MediMag+

Edition 9

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Subjects: Chemistry, Biology, Maths, Psychology
Aspiration: Paediatrician
Editor's pick: How should medical professionals approach health inequality in the 21st century?

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Subjects: Chemistry, Biology, Maths, French
Aspiration: Surgeon
Editor's pick: The Charlie Gard Case: A Legal and Ethical Analysis

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Subjects: Chemistry, Biology, Maths, Physics
Aspiration: Cardiologist or Neurologist
Editor's pick: The Future of Neural Repair: Can we heal the brain like we heal the skin?

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Editor's pick: Under the Influence: Anaesthesia Explained

Sansitha J

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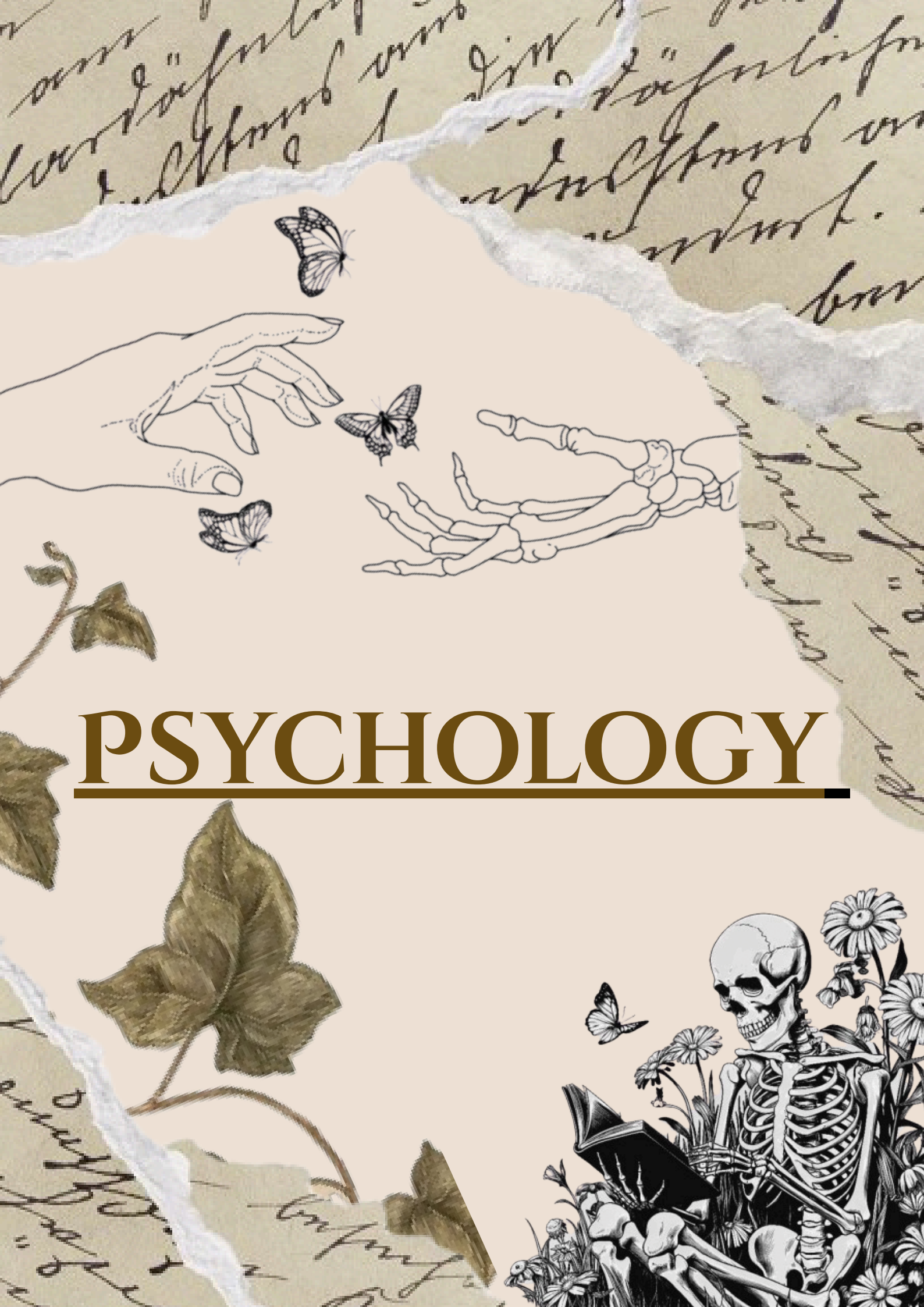
Aspiration: Psychiatrist or Dermatologist
Editor's pick: Chinese Medicine

