuptake Inhibitors (SSRIs); one version, Fluoxetine (more commonly known as Prozac), became the first SSRI to be approved by the FDA in 1987.

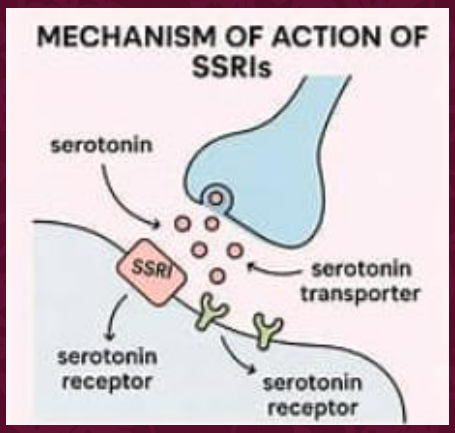
HOW DO ANTI-DEPRESSANTS WORK?

The aim of antidepressants is to improve negative thinking and influence how our bodies respond to stress. Types of anti-depressants include:

- **SELECTIVE SEROTONIN REUPTAKE INHIBITORS (SSRIs)**
- **SELECTIVE NORADRENALINE REUPTAKE INHIBITORS (SNRIs)**
- **TRICYCLIC ANTI-DEPRESSANTS (TCAs)**
- **MONOAMINE-OXIDASE INHIBITORS (MAOIs)**

SSRI's (the most commonly prescribed class of anti-depressant) block the reabsorption of serotonin, a neurotransmitter that affects mood, increasing serotonin concentration in the synaptic cleft. This was suggested by the 'serotonin hypothesis', which concluded that low levels of this neurotransmitter was linked to depression – increasing serotonin could lift mood and help relieve symptoms.





WHAT ARE THE SIDE EFFECTS?

Anti-depressants come with a variety of potential side effects, but this can differ between the type of antidepressants and the patients taking them. Common side effects include nausea, fluctuations in weight, trouble sleeping, anxiety and tremors. Less frequently, patients taking SSRIs can suffer from a lower alcohol tolerance, bleeding (due to the drug affecting blood clotting) and lower sodium levels.

Antidepressant withdrawal or discontinuation syndrome is not experienced by everyone that stops taking antidepressants, and some may never feel depressed again, while some patients may relapse as soon as they stop taking the drug. This is because there is no definite cause for depression as antidepressants are based on the chemical imbalance theory, so some patients report that the treatment works while others don't. Typical symptoms of those that experience withdrawals include dizziness or vertigo, flu-like symptoms, electric shock sensations in head, sensory disturbance and tinnitus (ringing in the ears).

MENTAL HEALTH HELPLINES

SAMARITANS - you can contact Samaritans 24 hours a day, 365 days a year.
call 116 123 (free from any phone)

SANELINE - you can use SANEline to support yourself or others through a crisis
call 0300 304 7000 (4.30pm–10pm every day)

NATIONAL SUICIDE PREVENTION HELPLINE UK - offers a supportive listening service to anyone with suicidal thoughts.
call 0800 587 0800 (6pm to midnight every day). If you're unable to connect to the main number, you can call 0800 689 0880.

- Eva R

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Mental health helplines

Possible Side Effects of Antidepressant Medications

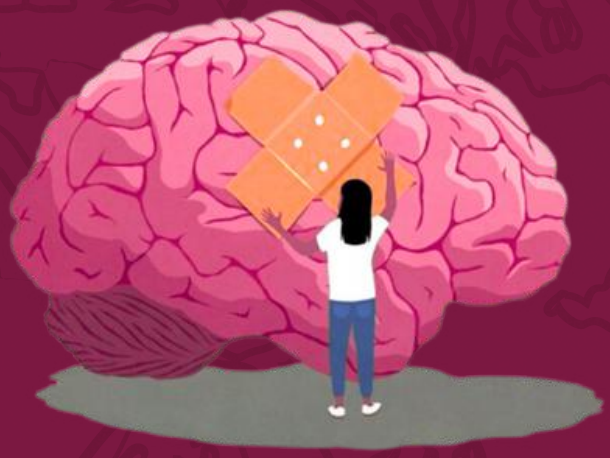
Withdrawal effects of antidepressants

Munchausen Syndrome

Is faking an illness ACTUALLY an illness?

We've all been in that position where it's a Monday morning and suddenly, we have a soaring high temperature that makes it ABSOLUTELY IMPOSSIBLE for us to do any work the rest of the week. But sometimes, faking an illness could signal a deeper psychiatric problem, which provokes the behaviour to feel compelled to fake an illness; and just to clarify, your "50-degree temperature" is not an example of this.

WHAT IS MUNCHAUSEN SYNDROME?



Munchausen syndrome is described by the NHS as 'a psychological condition where someone pretends to be ill or deliberately produces symptoms of illness in themselves.' So, what symptoms do they present? The answer is extremely varied: from fake psychological symptoms such as hearing voices, physical issues such as chest pain and stomach aches, and attempting to get ill intentionally or not letting a wound heal. Symptoms of this syndrome are usually unnoticeable by doctors due to:

1) the rarity of the illness

2) the extremely realistic appearance of the symptoms in the patient.

WHAT CAUSES MUNCHAUSEN SYNDROME?

This syndrome could be caused by a multitude of factors, from personality disorders to childhood trauma, and even a deeper grudge against positions of authority/healthcare professionals. Although there are studies that attempt to unearth neurological reasons behind this illness, they have not made many advancements due to the complex nature of the illness and the combination of life experiences that contribute to it.

Personality disorders can come in several different forms and can be presented in opposite ways to each other. For example:

- Antisocial personality disorder, in which people feel joy in manipulating and deceiving doctors and receive a sense of accomplishment in doing so.
- Borderline personality disorder, in which people struggle to control their feelings and often swing between positive and negative views.
- Narcissistic personality disorder in which people see themselves as special and at the same time worthless, which can lead to unstable behaviour and periods of erratic behaviour.

Emotional trauma is also a key factor that can cause Munchausen syndrome to be presented. These people may have faced neglect during childhood, making them crave a sense of affection that they feel can only be attained by being ill or, in other cases, could be because of thinking that they do not deserve to live a privileged life. The NHS describes this cause as 'having a compulsion to punish themselves by making themselves ill because they feel unworthy.'

Some people may not have an existing underlying mental problem; however, they may just have a grudge against healthcare professionals, leading them to enjoy manipulating doctors.

But what does Munchausen syndrome do? Surely, it seems like faking a cough repeatedly does not seem harmful; however, the reality can be far worse than that.

CASE STUDY

A case study from the BMJ Best Practice podcast vividly highlights the true, dangerous nature of this syndrome. A clinic in America received a request from a patient to undergo surgery to treat and remove a mass that was present in the ovaries. The women came in for an initial examination, and the doctors did not identify any issues; however, ovarian tumours were notorious for being difficult to find and locate. Therefore, the doctors agreed that it was best for the woman to have scans taken, as the proposed procedure was extremely invasive and required a large incision with a high-risk level of lasting injury and even death. When the scans came back, the doctors were astonished. The scans were all clean, with no signs suggesting that the women had any form of ovarian cancer. The doctors then looked back at the reports and scans the woman had given prior, and noticed they were all fabricated, after being copied from the internet.



This lie could have been potentially life-threatening for the woman and would have had several implications on her health in the future; however, due to her having Munchausen syndrome, she was unable to see the potential dangers that this lie could cause her down the road.

WHY IS MUNCHAUSEN SYNDROME MORALLY CONFLICTING?

Munchausen syndrome is not only dangerous for the patients but also morally conflicting for the doctors. They may have spent a considerable amount of time prioritising what's right for the patients, requesting scans, (a use of resources) and expressing empathy for their situations, only to have been caught in an elaborate web of lies. Although doctors comprehend the symptoms of Munchausen syndrome, it can be extremely humiliating and difficult to accept that, even though their primary aim was to help the patient, they were being tricked all along. Therefore, doctors are

required to overlook the fact that a patient is inclined to proving them wrong, and they must keep the patient at the centre of care, no matter how challenging this may be for them.

HOW CAN WE TREAT MUNCHAUSEN SUNDROME?

Unfortunately, treatment options are still extremely limited for Munchausen syndrome. The most common suggestion is therapy – however, it can be futile if the patient is unwilling to admit that they may have a problem and refuse to cooperate with any treatment plans that could alleviate the symptoms. Munchausen patients tend to believe that they have a physical illness, so they often struggle to accept that they may have a mental disorder. Studies have shown that 44.9 % of patients return to the same hospital claiming another illness. In the rare circumstances that the patient comprehends the syndrome, they are referred to a psychiatrist for further treatment, such as dialectical behaviour therapy, which involves using techniques such as the tree of life. If there is no compliance, medical contact is kept at a minimum with the patients, so that they do not cause any more harm to themselves.

Overall, faking an illness is, in some situations, an illness itself. It is important to feel empathy for those with Munchausen syndrome, as they are unable to control their urge to fake illnesses. Furthermore, in the future, as a clearer understanding of the neurological aspects of this syndrome develops, more treatments may be found to make it more manageable.

- Niah S

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Sleep & Insomnia

Sleep is not just rest – it is a vital, active process. During sleep, the body repairs tissues, strengthens the immune system, regulates hormones and consolidates memory. Chronic sleep disruption is linked to a wide range of medical issues including cardiovascular disease, metabolic disorders, and neurodegeneration.

WHAT ACTUALLY HAPPENS WHEN WE SLEEP?

A typical night of sleep progresses through four to five cycles, each lasting 70-120 minutes, composed of four stages divided into REM (rapid eye movement) and non-REM sleep. The first three stages are non-REM:

- **STAGE 1** (N1 sleep) is the lightest stage of sleep, a transitional period from wakefulness to sleep and typically lasts a few minutes. During this stage, heart rate and breathing slow down, and muscles begin to relax.
- **STAGE 2** (N2 sleep) is where the body temperature, heart rate and breathing slow down further than in N1, and the body settles into rest. This stage is still light sleep.
- **STAGE 3** (N3 sleep) is also known as deep sleep; you need this to wake up feeling rested. During this stage, brain activity has a pattern known as delta waves, which processes memories and experiences from the day, while the body releases growth hormones to repair muscle tissue, regrow bone cells and strengthen the immune system. Bursts of activity, known as sleep spindles, help prevent unwanted awakenings and facilitate proper brain function. This stage makes up about 25% of total sleep time in adults, but babies and children need more stage 3 sleep – the older you get, the less you need.

The fourth stage, REM sleep, is when brain activity rises to near-wake levels. Vivid dreaming occurs, while most voluntary muscles are paralysed to prevent acting out dreams. Dreams are more than just a series of surreal images – they serve as a mental housekeeping to clean up partial or unnecessary information. There is also evidence to show that REM sleep contributes to insightful thinking, creativity and memory.

WHAT IS INSOMNIA AND ITS IMPACTS?

Insomnia is when a person doesn't sleep as they should. This could mean they aren't sleeping enough, aren't sleeping well or having trouble falling or staying asleep. Insomnia is very common, with 1 in 3 adults worldwide with insomnia symptoms, and about 10% of adults meeting the criteria for insomnia disorder



There are many effects of insomnia, due to the body not receiving the amount of sleep it requires, which results in symptoms such as: delayed responses (such as reacting slow when driving), feeling tired, unwell or sleepy, having trouble remembering things, slow thought processes, trouble concentrating, and mood disruptions.

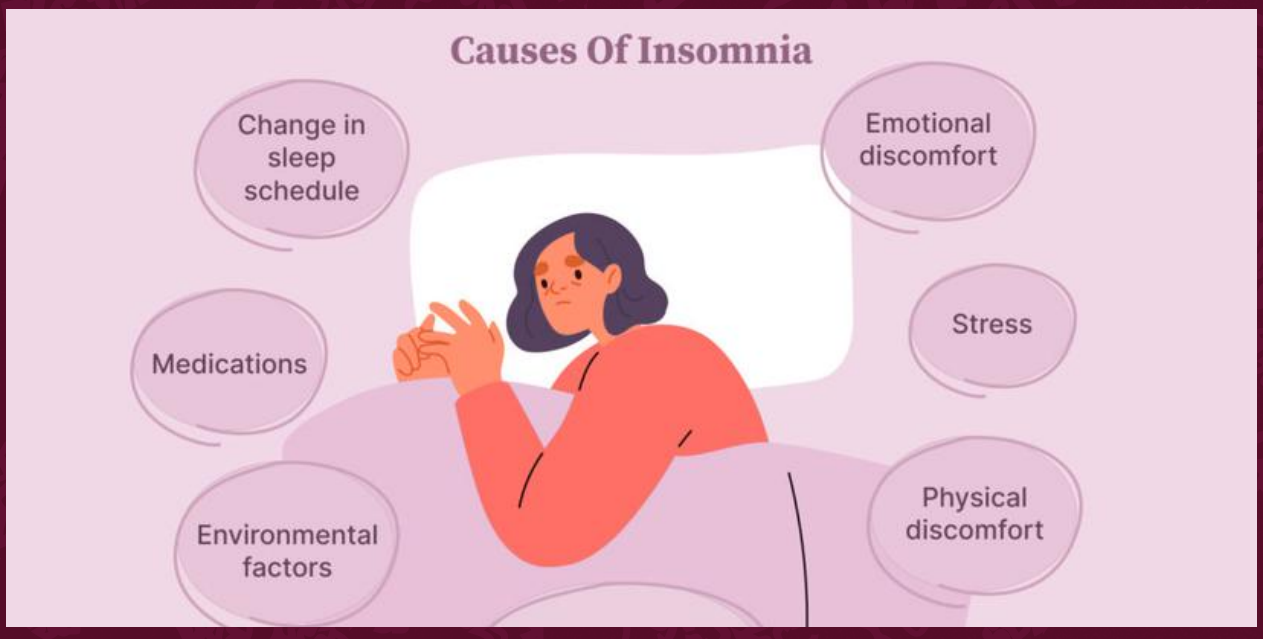
Insomnia disrupts the natural progression through non-REM and REM sleep, and the resulting health consequences are often stage-specific. Disruption of N3 or deep sleep, can reduce the release of growth hormone and cytokines, leading to weakened immunity, slower recovery from illness or injury, and impaired metabolic regulation. Chronic loss of deep sleep has been linked to an increased risk of obesity, insulin resistance and cardiovascular strain. Insufficient REM sleep impairs memory formation, learning, attention, and emotional resilience, and increases susceptibility to anxiety, depression and irritability.

WHAT CAUSES THE CONDITION?

Experts aren't entirely certain as to what causes insomnia, but the current understanding is that multiple factors are involved. A potential cause could be genetics, as sleep traits and conditions seem to run in families. Physical health can also affect your ability to sleep – this includes temporary illnesses like minor infections or injuries, or chronic conditions like acid reflux or Parkinson's disease. Conditions that affect your circadian rhythm, which is your body's natural sleep clock, are also factors. Sleep habits can also contribute to insomnia, such as the temperature of your bedroom, background noise, the time you sleep and caffeine consumption.

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HOW IS INSOMNIA TREATED?

Insomnia can be managed through a combination of lifestyle interventions, mental healthcare, and when necessary, medications. Sleep hygiene – such as maintaining a consistent sleep schedule, creating a comfortable sleep environment, limiting screen time before bed, and avoiding caffeine or alcohol later in the day – forms the foundation of treatment. Mental healthcare is also crucial, as stress, anxiety, and depression can exacerbate sleep difficulties. Pharmacologic treatments may also be used. These include sedative or hypnotic medications, melatonin or related compounds, sedating antidepressants, and certain antihistamines. While drug treatments can improve sleep onset or duration, they must be carefully selected to avoid disrupting sleep patterns or causing dependence on the medication and are generally not the mainstay of management.



WHAT IS GOOD SLEEP HYGIENE?

Sleep hygiene is a set of practices and habits that promote good sleep by creating a healthy sleep environment and routine. Good sleep hygiene includes:

- Keeping regular sleep hours, which helps regulate your body clock and train your body to rest and remain alert at specific times of the day.
- Creating a restful bedroom environment: a comfortable room temperature, low light levels and as quiet as possible.
- Not using electronic devices for at least an hour before bed, as devices stimulate your brain for several hours after use, making falling asleep difficult.
- Avoiding stimulants before bed, such as coffee, tea, energy drinks and chocolate.
- Eating a light meal before bed, as going to bed too full can force your digestive system to keep working when it should be resting. Likewise, going to bed hungry can also disturb sleep.

Overall, sleep is an important, multi-stage process essential for physical restoration, cognitive function, and emotional regulation. Insomnia disrupts this process, reducing deep non-REM and REM sleep and leading to a wide range of medical consequences, from impaired immunity and metabolic regulation to cognitive deficits and mood disorders. Effective management combines sleep hygiene and strategies to support mental health and, in more severe cases, using medications, to help restore healthy sleep cycles. Recognizing insomnia as a medical condition, rather than a mere inconvenience, is key to protecting long-term health and overall well-being.

- Maryam V

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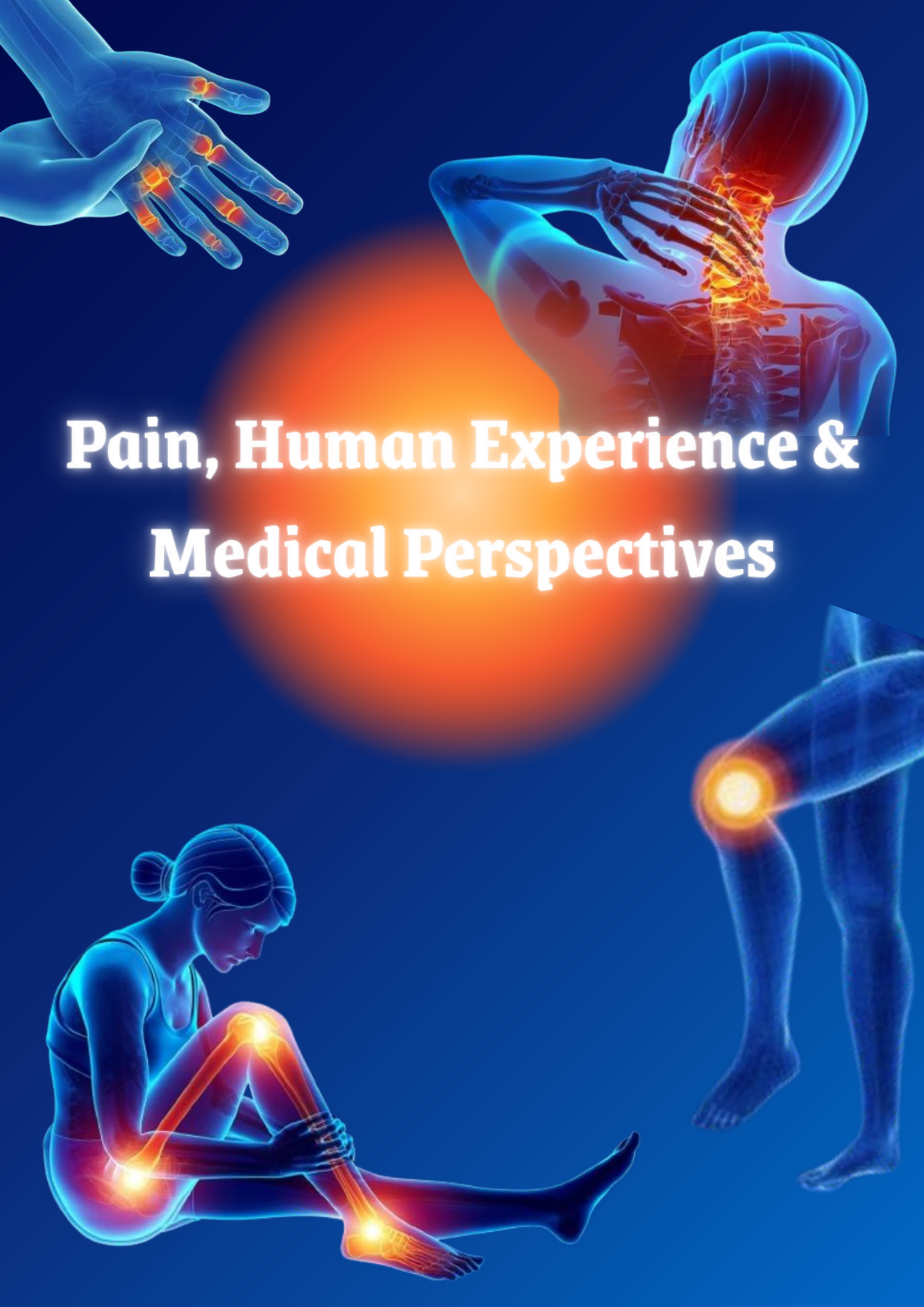
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Pain, Human Experience & Medical Perspectives

THE SCIENCE BEHIND
PHANTOM LIMB PAIN

Imagine losing a limb – the physical part is gone, but you still feel it. Not just a faint tingling, but burning, twisting, cramping, or even stabbing sensations. This experience is known as phantom limb pain (PLP), and it remains one of the most fascinating mysteries in neurology. Even though the limb is no longer there, the pain is very real, which raises the question: why does the brain hold onto something that no longer exists?

WHAT IS PHANTOM LIMB PAIN?

Phantom limb pain occurs when someone feels genuine pain in a limb that has been amputated. Studies estimate that around 80% of amputees experience it at some point. This is not "imagined pain": brain-imaging scans show that the same neural pathways activate as when real, physical pain occurs. In other words, the brain truly believes the limb is still present.



It's important to distinguish between two things:

- **Phantom sensations:** the feeling that the limb is still there
- **Phantom pain:** when those sensations become painful, often severely

PLP belongs to the second category and can significantly affect quality of life.

WHY DOES THE BRAIN CREATE PHANTOM LIMB PAIN?

Although the exact cause is still being researched, scientists have identified several major mechanisms that explain why PLP occurs.

1. CORTICAL REORGANISATION

The brain contains a 'body map', the somatosensory cortex, which allocates specific areas to different body parts. After amputation, the area connected to the missing limb becomes unused, and neighbouring brain regions begin to 'invade' it. This can cause cross-wiring.





For example, some patients feel sensations in their missing hand when their face is touched. This miscommunication can also trigger phantom pain.

2. FAULTY NERVE SIGNALLING

At the site of amputation, damaged nerves may send uncontrolled or irregular signals. With no real limb to interpret these messages, the brain defaults to its previous understanding that there is pain in the missing limb.

3. PAIN MEMORY
If the limb was painful before amputation (due to injury or disease), the brain may retain a 'memory' of that pain. After the limb is removed, the brain can continue replaying this pre-existing pain pattern, even without physical input.

HOW IS PHANTOM LIMB PAIN TREATED?

Because PLP originates in the nervous system and the brain's body map, treatments often focus on retraining or recalibrating the brain.



- MIRROR THERAPY
One of the most popular treatments; a mirror is used to reflect the intact limb, creating the illusion that the missing limb is moving. This visual feedback can help correct the brain's mismatched signals and reduce pain.

- Virtual Reality (VR) Therapy
This is essentially a modern extension of mirror therapy. Patients use VR to 'control' a virtual version of their missing limb, giving the brain the sensory feedback it expects.

- NEUROMODULATION
Techniques such as transcranial magnetic stimulation or spinal cord stimulation electrically influence nerve pathways to interrupt pain signals.

- MEDICATIONS
Traditional painkillers often do not work well for PLP, so doctors instead use drugs that target nerve pain, such as certain anticonvulsants or antidepressants.

- PSYCHOLOGICAL SUPPORT
Trauma, stress, and emotional distress can worsen PLP. Therapy can help manage these factors, reducing the intensity and frequency of phantom pain episodes.

WHY DOES PHANTOM LIMB PAIN MATTER?

PLP challenges long-held assumptions about pain. It shows that pain is not simply a response to physical injury, but it is constructed by the brain. Even without a limb, the brain can create intense pain purely through unexpected neurological changes. Understanding PLP provides insight into neuroplasticity, trauma, and how identity is tied to the body.

Research is expanding rapidly. Scientists are exploring prosthetics that provide real sensory feedback, brain-machine interfaces, and more advanced neurostimulation. In the future, these innovations may not only reduce phantom pain but restore the sense of connection between the brain and artificial limbs.

- Vaishnavi R

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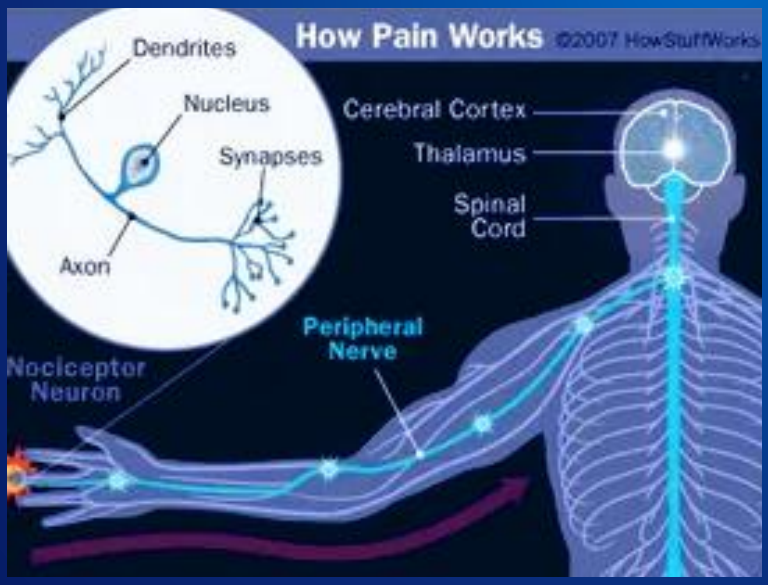
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WHY DO SOME PEOPLE NOT FEEL PAIN?

What is the most pain you have ever felt? Maybe a paper cut from your English homework, stubbing your toe against a table, or even a broken bone. But what if that pain just went away or was never there in the first place? Feeling no physical pain at all is a reality for a few hundred people worldwide. You might think they're lucky to never feel the pain of being hit on the funny bone, and it may seem like they're superhuman. However, the inability to feel pain can cause serious damage to both their physical and mental health.

WHAT IS CIP?

Congenital insensitivity to pain, or CIP, is an extremely rare neurological genetic condition in which people's brains cannot feel pain. Only 80 cases have been documented, and 300 cases have been reported in medical literature. People with CIP often have senses which are underdeveloped from birth, such as the inability to smell or feel extreme temperatures. CIP is autosomal recessive: this means that two copies of the mutated gene must be inherited, one from each parent, for the disorder to develop. Both parents must at least be carriers of the gene, even if they do not show any symptoms. al pain occurs. In other words, the brain truly believes the limb is still present.



WHAT CAUSES CIP?

The most common cause of CIP is a mutation in the SCN9A gene. This gene codes for a voltage-gated sodium channel that is important for nociception, the process of sensing pain. This channel is mainly found in nociceptive neurons, which transmit pain signals and also contribute to the sense of smell. This is why the condition can affect smell. Another gene that can cause this disorder is the NTRK1 gene, which is linked to congenital insensitivity to pain with anhidrosis, or CIPA. This condition prevents the individual from feeling pain and sweating, which can lead to dangerous overheating. The NTRK1 gene encodes a protein that activates other proteins in the cell and stimulates the growth of neurons. Mutations in this gene can destroy or prevent the development of sensory neurons that detect pain or neurons in sweat glands that signal sweat production. These mutations disrupt the normal transmission of pain signals from the body to the brain.

There are five types of CIP:

- **HSAN2D** which causes a lack of pain sensation
- **HSAN3** which causes low sensitivity to pain and difficulty maintaining stable body temperature and blood pressure
- **HSAN4** which prevents feeling pain and sweating
- **HSAN5** which causes a lack of pain sensation and autonomic dysfunction
- **HSAN6** which causes a lack of pain sensation and autonomic dysfunction

HOW ARE PEOPLE'S LIVES AFFECTED BY CIP?

The most obvious effect is that individuals can experience repeated injuries, infections, and complications that go unnoticed, putting their health at risk. Untreated injuries such as fractures or burns can make everyday life dangerous. Even simple tasks like cooking could result in severe burns without the individual realizing it. Eating regularly may be difficult because the person cannot feel hunger, which can prevent proper nutrition. Young children with CIP may accidentally bite their tongues while teething, which can be dangerous. Childbirth may also be more complicated because the individual cannot feel labour contractions.

There are psychological impacts as well: CIP can lead to isolation, alienation, and anxiety about potential injuries. Constant vigilance is required, which can cause stress for both the individual and their caregivers. Regular check-ups are needed to ensure no injuries go unnoticed and to monitor other potential health issues. Some individuals with CIP may have a shorter life expectancy; others may have a normal lifespan but face various health complications throughout their lives. Continuous self-injury can significantly shorten life expectancy, and very few patients survive past the age of 25.

Although individuals with CIP cannot feel pain, the consequences of their injuries can still affect daily life. Frequent injuries and infections may lead to complications that limit mobility or function. Mental health and social interactions are also often affected.

CASE STUDIES

In a rural area in the Middle East, a five-year-old boy was brought to the emergency department with a burnt hand from a heater but showed no signs of pain or distress. When he was six months old, his mother noticed that he did not cry after accidentally getting burnt, losing four upper teeth, or dislocating his left hip. On examination, the boy had multiple scars on his hands, feet, and both knees, misalignment of his left big toe from previous fractures and swelling of both feet and ankles after a hip dislocation at age three. All of these injuries were caused by unintentional trauma. The patient had normal developmental milestones for his age but suffered from stress incontinence and was still wearing a diaper. He did not react to pinprick, salt, spice, or hot and cold stimuli. Doctors treated his injuries and provided mental health support to both him and his family.



A case study in the Hong Kong Journal of Orthopaedic Research described a young boy with CIPA. At three years old, he had unexplained swelling in his left elbow for five weeks with no obvious trauma or injury. There was no family history of inherited diseases or bone fragility. The patient showed developmental delays and began walking late, at two years and six months. He experienced multiple high fevers from ages one to three. At four years and ten months, he could not bear weight on his lower left limb and a left hip dislocation was discovered, which recurred six months later. Within a year, he had a right hip dislocation. He has not been able to walk since his first hip dislocation.

With proper care and management, individuals with CIP can lead healthy and fulfilling lives. Regular medical support, check-ups, and psychological assistance are essential. Education for both individuals with CIP and their families about the condition and access to resources is highly beneficial. For healthcare professionals, understanding CIP and similar conditions is important to develop effective treatments and provide comprehensive care.

- Swati N

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THE PROGRESSION OF PLASTIC SURGERY

Plastic surgery can be defined as a surgical specialty that focuses on the restoration, reconstruction, or alteration of the human body for form or function primarily and is not subjective to one anatomical area. It can be divided into 2 categories: reconstructive and aesthetic.

Reconstructive- restoring function and appearance after an accident or illness.
Aesthetic- altering appearance by choice, also known as cosmetic surgery.



EARLY ORIGINS

Plastic surgery has origins from ancient Egypt during the reign of Pharaoh Sesostris I. Ancient Egyptians performed plastic surgery on the deceased as part of the mummification ritual. They believed that the body must be preserved in perfect condition for the afterlife, so additional steps were taken to enhance the appearance of the mummified body. One of these modifications included straightening a crooked nose by inserting small sticks or wax to alter the nose shape. Another example is breast enhancements by placing a bag of herbs and other materials to increase breast size and transfigure the shape. Ancient Egyptians believed that the body should be in perfect condition as a show of respect to the dead as part of their culture and would also attempt to amend any facial deformities.

The first recorded practices of plastic surgery emerge from ancient India around 800 BC, when Sushruta Samhita, considered the father of plastic surgery, wrote about the detailed techniques for skin grafting by using a flap of skin from the cheek or forehead to restore the nose (which was a common procedure due to nose amputations being used as a punishment for crimes) as well as surgeries to restore the ears and lips.

MEDIEVAL - WORLD WAR II

In medieval times, plastic surgery was not very common as it was considered taboo and without enhanced knowledge of infections and anaesthetic it was a very dangerous procedure.

In the 14th century there were the first documented cases of female breast augmentation carried out by barber surgeons. The 2 most common plastic surgery procedures during the dark ages were nose reshaping and scar repair in the 16th century. Also, in the 16th century Gaspare Tagliacozzi, an Italian surgeon, considered to be the father of modern reconstructive surgery, introduced revolutionary techniques for skin grafting which are similar still to the ones we use today.

During the 19th century as knowledge on anaesthetic, sterile techniques and infections advanced so did plastic surgery. With a significant role in WW1 as the field of reconstructive surgery progressed immensely, due to the increased demand by wounded soldiers. One surgeon that pioneered plastic surgery during WW1 is Dr. Harold Gillies, who trained in England. He specialised in facial reconstruction and when he returned from his post in France, he set up a special ward dedicated to facial injuries at Cambridge Military Hospital, and later in 1917, the world's first ever hospital dedicated to the treatment of facial injuries at The Queen's Hospital with the hope to treat wounded soldiers so that they can live a normal life after the war. He also used skin grafting techniques that allowed the donor skin flap to stay connected to the rest of the skin when laid over the wound, rather than being severed, significantly reducing the risk of rejection.



Walter Yeo, before (left) and after (right) skin flap surgery performed by Gillies in 1917.

MODERN

In the 20th century there has been a rapid rise of cosmetic surgery that can be partly attributed to advancing technology, as well as evolving beauty standards. Development in technology such as lasers, 3D scanning and computer-aided procedures have allowed plastic surgeons to perform more precise surgeries, whilst simultaneously reducing scarring and recovery times.

There has also been an influence from the media as more celebrities have undergone cosmetic surgeries, with the public following suit – this has caused an increase in procedures such as rhinoplasty and breast augmentation as plastic surgery becomes part of mainstream culture.