contents


PSYCHOLOGY

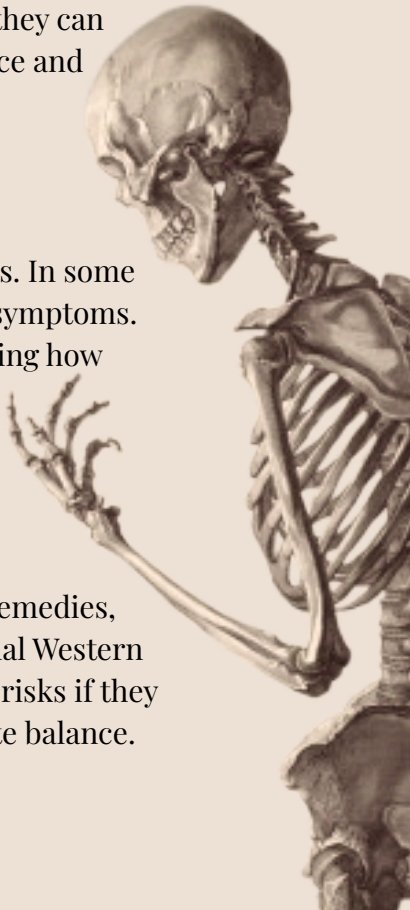
Cultural Psychology: Bridging Medicine and the Mind

In the ever-evolving field of medicine, understanding the intricate relationship between culture and psychology is crucial for providing holistic and effective healthcare. Cultural psychology, a field that explores how cultural contexts shape human behavior, cognition, and emotions, is increasingly recognized as an essential aspect of medical practice. The way people perceive illness, adhere to treatments, and seek medical help is deeply influenced by their cultural background. This article delves into the significance of cultural psychology in medicine, exploring how it enhances patient care, medical decision-making, and health outcomes.

The Role of Culture in Psychological and Medical Well-being

Culture is a powerful force that influences beliefs, traditions, and behaviors, all of which contribute to a person's overall well-being. Different cultures have distinct attitudes toward mental health, disease prevention, and medical interventions. For instance, in Western cultures, mental health issues such as depression and anxiety are increasingly recognized as medical conditions requiring professional treatment. However, in some Asian and African cultures, mental health problems may be perceived as a spiritual or moral imbalance rather than a medical issue, leading to reliance on traditional healers or religious practices instead of professional psychiatric care.

Understanding these cultural variations is essential for healthcare providers to offer culturally competent care. When doctors and psychologists take cultural beliefs into account, they can tailor treatment plans that align with patients' values, ultimately improving adherence and health outcomes.



Cultural Variations in Perception and Treatment of Illness

Different cultural groups interpret symptoms and medical conditions in unique ways. In some cultures, pain tolerance is seen as a virtue, leading individuals to underreport their symptoms. Conversely, in others, even mild symptoms may be expressed dramatically, influencing how healthcare professionals assess and diagnose conditions. These cultural differences in symptom expression have significant implications for medical decision-making, highlighting the need for practitioners to adopt culturally sensitive diagnostic approaches.

Additionally, traditional medicine plays a significant role in many societies. Herbal remedies, acupuncture, and spiritual healing are often used alongside or instead of conventional Western medicine. While some traditional practices have scientific backing, others may pose risks if they interact negatively with prescribed treatments. Physicians must navigate this delicate balance.