EXTREME CASES

Pixie Foxx: a Swedish model and influencer, who is known for removing 6 ribs to achieve a 14-inch waist inspired by Jessica Rabbit and is reported to have had approximately 200 cosmetic procedures.

Hang Mioku: a South Korean model who was reported to be addicted to plastic surgery when doctors refused to operate, she began to inject cooking oil into her face at home, leaving her face permanently disfigured.





Andrea Ivanova: a 22-year-old Bulgarian woman who is reported to have had 17 cosmetic procedures in an attempt to have the world's biggest lips.

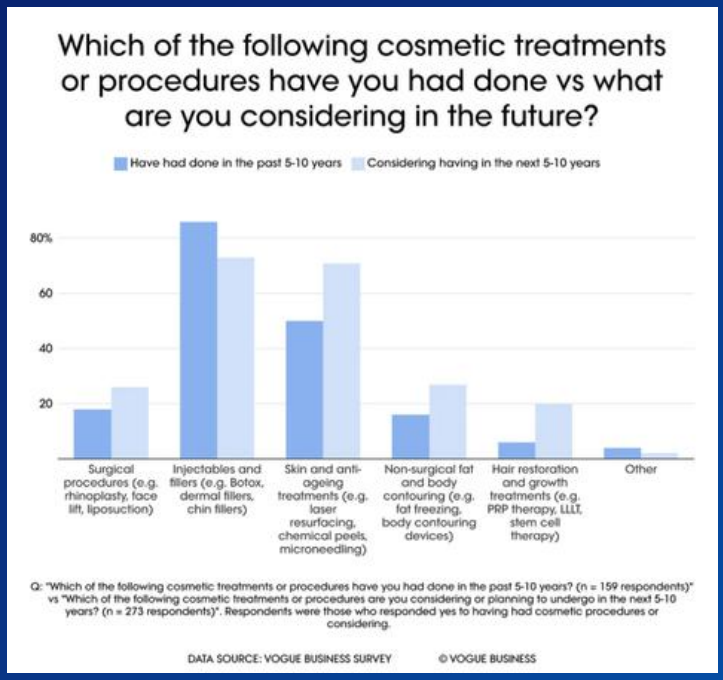
Pete Burns: the lead singer of Dead or Alive, who has undergone over 300 plastic surgeries.





POTENTIAL FUTURE

Cosmetic plastic surgery has become more popular, and celebrities are more open about procedures they have undertaken. We are in an era where plastic surgery is considered ordinary rather than extraordinary. In 2025 it is reported globally that there has been a total of 37,953,870 aesthetic procedures and this figure is only estimated to rise following trends from previous years. Additionally, as the number of procedures rise, it is predicted that technology will improve to have less-invasive surgeries with safer outcomes.



- Eva R

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THE DIAGNOSTIC METHOD OF DR. HOUSE - CAN REAL HOSPITALS WORK LIKE THIS?

A patient collapses and the symptoms defy simple explanation. Doctors argue around a whiteboard until a lone genius storms in, scribbles down a wild theory, orders his colleagues to search the patient's house for evidence, and then miraculously saves a life in the final few minutes of the episode.

It's gripping television, but could real hospitals work like this?

The renowned world of House, M.D presents medical diagnosis as an intellectual battleground. Each episode follows a similar pattern: a mysterious case arrives, the main team consisting of Dr. Cameron, Dr. Foreman, and Dr. Chase gather around a whiteboard, and the often grumpy Dr Gregory House, played by Hugh Laurie, drives the diagnostic process with rapid-fire hypotheses and unfiltered intuition, often overriding the milder and more logical suggestions and approaches of his colleagues.



One of the show's most famous episodes, Three Stories (S1 EP21), perfectly captures House's dramatic approach to diagnosis. To summarise, House presents three separate patient cases to a group of medical students. Each patient has leg pain, which is a symptom that could indicate dozens of different conditions. Instead of following a standard clinical pathway, House pushes the students to jump between unlikely possibilities: trauma, infections, parasites, autoimmune disorders, and even cancer. In one of the patient cases, House even sends his team to search the private property of the patient to collect evidence in order to diagnose a supposed snake bite found on the patient's leg. Throughout the episode, and indeed other episodes throughout the entire show, House encourages bold assumptions, dismisses standard protocols, and tests dangerous hypotheses. He also orders invasive procedures almost instantly without consulting his seniors, based on hunches rather than guidelines or definite proof. As each case unravels, last minute revelations drive the plot and, in the end, the audience learns that one of the stories is actually House's own medical history, and the story behind his infamous limp and crutch. The fast-paced deductions, plot twists, and focus on extraordinary cases show how the series prioritises mystery and storytelling over realistic hospital procedures.

HOW DO REAL HOSPITALS DIAGNOSE PATIENTS?

While the series dramatises aspects of the American medical system, and despite the significant differences between it and the NHS, House's attitudes and approach to diagnosis would be virtually absent in real hospitals in both contexts.

In real hospitals, diagnosis is a structured and methodical process grounded in evidence, teamwork, and patient safety – a stark contrast to the dramatic shortcuts seen in House, M.D. Doctors must perform a clinical history, conduct a physical examination, and order appropriate diagnostic testing. Each step must be justified, documented, and aligned with national guidelines – this is the key point that the diagnostic methods within the show fall short of.

Rather than relying on the intelligence of a single maverick doctor to perform brash actions, most diagnoses are made through the collaboration of members within a multidisciplinary team. Within the NHS, Consultants, junior doctors, nurses, radiologists, and laboratory specialists work together, sharing information and refining possible explanations. Decisions are rarely instantaneous; test results can take hours or even sometimes days, and treatments are adjusted carefully based on evidence, rather than hunches, and doctors certainly cannot search private property to find that evidence, as seen many times within House, M.D. Environmental investigations do happen, but they must be through the proper channels of public health inspectors, environmental health teams, occupational health specialists, or local authorities. If doctors were to perform these unauthorised searches, it would raise ethical concerns around consent, liability and safety.

WHY ARE RARE CASES RARE?

House, M.D., often presents a hospital as an endless showcase of exotic diseases that creates the impression that medical mysteries are the norm when it comes to diagnosis. In real hospitals, however, the vast majority of diagnoses involve common, well-understood conditions. This can be seen within a study conducted by a Swiss teaching hospital between August 1st, 2009, and August 31st, 2017: out of 165,908 inpatients being admitted to the hospital, 146,804 had non-rare diseases, whereas 19,104 had one or a combination of rare diseases (11.5%). And in fact, a common and often repeated aphorism constantly hammered at postgraduate students during their training is,

"When you hear hoofbeats, think horses; not zebras,"

WHAT DOES THE SHOW GET RIGHT?

Despite its exaggerations, the series does capture some important truths about medical practice. House's emphasis on differential diagnosis (listing possible causes and eliminating them one by one), is a genuine clinical method. The show also highlights the value of persistence, curiosity and thinking critically when symptoms don't fit a simple pattern. Albeit sometimes unjustified by House, the 5 pillars of diagnostics recognised within NHS (Imaging, Endoscopy, Pathology, Physiological Measurement and Genomics) are also displayed well throughout the series, which highlights the many factors that need to be considered when diagnosing someone. Therefore, whilst House's extreme personality and shortcuts are unrealistic, the underlying idea that medicine requires problem-solving and careful reasoning is accurate.

To conclude, although the show captures the pressures and uncertainties that often accompany diagnosis within medical cases, House, M.D. ultimately presents a highly stylised version of clinical practice and diagnosis. Its focus on rare conditions and rule-breaking to make dramatic breakthroughs makes for compelling television but bears little resemblance to the structured, collaborative, and, most importantly, ethically grounded processes used in real hospitals. Both the American healthcare system and the NHS prioritise patient safety and consent, as well as evidence-based decision making which are principles that leave little room for the impulsive methods seen on screen. And whilst Dr. House appears a "genius" on screen and puts an important focus on differential diagnosis, most doctors manage to do this without insulting everyone in the room, and they rely much less on Vicodin-fuelled sarcasm too.

-Praveena S

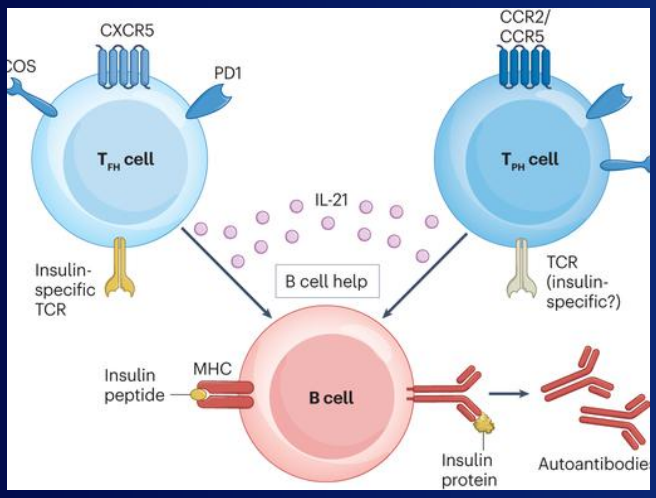
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LIVING WITH CHRONIC ILLNESS

Chronic illnesses are medical conditions that persist for one year or longer, require ongoing medical attention, and often limit daily activities or functioning. Unlike acute illnesses, which arise suddenly and typically resolve with short-term treatment, chronic diseases follow a prolonged course characterised by fluctuating symptoms, long-term management, and significant impacts on both physical and psychological wellbeing. There are many chronic conditions, ranging from cardiovascular disease to autoimmune disorders, but this article focuses on two well-characterised examples underpinned by immune dysregulation: type 1 diabetes and Crohn's disease.

Many chronic illnesses arise from abnormalities in immune regulation. Under normal circumstances, the immune system distinguishes self from non-self and orchestrates targeted responses to pathogens while preventing damage to host tissues. In autoimmune conditions, however, this tolerance breaks down, leading to sustained and inappropriate immune activation against the body's own cells.



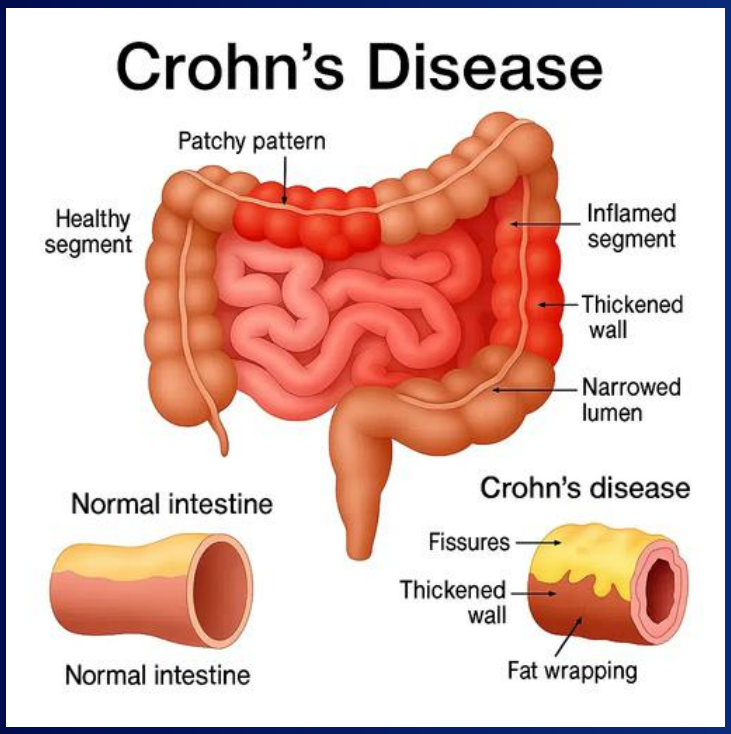
Type 1 diabetes (T1D) is a clear example of this process. T-lymphocytes attack the pancreatic islets and gradually destroy the insulin-producing β-cells. Since the body can no longer produce insulin, individuals need lifelong insulin treatment through injections or a pump, along with regular blood-glucose monitoring. Keeping blood glucose stable then depends on carefully balancing insulin doses with food intake, exercise, and stress levels, which makes day-to-day management both physically and mentally demanding.

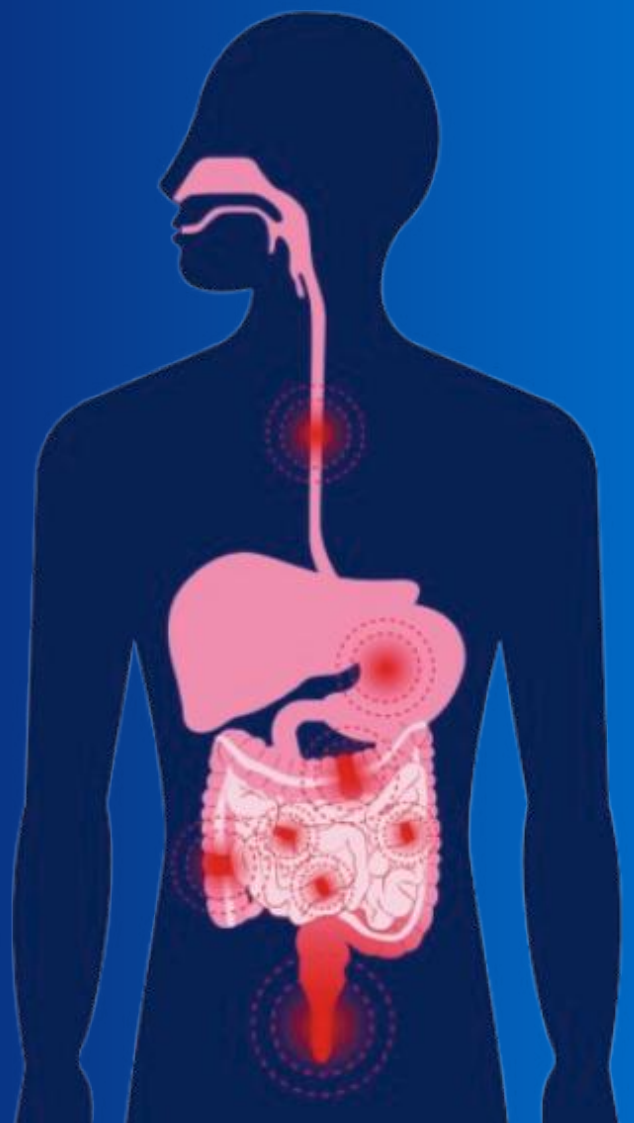
Crohn's disease, a chronic inflammatory condition of the gastrointestinal tract, also involves immune dysfunction but with different mechanisms. In Crohn's, dysregulated innate and adaptive immune responses lead to persistent inflammation, ulcer formation, strictures, and malabsorption. Abnormal interactions between host immunity, the intestinal barrier, and the gut microbiome are key contributors. Treatment often involves corticosteroids, immunosuppressants, or biologic therapies to modulate immune activity, though disease course remains unpredictable.

Although distinct in their pathology, T1D and Crohn's disease illustrate common features of chronic illness. Both conditions involve periods of relative stability punctuated by acute exacerbations. Both require long-term adherence to therapeutic regimens. And both impose a psychological burden due to uncertainty, dependence on medical technology or medication, and the constant need for vigilance in symptom monitoring.

The biological challenges of chronic illness often intersect with significant psychosocial effects. Many patients, particularly adolescents and young adults, describe reduced autonomy due to frequent medical appointments, dietary restrictions, or the need to carry emergency equipment. The invisible nature of symptoms such as fatigue, pain, or gastrointestinal distress may also lead to misunderstanding or minimisation by others. These factors can influence academic performance, participation in activities, and social identity.

-Nisara T





Public Health, Ethics and Society



The Controversy of Medical Diagnosis

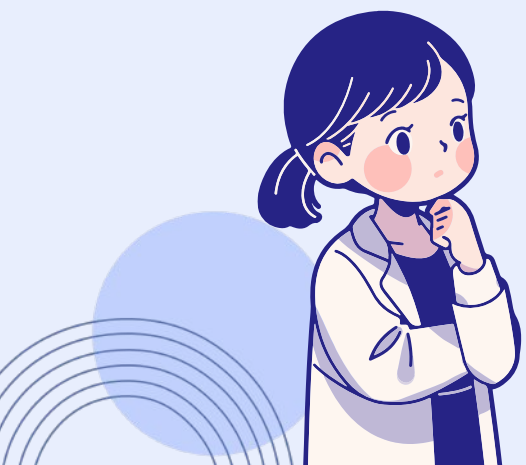
By Khushi M

Medical diagnosis is the process of determining which disease or condition explains a person's symptoms or signs. Diagnostic procedures include medical tests by healthcare professionals and may involve the use of imaging, laboratory analysis or physical examination. Determining the underlying condition can be complicated by the nonspecific nature of many symptoms which often overlap across multiple disorders and therefore require a thorough differential diagnostic process (Wikipedia, 2025). Growing medical knowledge and advances in technology have significantly improved the accuracy and timely identification of diseases which is crucial for guiding effective treatment, improving patient outcomes and preventing potential complications. However, the diagnosis of some medical conditions still remains controversial despite these advancements, where differing medical opinions and uncertainty can lead to cases of mystery illnesses and misdiagnosis.

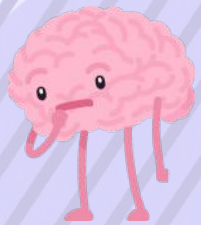
Subjective nature of symptoms

Many symptoms reported by patients such as fatigue, nausea and pain are subjective meaning they can be interpreted differently by physicians. These symptoms also rely on the patient's description, which can vary based on pain tolerance, communication style or emotional state and therefore introduce a degree of ambiguity into the diagnostic process. This uncertainty is amplified by overlapping symptoms which makes it difficult to distinguish between disorders that present in similar ways.

Diagnostic uncertainty occurs when symptoms do not clearly match any known condition. This may lead some doctors to believe they are observing a new syndrome while others may argue that these cases can be fully explained using existing diagnoses. This tension between possible misdiagnosis and the potential identification of a new diseases contributes to the controversy surrounding medical diagnosis and the case of 'mystery illnesses'. Examples include the prolonged debates surrounding conditions such as chronic fatigue syndrome (Swoboda, 2008) and fibromyalgia (Häuser, 2019) which took years to gain medical legitimacy due to unclear symptoms, lack of definitive tests and inconsistent medical opinions.



Fibromyalgia



Fibromyalgia is a chronic disorder characterised by widespread pain, persistent fatigue and cognitive difficulties often described as 'fibro fog' (NHS, 2022). The exact cause of this syndrome is unknown but is believed to be related to abnormal levels of certain chemicals in the brain and changes in the way the CNS processes pain messages carried around the body.

Fibromyalgia shares symptoms with numerous other disorders including chronic fatigue syndrome, multiple sclerosis, hypothyroidism, Lyme disease and autoimmune diseases like lupus and rheumatoid arthritis. Additionally, it does not have a single definitive diagnostic test with no blood markers, imaging scans or biopsies that can confirm its presence. This makes it a diagnosis based on symptoms rather than objective evidence, sustaining criticism about subjectivity (Robber, 2025).

Due to this uncertainty, patients have been misdiagnosed or dismissed with their symptoms sometimes attributed to psychological causes rather than a physical condition. Doctors further hesitate to diagnose fibromyalgia out of concern that they may be missing an underlying medical condition. As a result, despite affecting millions of people worldwide, some healthcare professionals still question or refuse to acknowledge fibromyalgia as a legitimate diagnosis. This makes it a clear example of controversy within modern diagnostic practice and reflects the ongoing debate whether such conditions represent genuine poorly understood diseases or are cases of medical misinterpretation.

Limitations in current medical knowledge and technology

Despite significant advances in medical science and technology, the practice of diagnosis is still limited by the extent of current knowledge and the inherent complexity of human biology (Naylor, 2010). Many diseases and syndromes remain only partially understood as even the most advanced diagnostic tools such as imaging, laboratory tests and genetic analysis are unable to capture every subtle physiological change or explain the body's response to a particular disease. For example, neurological disorders present particular challenges because current imaging and testing methods cannot fully explore the intricate functions and networks of the brain (Ningrum, 2023). Additionally, interactions between different organ systems often produce overlapping or ambiguous symptoms, complicating the identification of a single cause which often cannot be located by existing diagnostic methods. These limitations indicate how uncertainty is an intrinsic part of medical diagnosis and contributes towards the continued existence of conditions that are difficult to classify or explain, often labelled as 'mystery illnesses'.



Autoimmune diseases

Autoimmune diseases are when the body's immune system mistakenly attacks its own healthy cells, tissues and organs. Anti-NMDAR encephalitis is a type of autoimmune disorder affecting the brain in which antibodies target NMDA receptors leading to inflammation and disruption of normal brain signalling.

Anti-NMDAR encephalitis is frequently misdiagnosed as its initial presentation mimics psychiatric disorders. Early symptoms include behavioural changes, anxiety and agitation, (Mayo Clinic Staff, 2024) and in many cases these psychiatric signs appear before more obviously neurological symptoms such as seizures or movement disorders. A study found that roughly one third of patients with autoimmune encephalitis (AE) were first treated as having psychosis. This means that many patients receive inappropriate treatment which may not address the underlying autoimmune inflammation or even potentially cause harm.

Furthermore, the neuropsychiatric symptoms of AE overlap heavily with other medical conditions including primary psychiatric disorders, functional neurological and neurodegenerative diseases (Chahal, 2021), greatly complicating differential diagnosis. Additionally, testing for anti-NMDAR encephalitis is not always conclusive. In many cases, brain scans such as MRIs are often normal in anti-NMDAR encephalitis with around 50% of cases showing no abnormalities even during the disease course. This demonstrates how limits in current diagnostic tools can lead to misdiagnosis and medical controversy, reinforcing the idea of ‘mystery illnesses’ in clinical practice.



Overall, medical diagnosis remains an inherently complex and sometimes uncertain process due to overlapping or subjective symptoms and limitations in current medical knowledge. Despite advances in imagery and laboratory testing, some diseases continue to evade definitive diagnosis with ongoing debates whether certain conditions point towards new syndromes or can be explained by existing diagnoses. These factors contribute towards misdiagnoses, delayed treatment and the ongoing debate over the legitimacy of certain illnesses, emphasising that controversy is an unavoidable aspect of modern medicine.

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The Science Behind Burnout

By Rahini S

Burnout is not a brand-new phenomenon; many people have far exceeded their capacity for stress for several years. However, what is new, is the understanding of what goes on beneath the surface. Recent research shows that burnout is not just feeling overwhelmed or exhausted; it is a physical and biological reaction to long-term stress that causes measurable changes to the brain and body.

What is burnout?

Burnout is a stress-related occupational phenomenon that develops when an individual faces 'a prolonged period of stress,' which then negatively affects their wellbeing. The NHS states that 'the signs and symptoms may be subtle at first, but can progressively deteriorate and become overwhelming.' Burnout, although generally categorised as 'a triad of emotional exhaustion, lack of empathy, and reduced professional accomplishment,' can consist of a more extensive set of symptoms, many of which are widely accepted as features of this condition. Rather than a temporary feeling of tiredness, burnout reflects the measurable decline in the body's ability to manage ongoing pressure.



What are the symptoms and causes of burnout?

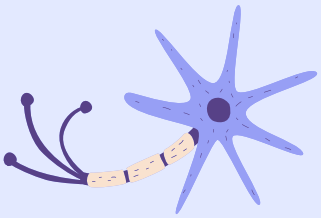
Burnout and its symptoms can originate from a range of different experiences, for example, a high volume of work, a work-life imbalance or a lack of resources and support. This can impair processes involved in motivation, concentration, and decision-making. More behavioural and emotional symptoms can consist of irritability, disengagement and uncharacteristic actions. A common misconception of burnout is that there are no physical impacts; however, in the long term there are many, such as muscle pain, headaches, memory issues and sleeping problems, and in some cases weight gain/loss.

What does burnout mean biologically?

Biologically, the phenomenon develops when the body's stress response system stays activated for extended periods without enough time to recover. When the brain detects stress, certain signals can activate two major pathways: the sympathetic nervous system, and the HPA axis (hypothalamus-pituitary-adrenal system).

In the short term, the sympathetic nervous system, responsible for the fight or flight response, protects the body. When the eyes and ears sense danger a signal is sent to the amygdala, a section of the brain that plays a role in emotional response. These distress signals are then sent to the hypothalamus, a part of the brain that communicates to the rest of the body through the autonomic nervous system. This stimulates the release of adrenaline, and later cortisol, causing the body to respond to the pressure.

However, during long-term pressure, the HPA axis, responsible for coordinating hormone release for stress regulation, stays active for far longer than it was designed to. Over time, this disrupts normal cortisol regulation, therefore affecting areas of the brain involved in attention and emotional control.



What are the long-term effects of burnout?

As mentioned before, burnout causes an irregularity in hormones and in the long-term causes parts of the brain to grow differently. This leads to the cognitive symptoms associated with burnout. The stress-controlling system becomes unregulated instead of returning to its baseline, resulting in chronic exhaustion and decreased concentration. Beyond this, in very extreme cases, it can cause more apparent physical problems such as 'hypercholesterolemia [(high cholesterol)], type 2 diabetes [and] coronary heart disease.'

How can we stop this cycle of burnout?

Burnout does not have to be permanent. Taking the first step is often the most challenging, however taking intentional breaks away from the source of stress, whether it be to rest or socialise with friends, family or a medical professional, can make a lasting impact. Developing and maintaining a stable routine, exercising, eating healthy food, and getting sufficient sleep can be key to helping the brain and body recover. Unlike relying on unhealthy coping mechanisms, positive habits can reduce the risk of falling back into the overwhelming cycle of burnout.

By recognising the signs of burnout early, individuals can manage pressure effectively and therefore protect their wellbeing.

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Assisted Dying - Sarco Pods

By Dionne A

"A Futuristic Option, a Fraught Debate": Why Switzerland Has Become the Focus of Interest in the Sarco Euthanasia Pod

Switzerland — long known for permissive rules on assisted suicide, with respected organisations such as Dignitas and Exit operating there — has in the last two years become the focal point of a renewed, highly charged debate about a very new player: the Sarco pod, a 3D-printed "euthanasia capsule" that promises a simple, technologically slick exit at the push of a button. What began as a niche bioethical stunt has morphed into a real policy flashpoint in Switzerland after the device was used there and authorities opened criminal probes. The result is increased public interest, political scrutiny, and worry from clinicians and ethicists about what it means for terminally ill patients seeking control at the end of life.

What the Sarco is — and why it attracts attention

The Sarco (short for "sarcophagus") is a 3D-printed detachable capsule designed by activist Philip Nitschke. It works with an inert gas (nitrogen) to cause death by hypoxia; designers have emphasised that it is intended to be activated by the person inside. The device's futuristic, design-forward presentation — and the way it reframes assisted dying as a technologically mediated, individual choice — captured global media attention and prompted strong emotional responses from advocates and opponents alike.



Why Switzerland?

Switzerland already has a legal framework that, uniquely in Europe, allows assistance in suicide where there is no selfish motive for the aider; in practice, non-profit organisations have helped people (including non-residents) to end their lives for decades. That legal openness, together with the presence of established right-to-die organisations and a relatively high public awareness of organised assisted dying, made Switzerland a natural place for proponents of the Sarco to test and publicise the device. At the same time, Swiss criminal law still criminalises inducing or assisting suicide for selfish reasons, and active euthanasia (administering lethal drugs) remains illegal — so the legal status of a machine like Sarco is not straightforward.

The turning point: first reported use and legal fallout

The debate moved from hypothetical to concrete in September 2024, when Swiss police opened a criminal investigation after the death of a woman who reportedly used a Sarco capsule on Swiss soil. Several people were detained as authorities investigated possible offences of inducement, aiding and abetting suicide. Swiss federal officials and cantonal authorities reacted strongly; federal politicians called for legal clarification or specific bans, and some cantonal health authorities moved to restrict the device's use. Those developments turned the Sarco from an advocacy project into an active legal and political issue in Switzerland.

Trends and context: assisted dying in Switzerland is rising

This controversy is taking place against a background of growing use of assisted dying in Switzerland. National data and reports from euthanasia organisations show rising numbers in recent years — for example, statistics reported in early 2024 showed an 11% increase (year-over-year) in assisted suicides in Switzerland in 2023, a fact that both supporters and critics of assisted dying point to when making their cases. For terminally ill patients, those rising figures reflect both demographic pressures (an ageing population) and heightened public awareness of end-of-life options.

What supporters say

Proponents of Sarco and similar options frame the device as an extension of patient autonomy and dignity: a non-violent, controlled way for terminally ill or otherwise suffering people to end their lives with minimal distress. Advocates argue that the capsule's design — which avoids the agonising suffocation sensation associated with CO_2 and frames the decision clearly as the user's own — may be preferable for some competent patients who want to avoid prolonged deterioration. They also say Switzerland's legal openness to assisted dying makes it an appropriate location to offer such an option, subject to safeguards.

What critics warn about

Critics raise multiple, serious concerns. Clinicians and ethicists worry about medicalisation and the possible erosion of palliative-care investment if a "techno-solution" becomes normalized. Mental-health specialists warn of copycat effects and the glamorisation of suicide, noting that highly publicised or visually striking means can influence vulnerable people. Legal authorities have pointed out that the Sarco's push-button framing risks sliding from assisted suicide to inducement, particularly if the device is made easily available to non-residents or to people whose competence is not carefully assessed. Political responses in Switzerland have included calls for clearer rules and even attempts to ban the device's use.

Implications specifically for terminally ill patients

For terminally ill patients, the conversation is not only theoretical. Some patients and families are attracted to the possibility of a clean, rapid option that responds to intolerable suffering and preserves agency. Others fear a slippery slope: that availability of a device like Sarco could subtly shift cultural expectations — pressuring patients to choose death to avoid being a burden, or making a dramatic technological means seem preferable to careful, person-centred palliative care. Clinicians stress the need for comprehensive assessment (including psychiatric evaluation), robust consent procedures, and stronger palliative-care alternatives so that "choice" is genuine rather than coerced by limited options.



Where the debate is heading in Switzerland

Since the 2024–2025 incidents, Swiss politicians have submitted motions demanding legal clarity; public health officials and cantonal authorities are weighing whether to regulate devices explicitly or to pursue criminal enforcement when necessary. Given Switzerland's cautious approach to major legal reform, experts expect incremental steps: tighter local controls, clearer protocols for organisations that assist dying, and renewed investment in mental-health and palliative services — rather than immediate nationwide bans or wholesale legal change. The Sarco episode has accelerated discussions about how to balance autonomy, safety, and the role of technology at the end of life.

Ethical and policy takeaway

The Sarco controversy distils a broader tension in modern end-of-life policy: respect for autonomy versus the obligation to protect vulnerable people and to sustain humane alternatives. For terminally ill patients, that tension translates into practical questions — who assesses competence, how to guarantee informed consent, what safeguards keep commercial or non-medical actors from exploiting ambivalence, and how to ensure palliative care remains well-resourced. Switzerland's experience will be watched internationally: its combination of permissive assisted-suicide law, established organisations, and federalist health governance makes it a real-world laboratory for answers to these questions.

Exploring Palliative Care in Medicine

By Lakshana R

When we think about medicine, our minds often leap to cures, to the race to eradicate disease, to repair, to restore. From groundbreaking surgeries to new cancer therapies, medicine has always been driven by the desire to conquer. But sometimes, healing takes a different form. Sometimes, it is not about adding days to life, but adding life to days.

That is the heart of palliative care, the branch of medicine that focuses not on curing, but on caring.

What is palliative care?



Palliative care is a specialised approach to medicine for people living with serious or long-term illnesses. Its purpose is simple yet profound: to relieve suffering—physical, emotional, social, and spiritual—and to improve the quality of life for both patients and their families.

Unlike hospice care, which is limited to the final months of life, palliative care can begin at any stage of illness. It can exist alongside treatments intended to cure, such as chemotherapy, dialysis, or surgery. It is not about giving up; it is about living better, no matter what the prognosis.

Palliative care teams include doctors, nurses, physiotherapists, psychologists, social workers, chaplains, and volunteers who work together to support patients in a holistic way. They address not only symptoms like pain, nausea, or breathlessness, but also anxiety, loneliness, and fear. It is medicine that listens and truly sees the person.



The human side of healing

Palliative care restores dignity and comfort in moments when medicine's usual tools—drugs, machines, and procedures—may no longer be enough. The evidence for its benefits is compelling. Studies show that patients who receive early palliative care report better symptom control, improved mood, and sometimes even longer survival compared to those who receive standard treatment alone. Families also experience less stress and grief when their loved one's pain and discomfort are managed.

But beyond statistics, palliative care changes the experience of illness. It helps people reclaim meaning and connection. A patient may find joy again in small moments—sharing a meal, hearing laughter, feeling the sun through the window—because their symptoms are controlled and their fears have been heard.

Breaking the myths

Despite growing awareness, palliative care is still misunderstood. Many people think it means that "nothing more can be done." In truth, it means that everything possible is being done to ensure comfort, respect, and emotional wellbeing.

Another common belief is that it is only for cancer patients or the elderly. In reality, palliative care supports people with a wide range of illnesses such as heart failure, chronic kidney disease, neurological disorders like Parkinson's and motor neurone disease, and even severe trauma. It is about living well with illness, not just about dying well.

This misunderstanding often delays referral to palliative care. Some doctors worry it might take away hope, but the opposite is true. Palliative care expands hope. It helps patients and families focus on what matters most, whether that is attending a family event, sleeping peacefully, or simply being heard and understood.

The family as a patient too

Serious illness affects more than one person. It touches families, friends, and communities, reshaping relationships and routines. Palliative care recognises this by offering support not only to the patient but also to caregivers. Social workers help families make difficult decisions. Counsellors provide emotional and spiritual support. Practical issues such as advance care planning and financial strain are also addressed.

By treating the family as part of the circle of care, palliative teams reduce stress and empower loved ones to be present rather than overwhelmed.