Cultural Competency in Healthcare: A Necessity, Not a Choice

To bridge the gap between cultural psychology and medicine, healthcare professionals must develop cultural competency—the ability to understand, respect, and respond appropriately to cultural differences. This includes being aware of language barriers, religious beliefs, dietary restrictions, and traditional healing practices that may impact a patient's healthcare decisions. Medical schools and hospitals worldwide are increasingly incorporating cultural competency training into their programs. By fostering an inclusive environment that acknowledges diverse cultural perspectives, medical professionals can build trust with their patients, leading to better communication, accurate diagnoses, and improved treatment adherence.

Conclusion

Cultural psychology is a vital component of modern medicine, shaping patient behavior, treatment approaches, and healthcare outcomes. By integrating cultural awareness into medical practice, healthcare providers can offer personalized and effective care that respects patients' diverse backgrounds. As medicine continues to globalize, embracing cultural psychology will be key to fostering a more inclusive and effective healthcare system.

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Lakshana R

Exploring the connection between the mind and the body.

Have you ever come across one of those wellness gurus who says things like ‘Your body hears everything your mind says’ and ‘the mind and body are not separate, what affects one affects the other’ and therefore you should buy their mind cleansing supplements? Well surprise surprise , they are right! (About the mind-body connection, not the supplements). In this article I will explore and explain to the best of my ability, cases where this mind-body relationship is relevant and some interesting potential remedies for the future.

The Placebo and Nocebo Effect

Often used in clinical trials, placebos are inert substances, e.g. sugar pills, that have no medicinal effect. The placebo effect occurs when there is a perceived improvement in patient condition after taking a placebo. But why does this work? As with many things in science, we are still unsure exactly how placebos work, but it could be linked to complex neurobiological reactions in the brain, or with chemicals like dopamine, where taking a placebo results in the endogenous release of such into the body. This has been particularly observed when test subjects take a placebo for an analgesic drug. Don’t get me wrong, a placebo won’t cure your cancer, but it has been linked to parts of the brain concerned with the way we perceive pain, meaning that even though placebos may not heal you, they may make you feel better.
Furthermore, it is quite difficult to properly assess the effects of a placebo since there is a very real danger of reporting bias in clinical studies. The placebo effect has a significant correlation with patients’ expectations.

Therefore, it is also worth talking about the Nocebo effect, which (you guessed it) occurs when patients experience adverse effects due to a placebo, which cannot be explained by the pharmacological properties of the placebo. This may be due to hearing negative feedback, watching others experience negative side effects due to the drug, or simply having negative expectations.

A psychosomatic disorder is a condition where psychological stresses and emotional factors lead to physical symptoms. These usually manifest in the form of stomach aches, respiratory issues, chest pain or chronic pain disorders. Psychosomatic disorders are particularly difficult to diagnose, as there is no apparent medical explanation. Patients may be told that 'It's all in their head' or that 'they're making it up for attention'. When diagnosed, psychosomatic disorders are treated by treating the psychological stress, thus alleviating the physical symptoms.

Psychogenic Non-Epileptic Seizures

Psychogenic Non-Epileptic Seizures are seizures that mimic epileptic seizures but are not due to abnormal brain activity, but rather to psychological reasons for example, anxiety, PTSD (Post-Traumatic Stress Disorder) or personality disorders. Because the seizures are outwardly extremely similar to epileptic seizures, they are often misdiagnosed. The best way to determine whether someone is having an epileptic seizure or a psychogenic non-epileptic one is to monitor the person with video ECG (Electrocardiogram) monitoring during the seizure. Just like psychosomatic disorders, the only way to effectively treat these seizures is to treat the underlying psychiatric or psychological problem, since the patient will not respond to an anti-seizure medication.

Exacerbation of already existing physical conditions

Furthermore, it goes without saying that physical symptoms can affect your mental health significantly. Chronic physical health problems, like endometriosis, fibromyalgia and IBS irritable bowel syndrome) can impact mental health especially when there is chronic pain and abnormal sleeping patterns involved. This in turn affects your physical health, potentially worsening your physical symptoms, in a cycle of pain and distress.