The challenge of communication

One of the most powerful tools in palliative care is not a drug or a procedure—it is conversation. Honest, compassionate dialogue about prognosis, treatment options, and personal goals can transform how patients and families experience illness. Yet these are also some of the hardest conversations in medicine.

Medical students are rarely taught how to talk about death, pain, or fear. Yet patients often remember not what their doctor said, but how they said it. The tone of voice, the eye contact, the pauses—all of these carry deep meaning.

Training future doctors to communicate with empathy and honesty is essential if palliative care values are to become part of everyday medical practice.

A global need

The World Health Organisation estimates that more than 56 million people, including children, need palliative care each year, but only about 14 percent receive it. In many low- and middle-income countries, this gap is even wider because of limited resources, lack of trained staff, or restrictions on pain relief medicines.

Still, progress is being made. Organisations such as the Worldwide Hospice Palliative Care Alliance and national initiatives in countries like India and Uganda have developed community-based programmes that train local health workers and volunteers to provide care at home. These efforts show that compassion does not always depend on technology; sometimes, it simply requires presence and understanding.

The future of compassionate medicine



As people live longer and chronic diseases become more common, the need for palliative care will continue to grow. The next generation of doctors must view it not as a last resort but as a vital part of good medicine. Encouragingly, more medical schools are now including palliative care training, focusing not only on symptom management but also on empathy, communication, and cultural awareness.

For young people entering medicine, palliative care offers a chance to practise the art of healing in its purest form. It reminds us that being a doctor is not only about curing disease but about caring for the person who lives with it.

In a world so focused on cure, palliative care offers a quieter truth: healing and curing are not the same thing. Healing can still happen even when the body cannot recover. It appears in small mercies—the easing of pain, the shared laughter, the peace of being understood. As future healthcare professionals, embracing palliative care means embracing the full heart of medicine, the science of the body and the art of compassion. Because sometimes, the most meaningful act a doctor can offer is not to fix, but simply to be there.



Vaccine Hesitancy

By Awuradjoa FM

The term “vaccine hesitancy” describes delaying or refusing vaccines or accepting particular ones but not others, especially and even when they are available and recommended. It often stems from a range of factors such as mistrust, misinformation, and perceived risks and can be influenced by historical context, media and personal experiences.



There are multiple causes and contributing factors with misinformation and perceived risks being key components to doubt and fear towards vaccines. Through social media, the spread of inaccurate data and theories can fuel already skeptical minds and fear about vaccines and their efficiency. Unreliable sources often amplify misinformation and conspiracy theories that undermine public trust in medical and government authorities. A prime example could include the 1998 Andrew Wakefield statement, which addressed false claims that linked vaccines to causes of autism, now officially debunked. Whilst there are multiple illustrations across the internet, viral online posts have circulated, exaggerating side effects or claiming that vaccines are a part of government “control” plots. Propaganda such as this can also spark concerns about the potential side effects or effectiveness of vaccines. More recently, people have displayed fear over the belief that the COVID-19 vaccine contained the live virus or could harm those with a low immunity.

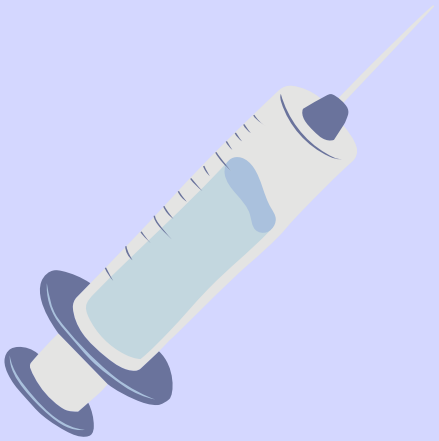
Distrust in authority

Distrust in authorities has also become one of the most significant barriers to vaccine uptake in healthcare today, as many often question the credibility of the communities responsible for public healthcare. Scepticism in governments, health organisations and pharmaceutical companies have statistically proven to be significantly associated with vaccine hesitancy. This wariness can stem from past events such as historical medical mistreatments of groups and the belief that authorities have ulterior motives.

A study from the UK showed that respondents with low trust in the government and low concern about COVID-19, were between 26-29% more hesitant than respondents that displayed higher trust and concern.

This dubiety can then cause people to lean into other, less credible sources of information, such as social media and informal networks with unreliable data.

A report published by NHS England titled “Vaccination: race and religion belief” provided data that claimed that “it had been theorised that vaccine hesitancy is primarily driven by a lack of trust in the medical profession due to historical discrimination, racist ideology and immoral experimentation on people of colour”. Vaccine hesitancy has caused the UK to lose its measles-free status in 2019, the common factor being inaccurate documentation provided by social media platforms and blogs. This is one of the few consequences of the falling rates of vaccinations as well as a recent measles outbreak in Europe and the U.S. after vaccination rates dipped below 95%.





Despite this, vaccine resistance has been a long-term issue, arising many centuries ago. Smallpox was one of the deadliest diseases in human history, millions of deaths rooting from it and leaving survivors with severe scarring. Its vaccine was developed in 1796 by Edward Jenner, however there are many objections, with people claiming that it was "unnatural" to inject material from cows into humans despite the fact that it was then proven to be the first disease in history to be eradicated by human intervention. This has since evolved into some of the doubts that is carried by humans now, with many fearing deformities or "contamination" by being injected with cow material. Onwards, religious objections emerged, that argued that vaccination interfered with divine will and natural order.

Today, similar patterns are reflected in people's mindsets with signs often including fear and misinformation. To tackle the issue of vaccine resistance today, transparency about vaccine development and approval is recommended and improvement to accessibility worldwide (such as drive-through vaccination centres that were opened during the COVID-19 pandemic) would help face internal barriers that people struggle with and more effort being made to counter misinformation effectively.

Ultimately, vaccine hesitancy reflects complex issues of trust, beliefs and access that many people face and by promoting accurate information, informed and transparent communication and collaboration between healthcare providers, we can ensure vaccines fulfil their life-saving potential.

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PubMed Central

Professional Grief Within Healthcare

By Hanushkha TV

Grief is universally recognized as a deeply personal experience tied to relationships, memories, and shared moments. When a loved one dies, it's natural to mourn, to feel the emptiness of absence. Yet in the world of medicine, grief often exists in a form that is less visible.



Professional grief is a distinct human experience. It occurs when doctors, nurses, and other clinicians mourn the loss of individuals they may barely know yet carry the emotional weight of those losses silently and continuously. Understanding professional grief is essential—not only for appreciating the humanity of healthcare workers but also for raising awareness about the emotional realities of life in the medical profession.

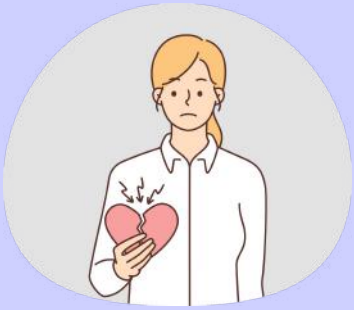
Personal grief and professional grief are very different. Personal attachment — inside jokes, shared experiences, the emotional bond — is the foundation of traditionally acknowledged personal grief. On the other hand, grief in the workplace is frequently felt due to an instinctive connection. Physicians may grieve patients they have only briefly treated or have had fleeting encounters with. Despite this, their grief is very real. It arises from human instinct, empathy, and a sense of responsibility to retain and preserve life.

There are various explanations as to why professional grief is felt so deeply: Neuroscience explains this through mirror neurons that activate when witnessing another person's suffering. This is why healthcare workers often experience emotional resonance with patients even without personal attachment. This shows that empathy is literally hardwired into our brains, so even brief moments of encounter or acts of care such as a simple touch or conversation can form micro-attachments that make loss meaningful.

Psychology explains professional grief through the concept of moral injury when the inability to retain a person's life clashes with a physician's sense of moral duty. The repeated exposure to these losses creates cumulative grief, layering losses over time, and reshaping emotional pathways in the brain. This often leads to desensitisation.

The demands of the profession require focus and functionality, and as a result this leads to suppression demanded by the culture of medicine, delaying processing. Some doctors report that grief surfaces later, in dreams. This delayed way of dealing with professional grief, along with the constant exposure to pain and death, can weigh heavily on them, even if it goes unnoticed by others.

Recognising professional grief is crucial, both for healthcare professionals and for society as a whole. Despite being widespread, it is often overlooked. Many assume that professional detachment negates grief, but this is far from true. Ignoring or invalidating professional grief can have serious consequences like emotional fatigue and moral decay.



Despite the challenges professional grief presents, it adds emotional depth to the role of a healthcare worker. Recognizing professional grief encourages discussions about mental health and support systems for healthcare workers. It is a silent burden, but one that shapes character, perspective, and professional identity. By giving professional grief recognition, society fosters empathy, strengthens healthcare systems, and honors emotional labor.

But professional grief should not remain as a silent burden. Institutions provide support by offering resources to tend to partitioners' mental health and promoting a culture of care for mental health. By acknowledging professional grief openly, healthcare systems not only protect the emotional well-being of clinicians but also strengthen the quality of care they provide. Society must recognize that healing the healers is as vital as healing the patients.


Technology

Viral vectors in gene therapy.

Gene therapy is vital for tackling hereditary diseases that are out of one's control, and this can aid those suffering by editing their genes to remove the faulty gene causing issues, or by delivering functional copies to the patient's cells. This can be done via numerous methods, but one that is being increasingly employed is the use of viral vectors, and these have shown potential to cure diseases that have troubled families for generations.

What is a viral vector?

A viral vector is a modified virus designed to deliver genetic material into cells, and this is applied in gene therapy to transport beneficial genomes into the patient by transduction, and this genome can be integrated into the patient's DNA. The benefits of using viral vectors for gene therapy is that it poses minimal immune responses which means that it is more suitable for usage especially when the area it is being used in is very delicate, such as the brain being the site of injection for gene therapy in Huntington's. However, if the body has already seen this virus before then it may be rejected by the immune system and targeted, diminishing the effects of the procedure as the DNA is destroyed.

There are many types of viral vectors that are used for different purposes, but most commonly adenoviruses are employed as these have a high and broad transduction efficiency, meaning that it can effectively deliver genetic material to the patient's cells, thus increasing success of the procedure.

Adeno-associated viruses (AAVs) are beneficial for their small quality and can be used in vitro (injected into the patient), and this means that it is useful for transporting smaller sections of genetic material to target areas of cells. Retroviruses are integrating viruses, meaning that the virus inserts a copy of its genome into the host cell that it invades, which changes the genome of the patient's cell as opposed to a non-integrating virus such as adenoviruses or AAVs which deliver genetic material to a cell's cytoplasm without inserting it into the host cell's genetic material. The effects of adenoviruses are short-term due to them being non-integrating, whereas retroviruses are integrating which can cause serious side effects as the virus can begin to transfer its own genetic material into the patient's cells, harming them.



	ADENOVIRUS	AAV	γ-RETROVIRUS
SIZE	~90-100 nm	~25 nm	~80-100 nm
GENOME	dsDNA	ssDNA	ssRNA
PACKAGING CAPACITY	~8 kb – 36 kb	~4.7 kb	10 kb
TRANSDUCTION	Dividing and non-dividing cells	Dividing and non-dividing cells	Dividing cells
TRANSDUCTION EFFICIENCY	High	Moderate	Moderate
INTEGRATION	Non-integrating	Non-integrating	Integrating
EXPRESSION	Transient	Transient or stable	Stable
BIOSAFETY LEVEL	BSL-2	BSL-1	BSL-2
IMMUNOGENICITY	High	Low	Moderate-High
GENE THERAPY STRATEGY	*In vivo*	*In vivo*	*Ex vivo*

What is Huntington's

Huntington's is a genetic disorder that is characterized by the progressive degeneration of nerve cells affecting movement, mental health, thinking capacity, and symptoms can include memory loss, issues with movement (such as standing, walking and tremors), and behavioural issues.

There is a large focus on this disorder in the genetic therapy field due to Huntington's being caused by a single known gene (huntingtin or HTT), meaning that it is a better condition to tackle at the beginning stages of gene therapy as it can help provide a model for understanding more complex disorders such as Parkinson's and Alzheimer's, which have many complex factors causing them – many of which are still unknown. Furthermore, the high 50% chance of a patient passing it onto their child means that it is an extremely prevalent disorder and affects many people. The focus for treatment is currently on management of symptoms alone, but with the use of AMT-130 gene therapy, scientists hope to find a way to cure this disorder instead of simply managing it.

What is AMT-130?

AMT-130 is a gene therapy utilising an adeno-associated virus vector carrying an artificial micro-RNA to silence the gene leading to a lowering of the HTT gene expression by recognising the HTT gene, binding to it and lowering the production of the HTT gene. The vectors are delivered directly into the deep brain structures via an MRI-guided neurosurgical procedure. AMT-130 has shown signs of slowing down the progression of Huntington's disease already in initial trials conducted by UniQure and shows great promise for the future of gene therapy for all neurodegenerative disorders.

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Human Stem Cells Reverse Aging in Monekys

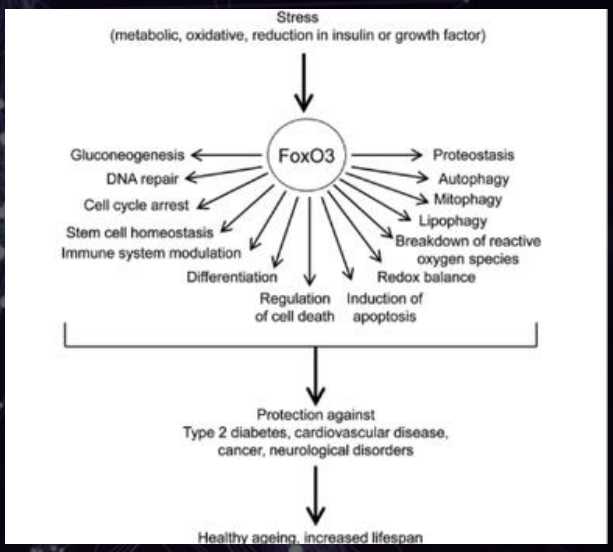
Chinese scientists have genetically engineered stem cells capable of rejuvenating the health, including the cognition, of aged macaques.

Adult stems cells play a crucial part in the growth and regeneration of our cells. When we are younger, our bodies are teeming with stem cells that are working hard to patch up and fix damaged tissues, rebuilding our body cell by cell. However, as we get older our bodies become riddled with inflammation, providing a far from ideal environment to keep our stem cells healthy. Eventually those stem cells lose their regenerative capacity, leading to degenerative aging.

Fox, O, Three

Hydra are a genus of small freshwater hydrozoans that live forever. The genus was named after the Hydra from Greek mythology, a many headed beast that was able to constantly regenerate its heads even after they were severed. Like its namesake, hydra are also able to regenerate severed parts of their body. Due to their impressive regenerative ability, they do not appear to die of old age or age at all, making them essentially immortal. This is because their stem cells can continuously proliferate and renew by producing FoxO, which is a protein they share with humans, though humans have far lower levels of it.





In humans, the FoxO protein, specifically the FoxO3 isoform, responds to cellular stress by binding to DNA and turning genes on and off. These genes are involved in numerous cellular processes that promote healthy aging and extended lifespan. This is why the FoxO3 protein's corresponding gene FOXO3 is considered a longevity gene.

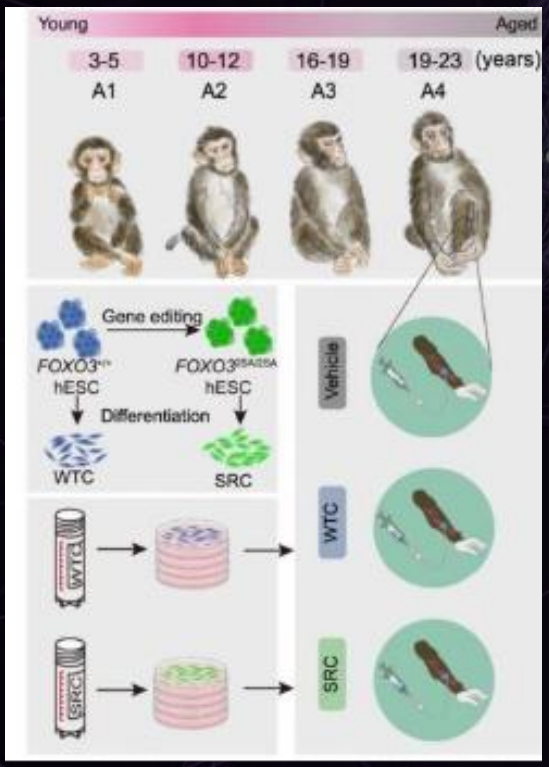
As FoxO3 assists cells in resisting stressful environments, such as inflamed tissue, researchers from the Chinese Academy of Sciences and Capital Medical University created a new type of human stem cell called senescence-resistant mesenchymal progenitor cells (SRCs) by engineering human stem cells to have enhanced FoxO3 activity. As published in Cell, the SRCs were designed to have a greater resistance to age related stress without developing tumours.

Experimenting with SRCs

To test the enhanced stress resilience of SRCs, the cells were tested on cynomolgus monkeys, also known as crab-eating macaques. First the monkeys were stratified into four groups based on age:

- A1: 3-5 years (approximately equivalent to 9-15 human years)
- A2: 10-12 years (approximately equivalent to 30-36 human years)
- A3: 16-19 years (approximately equivalent to 48-57 human years)
- A4: 19-23 years (approximately equivalent to 57-69 human years)

The oldest of the monkeys, the A4 group, were the focus of the study and were further subdivided into three groups. One group was injected with saline water, another group was injected with normal stem cells, and the third group was injected with SRCs. The research team conducted a 44-week experiment on the monkeys (approximately equivalent to 3 human years), where the macaques received biweekly intravenous injections of SRCs, with a dosage of 2×10^6 cells per kilogram of body weight. The researchers observed that the macaques did not experience any adverse effects, and after detailed assessments confirmed that the transplanted cells did not cause immune system rejection, tissue damage or tumours.



Results

The researchers examined 10 major physiological systems and 61 different types, and discovered that SRCs triggered a multi-system rejuvenation, reversing key markers of aging in over 50% of the 61 tissues examined, whereas the regular stem cells only rejuvenated 30% of the tissues examined.

The SRC treated macaques exhibited improved cognitive function, as well as a reduction in age related degenerative conditions such as brain atrophy, osteoporosis, fibrosis and lipid buildup, fortified skeletal structure and restored reproductive vigour.

On a cellular level, the SRCs reduced the number of senescent cells (cells that have stopped dividing but remain in the body, rather than dying off), reduced inflammation, and increased the number of progenitor cells (stem cells with a limited number of divisions) in neural and reproductive tissues.

SRCs Improve Cognition

After the 44 weeks of SRC injections, a suite of biological indices was measured from the aged monkeys to see whether SRCs slow down biological aging. One of these indices was memory retention. To test this, the researchers conducted a common experiment called Wisconsin General Test Apparatus (WGTA). In this experiment they trained each monkey to retrieve food located outside one of two identical boxes. During the test session after each monkey was tested, they placed food next to one of the boxes and then covered it up with a flap to block the boxes from the monkeys' view. When the flap was reopened three seconds later, each monkey had to remember which box contained the food. Remarkably the monkey injected with SRCs remembered the location of the food with greater accuracy than the monkeys injected with saline. Furthermore, the monkeys injected with normal stem cells, exhibited the same level of accuracy as the monkeys injected with saline, suggesting the only the SRC, not normal stem cells, improved the memory of the aged monkeys.

In addition, MRI based experiments showed that the SRC treatment mitigated age related brain shrinkage and restored the brain connectivity of the older monkeys to that of the young (A1) monkeys. These findings suggested that SRC treatments improved memory by protecting against neurodegeneration, which could reduce the risk of neurodegenerative diseases like Alzheimer's and Parkinson's.



SRCs Rejuvenate Many Organs and Tissues

In addition to the brain, researchers found that SRC treatments rejuvenated many other organs and tissues, which is important as this could reduce the risk of those corresponding age-related chronic diseases. For example, a common age-related disease is osteoporosis, characterised by brittle and weak bones that make patients more prone to broken bones and deadly falls. This is caused by the degeneration of bone tissue. However, after using an x-ray on the treated monkeys, researchers found evidence for the reversal of age-related bone loss, where the SRC treated aged monkeys had increased bone density and had teeth more similar to those of young monkeys, while the aged monkeys treated with saline had exhibited dental bone loss.

Researchers also observed other structural changes to organs and tissues such as improvements in the vascularity of the lungs and heart, reduction in the thickening of the aorta, longer projections in neurons and fewer proteins associated with Alzheimer's disease, and less mineralisation (unwanted mineral deposit) in the kidney and brain.

What could this lead to?

Although crab-eating macaques are closely to related humans, bringing SRCs to clinical trials and testing them in humans poses multiple challenges and is not yet viable. The long-term effects of the stem cells still need to be evaluated, and we do not know how well they will perform in humans especially with the diverse genetics and lifestyles within our species. However, the results of this study are proof of a groundbreaking possibility. It is possible, that in the near future, we will be able to combat aging and age- related diseases, potentially saving global healthcare systems from spending trillions on these conditions, allowing them to invest in other important parts of healthcare. It could also lead to people living longer and healthier lives, where aging is no longer a reason to give up on exciting lifestyles.

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CRISPR-Cas9 Gene Editing

CRISPR-Cas9 represents one of the most significant advances in modern biology, providing a method of altering DNA with unprecedented precision, speed, and relative ease. While it is often touted as a game-changing medical tool, its basics are surprisingly intuitive. CRISPR-a name given to an acronym for Clustered Regularly Interspaced Short Palindromic Repeats-was first discovered in bacteria. These patterns of repeating DNA serve as a kind of genetic history of viral infections, enabling a bacterium to remember a virus to which it has previously been exposed and defend against it. Adjacent to these repeats is Cas9, a DNA-cutting protein. In combination, CRISPR and Cas9 constitute a defence mechanism that enables bacteria to fend off a viral attack.

Shortly thereafter, scientists realized this simple bacterial mechanism could be converted into a powerful technology. At the heart of the CRISPR-Cas9 gene-editing technique exists a small piece of RNA, referred to as guide RNA (gRNA). This gRNA is designed to match a specific DNA sequence inside a cell. When the guide RNA is paired with the Cas9 protein, it directs Cas9 to the target that has been chosen. Cas9 cuts both strands of DNA at that location, creating a double-strand break. This cut initiates the cell's natural processes of repairing DNA, and these processes provide the basis for gene editing.

The repair pathways work in two major ways. The first, NHEJ, rapidly joins the broken DNA ends but often introduces small mistakes into the DNA. These might perturb a gene and thus turn it off. The second pathway, HDR, uses a matching DNA template to fix the break accurately. If researchers provide their own custom-made template, the cell can introduce new or corrected genetic information into the repair. That is how CRISPR-Cas9 can delete, correct, or insert selected genes and has become one of the most versatile genetic tools ever invented.

The medical possibilities behind the CRISPR-Cas9 technique are enormous. It is being researched for treatments of single-gene disorders such as sickle cell disease and some inherited forms of blindness. CRISPR may be able to treat such diseases at their root cause rather than just alleviate symptoms, by repairing the underlying mutation. Cancer researchers are genetically engineering immune cells capable of recognizing and destroying cancer cells. There is also work underway that will exploit how CRISPR could destroy viral genomes that reside inside the cells they infect and perhaps provide future therapies for viral diseases. In regenerative medicine, the engineered stem cells may one day create tissues resistant to injury or disease.

These strengths of CRISPR help explain why it has revolutionized molecular biology. First, it is more precise and efficient compared to the older gene-editing methods such as zinc finger nucleases and TALENs. The design of CRISPR is very simple: to change its target, the sequence of guide RNA only needs to be changed rather than redesigning whole proteins. It is also inexpensive, meaning that labs around the world can obtain access to it and experiment with it. Because of its accessibility, CRISPR has spread across fields very fast, from agriculture to biomedical research.

But the more scientists have learned about CRISPR, the more they realize that complex challenges and limitations exist. One of the biggest concerns is something called off-target effects, in which Cas9 cuts DNA at places that resemble the target sequences but are not identical to it. Such unintended edits could disrupt vital genes or introduce damaging mutations. There is also the problem of how CRISPR gets to the right cells within the body. Reaching some tissues is hard, and not all methods of delivery-for example, viral vectors-are equally safe or effective. Because Cas9 is a bacterial protein, some people may have immune reactions that limit the effectiveness and safety of treatment.

The ethical questions posed by CRISPR, however, are even more complex. Editing somatic cells-the ones that affect only the treated individual-is generally considered acceptable when done responsibly. But editing germline cells-those which pass genetic information to future generations-raises difficult moral and social questions. While germline editing could forestall inherited diseases, it could also alter traits passed through entire family lines. Worries about unequal access and misuse abound, and such a process could also create long-term genetic changes in ways that scientists are not yet able to predict. Because of these uncertainties, many researchers are in favour of strict international regulations and continuing public debate.

As CRISPR technology improves, novel forms of editing have emerged. Base editing enables scientists to change individual DNA letters without cutting the DNA strand at all. Prime editing is an even more advanced technique in which a modified Cas9 pairs with a reverse transcriptase enzyme to rewrite DNA in a breathtakingly accurate way. Researchers are also studying variants of the Cas proteins with different properties in terms of cutting, investigating the DNA–protein interactions at an atomic level, and exploring ways in which the repair pathways could be directed or controlled. These move CRISPR from being a simple biological tool into a complex system of molecular engineering. In short, CRISPR-Cas9 went from a simple bacterial defence mechanism-very understandable using basic ideas of molecular biology-to the extra layers developed through research, becoming very scientifically and ethically complex. It stands at a crossroads of possibility-capable of transforming medicine, reshaping biotechnology, and even our notion of inheritance and disease-but its power calls for responsibility, caution, and thoughtful regulation. The journey of CRISPR-from its simple natural mechanism to an elaborate, far-reaching technology-is a story not just about scientific progress but also humanity's struggle in handling that progress intelligently.

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AI in vetenary medicine

You might've come across stories of AI drafting papers, making pictures, or winning chess games against people. Yet you have not realised it is now getting good at spotting when a dog feels off, aiding horses that struggle to walk, or tackling tumours in our pets who we care about deeply. Step into today's vet clinics this is not futuristic dreaming anymore; tech tools are becoming just another everyday instrument vets rely on.

Diagnosing with Data:

One big thrill with AI shows up in how we scan bodies for sickness. Much like people docs do, animal doctors lean on X-rays, sonograms, or MRI shots to peek under the skin of pets. However, making sense of those pictures means loads of practice plus serious focus.

AI systems learn from heaps of pictures, then help like a turbocharged helper. When looking at an x-ray, they spot things fast - a small crack in bone, first hints of stiff joints, even a shadowy lump in lungs - that a rushed vet could overlook. Not swapping out the vet, just handing them a sharper way to see issues quicker and clearer. Pets end up getting care that is smarter, sooner.

The Early Warning System: Predicting Illness Before Symptoms Appear:

Imagine your vet spotting signs your dog might get diabetes - even before it starts guzzling water or shedding pounds. Thanks to smart tech, that is now possible. Instead of guessing, computers study loads of details like breed, how old the dog is, size, past checkups - then spot hidden trends. That way, they can warn about health issues ahead of time.

Devices you strap on pets for example collars that log movement and rest shoot live updates straight into the system. When an energetic pup goes quiet outta nowhere, the software flags both owner and vet, sparking early visits well ahead of big problems.

Personalising Pet Care:

Some remedies do not fit all creatures. Yet, smart tech is pushing pet care into tailored solutions. With genetic data in hand, computers aid doctors in spotting health issues and picking drugs that suit one animal best. So, reactions drop, healing improves, outcomes get better.

The Virtual Vet Assistant: 24/7 Support:

Ever typed "why's my cat hacking nonstop in the middle of the night?" into a search bar? These days, smart bots built with machine learning offer quick first-step guidance. Instead of guessing, they run through symptom checklists figuring out whether you should just watch things or sprint to an open-all-night vet clinic. Less stress hits pet parents. Clinics are not overwhelmed by unsure callers needing urgent answers.

The Human Touch is Still number one:

When people chat about AI and all its new advancements, you might ask can robots take over vet jobs? Nope, not really. Think of artificial brains as helpers, not stand-ins. They sort facts fast, yet they cannot calm a trembling pet, share tough news gently with stressed owners, or handle tricky operations. The kindness, gut feeling, or steady touch of a vet can't be swapped out. Picture AI like the sharpest tool around, one that backs them up when things get tough.

The future of vet care? It is teamwork - where AI walks side by side with that deep connection between people and pets. Next time you bring your animal in for a visit, think this: some quiet AI could be running things under the surface, helping your friend stay strong and feeling good long term.



Lily S

Gene Editing

Gene editing is a type of genetic engineering which alters an organism's DNA to add, delete or replace a gene. It specifically targets a location in the genome. This can eitherr be used within gene therapy or to replace a faulty gene in order to treat genetic disorders. Although we mostly hear about gene editing in humans, it can be used in other animals and plants as well.

THE HISTORY OF CRISPR GENE EDITING TECHNOLOGY:

CRISPR gene editing was discovered in 2005, after CRISPR being identified within bacteria in the 1980s, and ever since, it has improved medicine across many areas of illness and disease. For example, it has developed cancer treatements and has aided animals in becoming resistant to certain diseases. before I move on, I would like to clarify that CRISPR stands for: clustered regularly interspaced short palindromic repeats. Firstly, in 2005, Doudna and Charpentier had a massive breakthrough, which led to them developing the building blocks for the CRISPR-Cas9 gene editing system! They identified the most important factors of the system, such as the RNA molecule (which guides the Cas9 protein to a specific target DNA sequence). These specific components are what make CRISPR gene editing so precise! Due to this discovery, not only can CRISPR gene editing be used in medicine, but also in agriculture, as well as research and biotechnology.

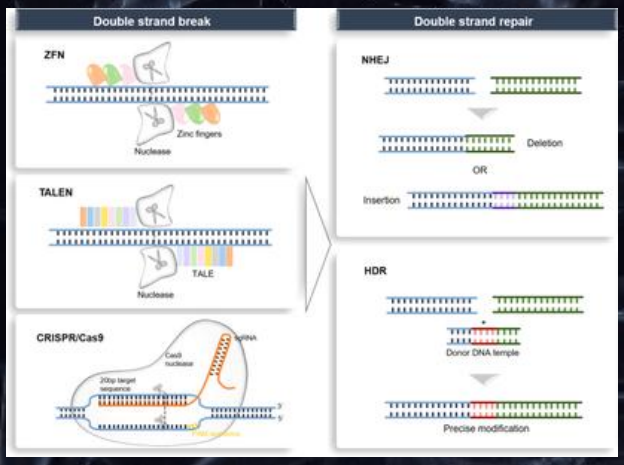
WHAT CAN GENE EDITING BE USED FOR?

To treat human embryos, Alzheimer's disease, Schizophrenia, type 2 diabetes, coronary artery disease, major depressive disorder, cystic fibrosis, cancer, sickle cell disease and many more.

WHAT CAN GENE EDITING BE USED FOR IN THE FUTURE?

Despite there being no current cure, gene editing is very likely to be a part of curing Alzheimer's! Additionally, due to the CRISPR tool, gene editing can now be performed with incredible precision, so scientists have many aspirations for the future, including development in new drugs and cancer treatment.

HOW IS GENE EDITING DONE



ACHIEVEMENTS MADE IN GENE EDITING (USING THE CRISPR TOOL):

The CRISPR technology has helped to made modifying genes an efficient and precise process CRISPR can be used to treat genetic diseases, which without this technology, many would still be suffering from today, without hope CRISPR is being used to treat the symptoms of; sickle cell anemia, cystic fibrosis, muscular dystrophy, and will hopefully cure these genetic diseases one day! This is achieved by editing the genetic mutations which caused these diseases CRISPR can be used in cancer therapies, and is being used to research its possible advancements in modifying genes involved in cancer progression in order to defeat cancer once and for all!

DRAWBACKS TO THE CRISPR TECHNOLOGY:

As with all recent medical advancements, there are ethical concerns, such as concerns about creating designer babies and unforeseen consequences and the safety of using this technology What are the long term affects? Only people with high socioeconomic status will be able to access this technology - but doesn't everyone deserve it? How could the environment and agriculture be affected by gene editing? We are yet to find out… Can gene editing be used as a weapon? Due to gene editing, pathogens can be created, or organisms modified, but how to we know who to trust to use these skills for the right reasons?

Elizabeth C

FOR WIDER READING

https://eu.idtdna.com/page/support-and-education/decoded-plus/crispr-cas9-whatare-the-10-pros-and-7-cons/ https://www.who.int/health-topics/human-genome-editing#tab=tab_1
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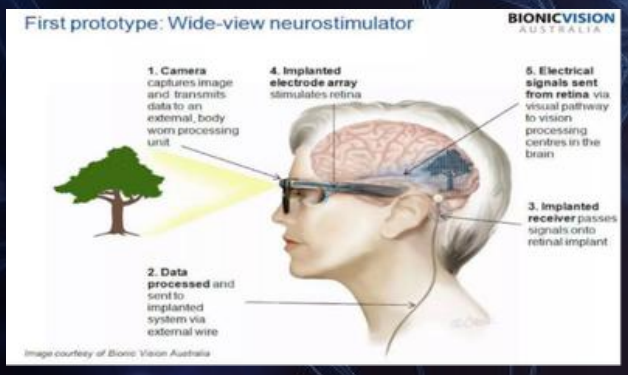
Bionic Eyes and how they are changing lives

Introduction

Imagine, you wake up in a world completely engulfed in darkness – a life that's all you've ever known – then one day, you see light again. However, not through your biological eye, but through a tiny, smart device that transfers information directly to your brain. With nearly 40 million people suffering from blindness worldwide and another 135 million affected by low vision, according to the World Health Organization (WHO), the need for new solutions is pressing. Could bionic eye technology lead the way? I know what you may be thinking, such amazing technology is too futuristically advanced to be within our reach, but I assure you, this is no science fiction. This is the promise of bionic eyes.