Research on Mind-Body Therapies (MBTs)

The has been a rise in interest in Mind-Body Therapies, which are based on psychosomatic medicine techniques, which emphasise the combined use of the body and the brain. Most of these therapies find their roots in yoga and mindfulness practices, tai chi, meditation, and acupuncture. Some of these therapies include (but are not limited to) positive psychology, hypnosis and breathe work and they aim to improve aspects of a person's mind like core mental ability, emotional regulation and hence, physical health

Conclusion

As more and more research is conducted concerning the reactions that intertwine the body and the mind, hopefully key findings will emerge that help the world to better understand these intricate connections and lead to breakthroughs in neurology, psychology and in mental health in general. But for now, the best advice, although it sounds cliche, is 'healthy mind, healthy body and healthy body, healthy mind'

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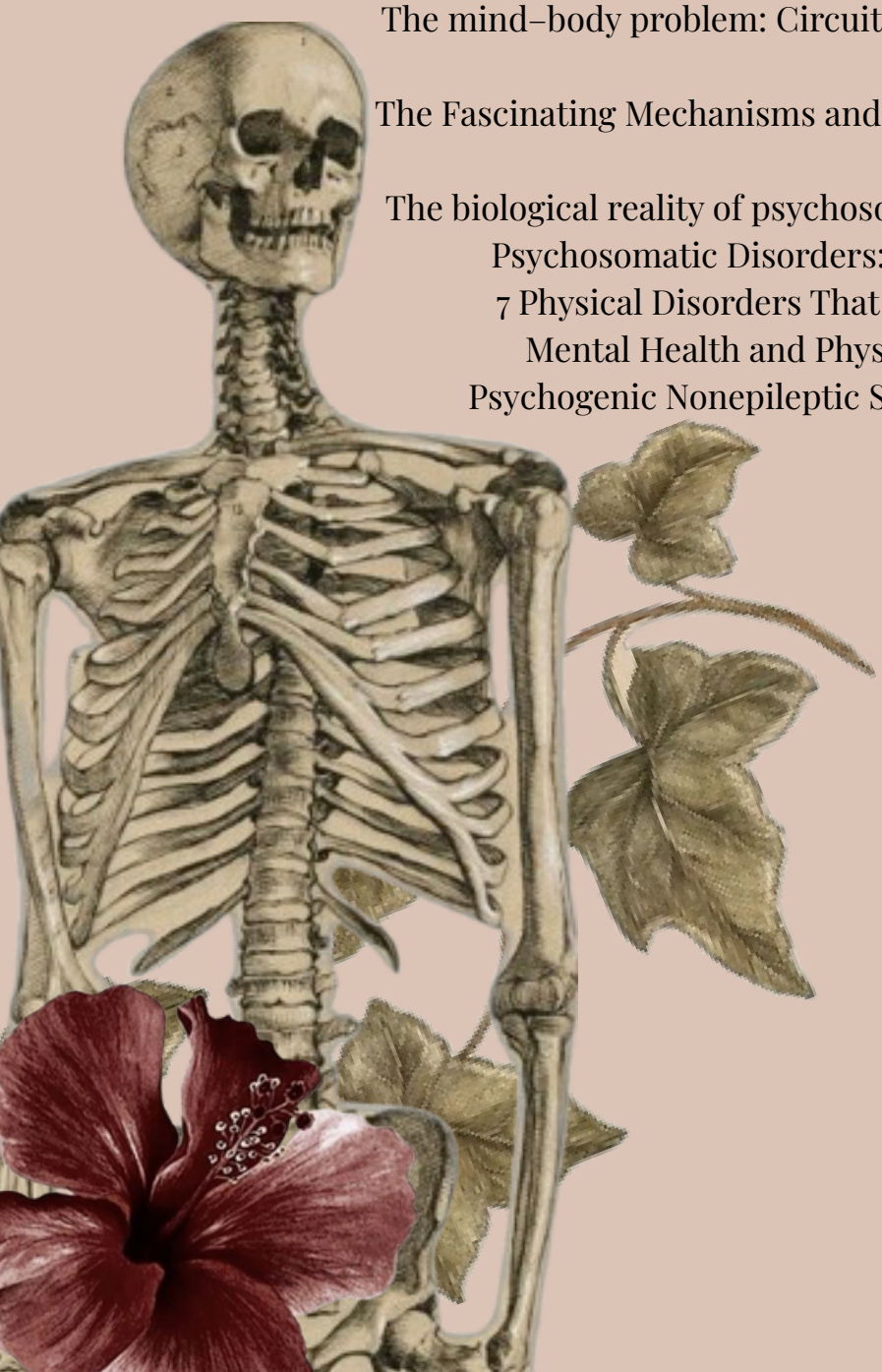
The biological reality of psychosomatic disease - TheScienceBreaker