What are bionic eyes and how do they work?

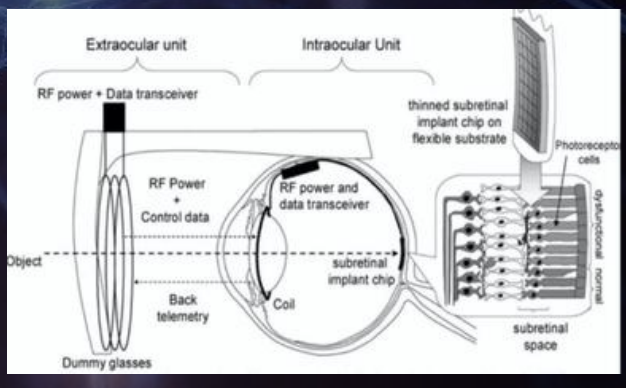
Well to start, the retina located at the back of the eyeball is the light sensitive part of the eye which contain light sensitive cells (rods and cons). These photoreceptors receive visual stimuli and transmit them to the brain through the optic nerve bundle. However, visual impairments occur when part of this system is interrupted, often by degenerative diseases which damage parts of the retina. This where technology steps in to bridge the gaps in the part of the damaged process. The first prototype bionic eye consists of a tiny eyeglasses-mounted camera and a transmitter that wirelessly sends signals (high frequency radio waves) to an electrode array that is implanted as a microchip onto the damaged retina of a blind person (for visual representation see Figure.1 and Figure.2). These electrical impulses stimulate cells in the retina that connect to the optic nerve. The impulses are then passed down along the optic nerve to the visual cortex of the brain, where they are interpreted as an image.



Current Applications and Research Development

In 2009, surgeons at Manchester and Moorfields hospital, UK, delivered the world's first trial of the Argus II bionic eye to patients with Retinitis Pigmentosa, according to the University of Manchester. They implanted the devices into ten patients with sight loss. The Argus II helped patients recognize shapes and patterns, and in 2013, the U.S. Food and Drug Administration legally approved the device for use. The first ever patient to receive this bionic eye treatment was a grandfather named Keith Hayman in 2009, according to the Association of Optometrists. He was in his 20s when he was diagnosed with retinitis pigmentosa and went blind several years later. After being fitted with the bionic eye at Manchester Royal Eye Hospital, he was able to see the difference between light and dark and could detect people moving. He said: "It means I can see my grandchildren for the first time. When they come round to see me they wear white t-shirts to help me keep an eye on them. I couldn't tell you much about what they look like, but at least I can see them coming now!"

Bionic eye technology has continued to develop since then and in 2021, researchers at Keck School of USC created an advanced computer model to mimic the human retina. This replicates the shapes and positions of millions of nerve cells and could help bring colour vision and improved clarity to the technology. Furthermore, scientists at the university of Sydney and UNSW recently carried out successful trials of the Phoenix99 bionic eye on sheep to study how the tissue heals when it is implanted with the device. The researchers confirmed that there were no unexpected side effects and that the implants could safely remain in place for many years without replacement, therefore, the device will likely go on to human trials soon.



Who can benefit from bionic eyes?

A simple screening session can help a doctor determine who will benefit from bionic eyes. Those most likely to benefit from our current bionic eye technology are middle aged or elderly individuals with very poor vision due to conditions such as:
Age-related macular degeneration (AMD). Causes degeneration of the macula, the part responsible for central vision
Retinitis pigmentosa (RP).5 A group of genetic diseases that destroys photoreceptors (rods and cones)
Choroideremia. A genetic condition that causes progressive degeneration of retinal cell layers like the choroid, retinal pigment epithelium or RPE, and the photoreceptors

Pros Cons and the Future of vision restoration

Advantages:

Ability to perform visual tasks demonstrated in many patients
Upgradeable external hardware and software to benefit from future innovation
It can be easily implanted
Quality of life improved for the patient
The brain has an amazing ability to adapt to new input and improve understanding of what is being seen via an artificial vision system

Disadvantages/Limitations:

Doesn't restore 100% vision due to the limitation in microelectrode density, as of current
They cannot restore vision for people with completely degenerated retinal cell layers.
Bionic eyes cannot perceive colour. Users can only see images in black and white.
The surgery is quite expensive. For example, the Argus II system may cost around $115,000 to 150,000.
A non-functioning bionic system can cause medical complications or interfere with procedures such as MRI scans.
There is always a risk of infection due to surgery.

What's in store for the future?

As scientists continue to explore the full potential of bionic eyes, future implants may be able to restore vision regardless of cause, for example, the Orion Visual Cortical Prosthesis System is being designed to completely bypass the damaged eye and connect directly to the brain. Other components, such as the camera function, can also be improved to provide users with the best resolution – increasing the number of microelectrodes can improve vision clarity. For example, incorporating the zoom function, thermal sensitivity, and other intelligent functions already in use in other areas can improve how bionic eyes work in the future. Scientists are also exploring alternatives to bionic eyes, such as cortical devices and biological therapies, which may compete with bionic eyes regarding safety and effectiveness. Advances in AI and nanotechnology may soon allow for full-colour, high-resolution vision — or even enhancements beyond normal human capability.

Conclusion

Bionic eyes may not yet restore full vision, but they open a door – from complete darkness to a world of light and shape. And for many, that glimpse is more than enough to change everything.

Oyindamola A

Mind Meets Machine: The Rise of Brain–Computer interface

Imagine a neural implant that captures every glance, every word, every memory, and lets you watch your life over and over; that's the chilling premise of the series Black Mirror's "The Entire History of You". At first, it seems like a dream: a perfect recall of every moment in your life. But soon, the technology exposes obsessions, paranoia, and the fragility of human relationships. What if this kind of "fictional" brain implant wasn't so far away? Advances in neuroscience and bioengineering suggest that what once seemed pure science fiction may actually be closer to reality than we think.

And the implications are only beginning to unfold.

In Black Mirror's "The Entire History of You", a tiny neural implant records every sight, sound, and event, letting the user replay memories on demand. The technology reveals uncomfortable truths about relationships and trust. In real life, brain-computer interfaces (BCIs) are not designed to replay memories, but they do share one fundamental similarity: they connect the brain directly to a device.

Although dramatised, the story mirrors growing concerns in the real world. The prospect of directly controlling devices with the human brain has long mesmerised the human race and has been a leading topic of both science and science fiction. Brain-computer interfaces (BCIs) and neural implants promise remarkable potential, yet they also raise critical questions about privacy, autonomy, and psychological well-being. Who owns the intimate data generated by an implant? Could constant access to one's own neural activity worsen a person's anxiety, paranoia, or obsessive behaviours? Countless science fiction scenarios highlight potential risks, while real-world research explores ethical and safety considerations. While fictional representations exaggerate the consequences, recent technological advancements suggest that brain-computer interfaces are advancing at an unprecedented rate.

CURRENT BCI TECHNOLOGIES AND CLINICAL APPLICATIONS

Brain-computer interfaces are devices that decode neural signals and translate them into commands to control external devices, often allowing direct communication between the brain and technology. They are used in various fields, particularly in medicine and computer science, to assist individuals with severe disabilities and to support rehabilitation after strokes. Companies such as Neuralink, Synchron, Blackrock Neurotech, and Open Bionics are at the forefront of developing such devices.

BCIs can be categorised as invasive or non-invasive. Invasive BCIs involve surgically implanting electrodes directly into brain tissue, allowing for highly precise neural recordings. For example, the Utah array, a tiny chip inserted into the motor cortex, records the electrical activity of individual neurons. While invasive BCIs offer high accuracy, they carry surgical risks.

Non-invasive BCIs are placed outside the skull. Electroencephalography (EEG), for instance, measures electrical activity using sensors attached to the scalp. Though less precise, non-invasive BCIs are safer and more accessible. Recently, companies like Synchron have developed minimally invasive devices inserted through blood vessels, reducing the need for open brain surgery. These developments demonstrate how BCIs are becoming more clinically viable and less intrusive.

NOTABLE BREAKTHROUGHS

In 2016, a swimming accident left Noland Arbaugh paralysed from the shoulders down due to a severe spinal cord injury. For years, he relied on assistive technologies. In January 2024, he became the first person to receive a Neuralink brain implant. The procedure involved implanting a coin-sized device into his brain, designed to interpret neural signals and translate them into digital commands. Following the surgery, Arbaugh was able to control a computer cursor using only his thoughts, marking a significant milestone in the development of brain-computer interface technology.

Anvesha G

AI in Healthcare and its Potential Risks and Benefits

Should artificial intelligence be allowed to make diagnostic decisions without human oversight?

Medicine is changing fast. Most hospitals today employ diagnostic algorithms that can read images, flag abnormal labs, and prioritize urgent cases. Too often, studies and pilot programs report improvements: for certain tasks, automated systems increase sensitivity by 5–20% while reducing reporting time by 30–70%. But these figures sit alongside worrying findings: in multiple studies, error rates for uncommon or under-represented patient groups were two to four times higher than for majority groups. These mixed statistics mean we must weigh benefits and harms with concrete evidence, not rhetoric.

Automated tools can be very fast and accurate on average. In large retrospective tests, with more than 10,000 images, some systems have matched or even outperformed the sensitivity of radiologists; areas under the curve values are often reported between 0.85 and 0.97. Efficiency gains are measurable: triage delays fall from hours to minutes, and routine screening turnarounds can drop by half. In settings where specialists are few, that speed can translate into earlier treatment and plausibly better outcomes for many patients.

But averages mask variation at the margins, and when algorithms are confronted with data that differ from their training sets—rarer diseases, different imaging machines, or patients from ethnic groups underrepresented in the dataset—performance can fall sharply. Various studies report false negative rates increasing from, for instance, 2% in a majority cohort to 6–8% in a minority cohort. Even when the overall false negative rate is low, increases of this magnitude in specific subgroups can cause significant harm when scaled across health systems.

There are also operational risks: when clinicians rely on automated outputs without careful review, diagnostic skills can atrophy; several observational studies and surveys have reported that 30-50% of clinicians acknowledge increased dependence on algorithmic suggestions in routine practice. Procurement and legal frameworks are often unclear: in many systems, vendor contracts and service agreements leave liability poorly defined, creating the possibility that patients harmed by an erroneous diagnosis may have limited avenues for redress.

These considerations suggest a prudent policy approach. First, maintain clinician sign-off for final diagnoses: require that a qualified clinician review and sign off any diagnosis which will change treatment, with automated flags serving as decision support rather than final verdicts.

Second, run controlled pilots before wider deployment: prospective trials with predefined safety endpoints and independent monitoring should precede full autonomy in any diagnostic role.

Third, mandate continuous performance monitoring with disclosure: systems must report accuracy, sensitivity, specificity, and error rates stratified by age, sex, ethnicity, and device type at regular intervals.

Fourth, clarify accountability: contracts and regulations should clarify who is legally responsible when an automated decision contributes to harm, and institutions should maintain incident logs, including time-to-detection metrics.

Fifth, require explain ability and communication tools: systems should display uncertainty estimates, such as confidence intervals or probability scores, along with concise rationales so that clinicians can explain the basis of a flagged diagnosis to patients.

Sixth, invest in representative data: public funding or consortiums should enable curated datasets that include diverse populations and multiple device types, with routine external validation; aim for external validation cohorts of at least several thousand cases to allow reliable detection of subgroup disparities.

In short, statistics show clear potential: faster decisions, higher average sensitivity, and efficiency gains that can help stressed services. But they also show clear limits: subgroup error increases, deskilling risks, and legal ambiguity. The prudent course is conditional adoption — to use algorithms to assist, not replace clinicians; to require transparent, stratified performance reporting; and to relax oversight only when robust, prospectively gathered evidence demonstrates safety and equity. Until then, it is both practical and evidence based policy to keep a human clinician as the final arbiter.

Neeraja T

The Uses of Viruses in Medicine

Introduction

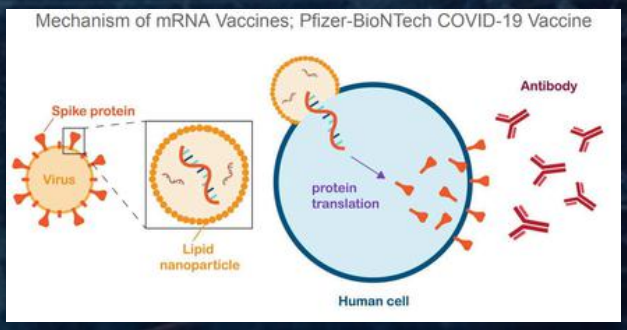
Viruses are traditionally considered as agents of devastating diseases, for example, the COVID-19 pandemic was caused by a viral pathogen. However, advances in biotechnology have manipulated them to be useful, particularly in medicine (1). Viruses have been used for a long time in vaccines, with the first being developed by Edward Jenner in 1796 to address smallpox (2). Their ability to enter cells and deliver their genetic material (a nucleic acid: DNA or RNA) allows them to be repurposed in gene therapy, cancer treatments, and bacteriophage therapy (3). This article explores the applications of viruses in therapeutic vaccines (with a focus on messenger RNA vaccines), viral vectors in gene therapy, bacteriophages to tackle antimicrobial resistance, and oncolytic viruses in cancer treatment.

Vaccines

Vaccines expose the immune system to a harmless form or component of a virus to generate artificial active immunity. Depending on the pathogen (a bacterium or virus) that is being targeted, different vaccine technologies are used to generate an effective response. In total, there are six different vaccine technology platforms (4):

- Live-attenuated vaccines contain live pathogens from either a bacterium or a virus that have been weakened.
- Inactivated vaccines a live pathogen is killed and is incapable of causing disease once injected.
- Subunit vaccines contain components, or antigens, rather than the entire pathogen.
- Toxoid vaccines induce an immune response to neutralise the toxins produced by bacteria.
- Viral vector vaccines use a harmless virus to deliver to the host's cells the gene that will produce the antigen, which will trigger an immune response.
- mRNA vaccines use a non-viral vector to carry mRNA to the host's cells

The Pfizer-BioNTech vaccine delivers a strand of synthetic, nucleoside-modified mRNA encoding the SARS-CoV-2 spike (S-2P) protein. Because mRNA is inherently unstable, it is packaged within lipid nanoparticles (LNPs), which protect it from degradation and facilitate entry into host cells. After intramuscular injection, the LNP-mRNA complex enters antigen-presenting cells via endocytosis. Once released into the cytoplasm, ribosomes translate the mRNA into spike protein. This antigen is then processed and displayed on MHC class I molecules, activating $CD8^+$ cytotoxic T cells, and on MHC class II molecules, stimulating $CD4^+$ helper T cells. In parallel, spike protein on the cell surface or released extracellularly is recognised by B-cell receptors, triggering the humoral response and the production of neutralising antibodies. The mRNA does not enter the nucleus, cannot interact with DNA, and is naturally degraded after protein synthesis (5).



Gene Therapy

Gene therapy aims to correct, silence, or replace faulty genes responsible for inherited conditions. Viruses are particularly effective delivery systems because they have naturally evolved to enter host cells and deposit their genetic material. By removing pathogenic viral genes and inserting therapeutic DNA, engineered viruses can act as targeted, efficient vectors. Several vector families are now used clinically or in advanced research stages:

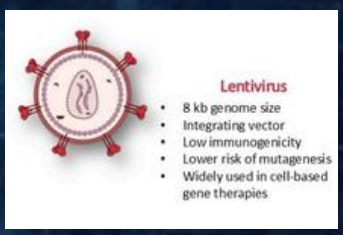
Adeno-associated viruses

(AAV) are non-pathogenic and have low immunogenicity (the ability to provoke an immune response). They persist mainly as episomes (a type of plasmid), which reduces the risk of insertional mutagenesis (where a foreign DNA sequence integrates into a host organism's genome, disrupting gene function).



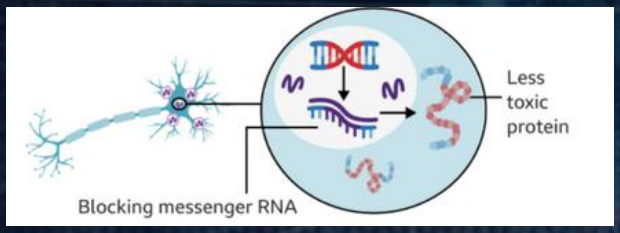
Their ability to mediate long-term gene expression makes them widely used in neurological and muscular disorders.
However, their small payload capacity (the size of the genetic material a vector can carry) limits use for larger genes.

Lentiviral vectors integrate into the host genome, allowing stable, long-term expression. This makes them suitable for blood and immune system diseases, where modified cells can self-renew. A limitation is potential insertional mutagenesis, although integrase-defective vectors (modified lentiviral vectors that cannot integrate due to an inactive integrase protein) substantially improve safety (6)



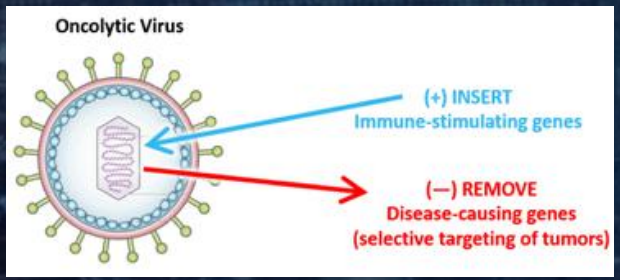
Huntington's Disease

Huntington's disease is caused by a CAG repeat expansion in the HTT gene, which produces a toxic mutant huntingtin protein. This leads to progressive neurodegeneration, particularly in the caudate nucleus and putamen, resulting in a combination of motor and cognitive symptoms. A promising therapeutic approach uses viral gene therapy. In this strategy, an AAV is engineered to carry DNA encoding a therapeutic microRNA. This vector is delivered directly into the brain via stereotactic neurosurgery, targeting the affected regions. Once inside neurons, the AAV delivers its DNA to the nucleus, prompting cells to produce microRNA molecules. These microRNAs bind to HTT mRNA, reducing levels of the harmful huntingtin protein. Early clinical results are encouraging: patients show approximately 75% slowing in disease progression, reductions in biomarkers of neuronal damage such as neurofilament light chain (a protein), and some improvements in movement and functional scores. This represents a significant step toward addressing the underlying cause of Huntington's disease, rather than treating its symptoms (7)



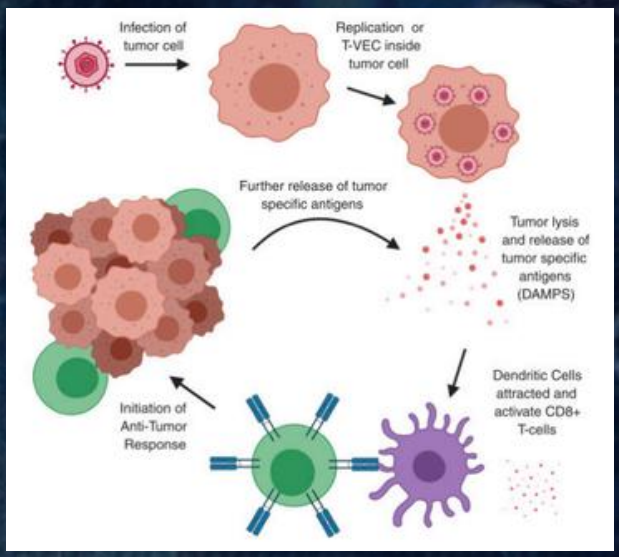
Cancer Treatment

Oncolytic viruses are an emerging form of immunotherapy that use viruses to selectively infect and destroy cancer cells. While certain viruses, such as hepatitis B virus and human papilloma virus, can contribute to cancer development, scientists have repurposed viruses to target already existing tumors. Cancer cells are often vulnerable because they have impaired antiviral defenses, making them susceptible to viral infection. Once an oncolytic virus infects a cancer cell, it replicates, causing the cell to burst and release tumor antigens. These antigens trigger an immune response that can attack any remaining cancer cells nearby, or even elsewhere in the body. Oncolytic viruses are modified to avoid infecting healthy cells, deliver therapeutic molecules directly to tumors, and stimulate the immune system (8).



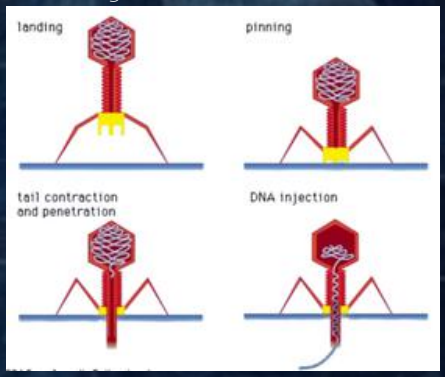
T-VEC (Talimogene laherparepvec)

T-VEC is a modified herpes simplex virus used to treat unresectable melanoma, a form of skin cancer that cannot be fully removed surgically. T-VEC is administered through direct injection into melanoma lesions in the skin, under the skin, or within lymph nodes. Once inside the tumor, the virus replicates within cancer cells, causing them to rupture and die. This releases tumor antigens and the immune-stimulating protein GM-CSF, which can activate the body's immune system to target remaining melanoma cells. T-VEC is primarily a local therapy, meaning it targets injected lesions rather than metastatic disease (9).



Phage Therapy

Bacteriophages, or phages, are viruses that specifically target and kill bacteria without affecting human cells. This specificity makes them particularly valuable in the fight against antimicrobial resistance (AMR), a serious global threat that limits our ability to treat bacterial infections. With new antibiotics often difficult and costly to develop, phage therapy offers a promising alternative for controlling antibiotic resistant bacterial infections (10). Once a phage attaches to a susceptible bacterial host, it can follow one of two replication strategies:

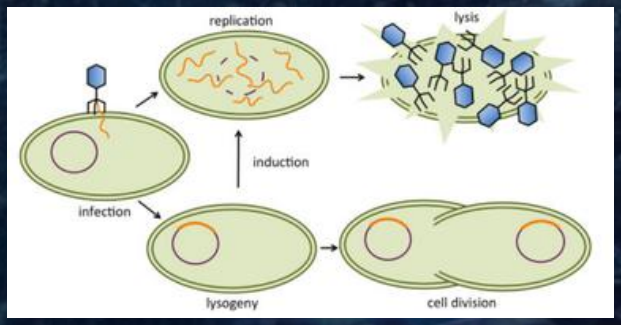


Lytic replication

- The phage injects its genome into the bacterial cell.
- It hijacks the host's machinery to produce viral proteins and replicate its genome.
- New phage particles assemble, and the host bacterium is lysed (destroyed), releasing phages to infect new bacteria.

Lysogenic replication

- The phage genome integrates into the bacterial chromosome or remains as a plasmid, becoming a prophage.
- The bacterium, now called a lysogen, continues to live and divide, passing the phage genome to daughter cells.
- Environmental triggers can later switch the phage to a lytic cycle, killing the host bacterium (11).



Despite its potential, phage therapy faces several challenges:

- Regulatory limitations: Especially in the EU, there are few guidelines for using phages in clinical or environmental settings, including water treatment, animal feed, and food processing.
- Personalised therapy hurdles: Effective treatment often requires identifying the patient's specific bacterial strain and matching it with suitable phages from well-maintained biobanks, which are currently limited.
- Public misconceptions: Phages are sometimes mistakenly seen as harmful human pathogens, highlighting the need for education about their safety and specificity (12).

Conclusion

Viruses, once regarded solely as harmful pathogens, are now being harnessed as powerful therapeutic tools across medicine. mRNA vaccines have transformed rapid, adaptable vaccine development, while viral vectors offer breakthrough potential for treating genetic disorders such as Huntington's disease. Phage therapy provides a targeted strategy against antimicrobial resistance, and oncolytic viruses illustrate how viral infection can be repurposed to fight cancer. Together, these innovations highlight how a deeper understanding of virology is driving some of the most significant advances in 21st-century medicine, turning our knowledge of viruses from a threat into a remarkable opportunity for human health.

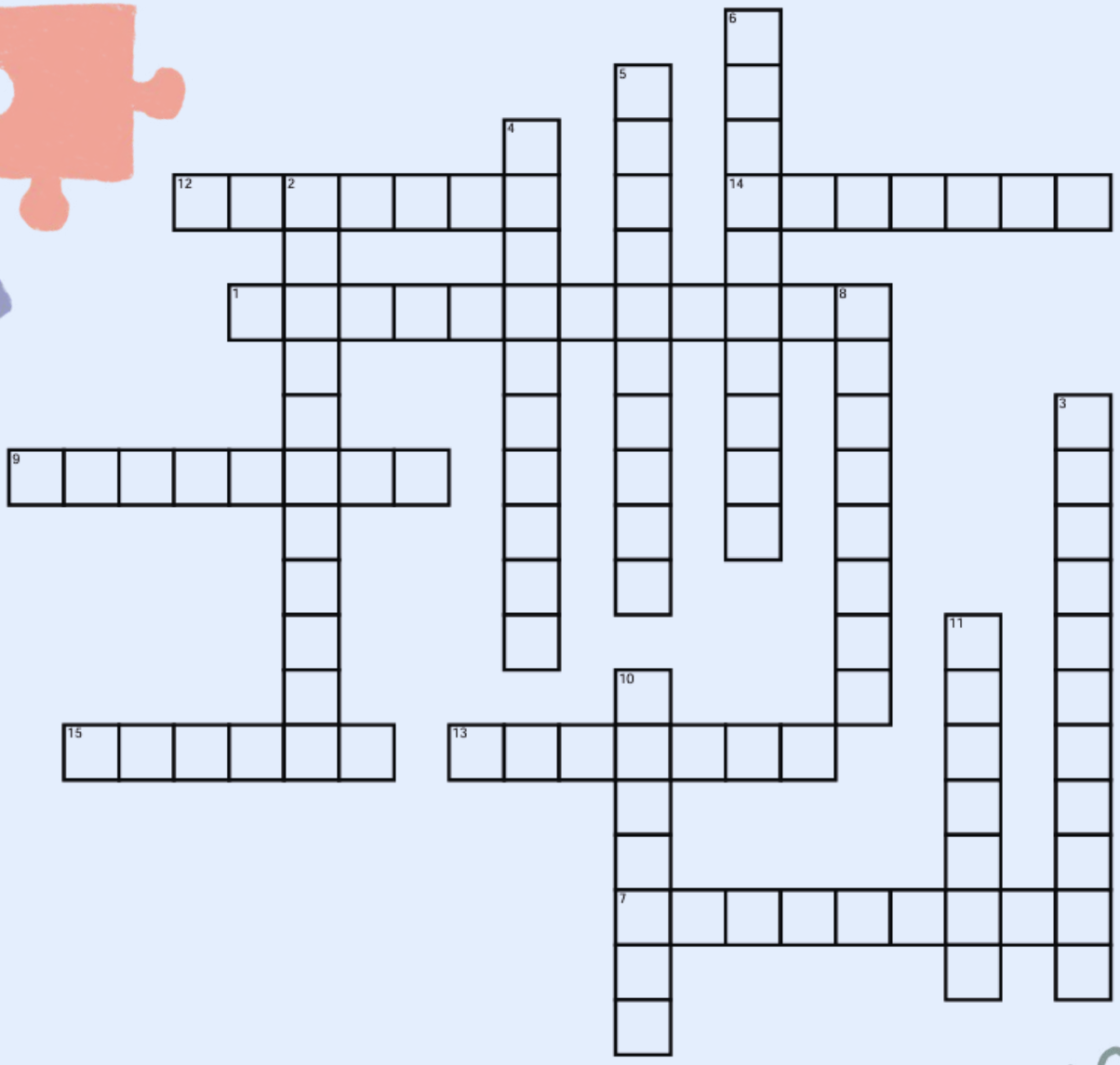
Rianna S

Reference List

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MediMag+ Crossword

Who doesn't love a good puzzle? See if you can put your problem-solving skills to the test and solve this crossword (answers are on the next page - no peeking!).



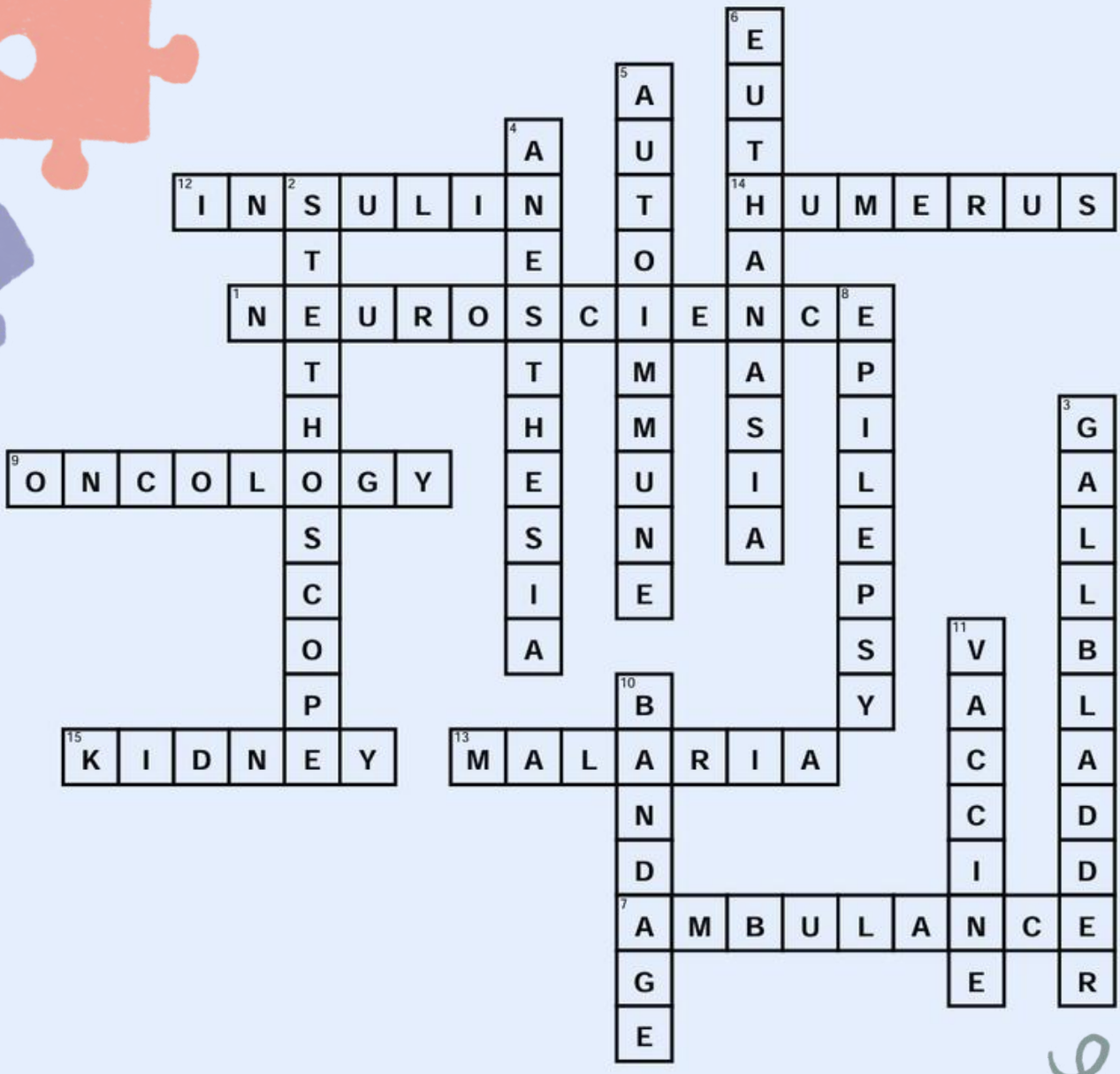
Across:

1. The scientific study of the nervous system (12)
7. Vehicle used for taking sick or injured people to the hospital (9)
9. The branch of medicine relating to the diagnosis, research and treatment of cancer (8)
12. A hormone used in the treatment of diabetes (7)
13. A disease which is transmitted by mosquitos (7)
14. The bone in the forearm which forms joints at the shoulder and elbow (7)
15. A vital organ responsible for filtration of the blood (6)

Down:

2. A medical instrument used for listening to someone's heart (11)
3. An organ which stores bile (11)
4. The loss of feeling or awareness due to specific drugs, usually before a surgical procedure (10)
5. A category of diseases where the body's immune system attacks its own cells (10)
6. The painless killing of a person or animal suffering from an incurable disease (10)
8. A chronic disorder relating to the brain causing recurrent seizures (8)
10. A strip of material used to bind up a wound or protect an injured part of the body (7)
11. A substance (usually injected) used to stimulate immunity to pathogens (7)

MediMag+ Crossword Answers



How many did you get?🤔

IT'S TIME TO START A NEW CHAPTER...



Edition 11 marks the time of the 2025 MediMag+ Editors coming to an end. All the contributions have been incredibly interesting, ranging from why we don't feel pain all the way to assisted dying! As the new year has rolled in, it's time to pass on the baton into the capable hands of the new editors, who will be revealed on the next page!

Thank you everyone for bringing so much enthusiasm and energy to the MediMag+ community and making it special for us. You've all brought so much creativity and diversity to the magazine - and that is what makes it so special. It's been such a fantastic experience working with each and every one of you to bring MediMag+ to life over the course of this year.
Wishing you all the very best for the future!

Signing off for the last time,
Your 2025 MediMag+ Editors,
Charvi K, Lakshana R, Manasvi B, Sachee K, Sansitha J

Your new editors



Aishani Srikanth

Evie Wakerly

Ishika Vashishth

Maryam Vaqas

PrAVEENA sAkthiVEL