Psychosomatic Disorders: Causes, Symptoms, and Treatment

7 Physical Disorders That Are Linked To Mental Health Issues

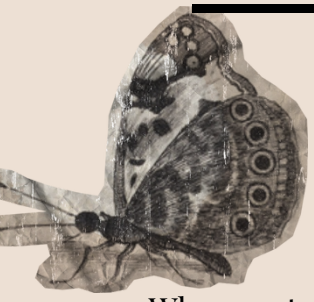
Mental Health and Physical Health: What's the Connection?

Psychogenic Nonepileptic Seizures PNES | Epilepsy Foundation



Annie-Lois A

The Evolutionary Influence of Neurodiversity



When we talk about evolution, we often focus on Charles Darwin's theory of natural selection, and the idea that the strongest traits are passed down through generations as a form of "survival of the fittest." We tend to measure evolutionary success by extremes: the fastest runner, the most intelligent problem-solver, the best at adapting to harsh environments. But what if one of the most significant factors in human evolution wasn't about perfecting sameness, but about embracing difference?

Neurodiversity refers to the concept that neurological differences: such as autism, ADHD, dyslexia, and other cognitive variations; are not just disorders, but rather natural and valuable expressions of human diversity. These variations in brain function and behavior may have significantly contributed to the evolutionary development and adaptability of our species, offering unique cognitive strengths that complement the broader spectrum of human potential. In early human societies, not everyone needed to excel at hunting or construction. Some people needed to notice patterns others couldn't. Some individuals were required to identify patterns that others could not, while others demonstrated the ability to hyper-focus, think creatively, or solve problems under pressure. A tribe made up of people who all thought the same and shared the same cognitive approach would have been less adaptable than one made up of individuals who approached the world in diverse ways. Neurodivergent traits may have played a crucial role in the survival of the group, even if these traits made daily life more challenging for the individual.

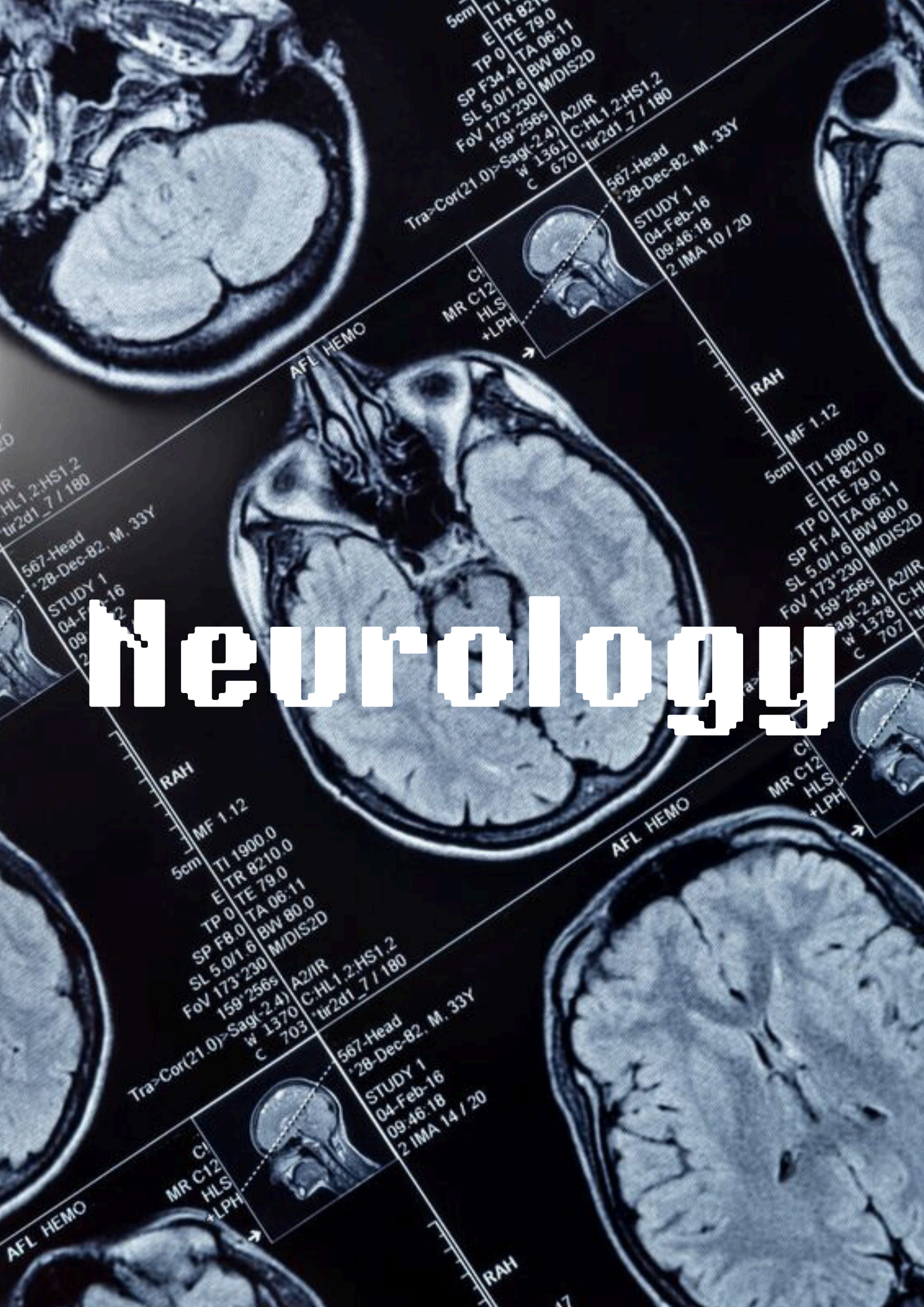
Even in today's society, many of the most successful and influential thinkers, artists, and innovators are individuals who possess non-traditional cognitive patterns. While it may be tempting to romanticize neurodiversity by suggesting that "autistic individuals are all geniuses" or that "ADHD fosters creativity," such generalizations are neither entirely accurate nor productive. However, it remains clear that society benefits from individuals who think unconventionally. If we consider evolution as a process of adaptation, neurodiversity could represent one of humanity's greatest advantages.

Exploring the concept of neurodiversity has led to a critical examination of how "normal" is defined within educational systems. When neurodivergent students are consistently required to adapt their learning processes to fit the traditional-rigid system, it raises the question of what skills and perspectives may be overlooked and forgotten. Instead of treating neurodivergent traits as issues that need to be fixed, there is a compelling argument for viewing them as natural differences that warrant understanding and support, especially given that these traits have been a part of the human experience for centuries.

However, not all evolutionary traits are inherently beneficial, and neurodivergent individuals often face considerable challenges in a society that is not structured with their needs in mind. But just as the diversity of physical traits contributed to human survival in changing environments, the diversity of cognitive approaches may have similarly played a role in ensuring intellectual, social, and creative survival.

Therefore, neurodiversity may not simply be something to accommodate; it may be an essential factor in our species' continued survival. It serves as a reminder that evolution does not solely favour strength or intelligence in the conventional sense, but rather diversity, adaptability, and the capacity to perceive the world from multiple perspectives. As we progress into a future that will increasingly demand problem-solving, creativity, and empathy, embracing neurodiversity may not only benefit individuals but could ultimately contribute to the collective well-being of humanity.

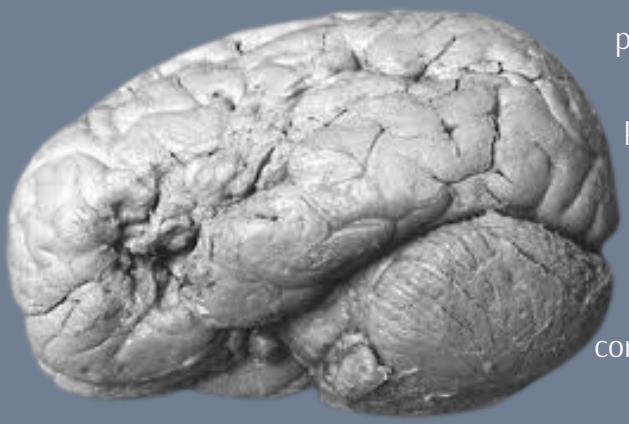
By Anika D


Neurology

Neuroscience :

Paul Broca was a French physician, anatomist and surgeon who identified the speech production centre of the brain located in the ventroposterior region of the frontal lobes, which is now known as the Broca's area.

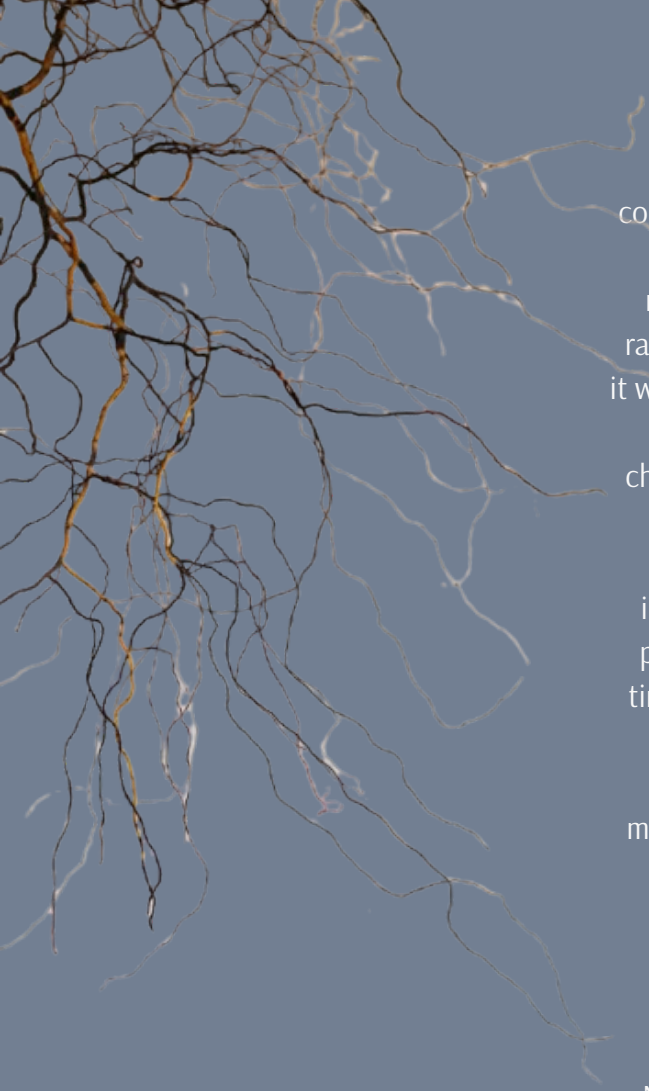
On the 12th of April 1861, he consulted a patient called Laborgne, who was 51 years old and had been hospitalised for 20 years after he lost his ability to speak. He was transferred to Broca's surgical ward because he had gradually become paralysed on his right side and showed symptoms of gangrene (death of body tissue due to a lack of blood flow) in his paralysed right leg. Broca was intrigued by Laborgne's inability to speak because his mouth and tongue had normal function, which meant he couldn't control the problem, therefore there was a disruption in the brain. Laborgne could not say his name. He could only say the word "Tan," which became his name.



Here is a picture of Laborgne's brain. Unfortunately, within a week he passed away, however Broca did an immediate autopsy, and found that he had an injury on one of the left frontal lobes of his brain (shown in the photo). Broca gave a presentation to the Society of Anatomy the next day and proposed that the area affected by the lesion was the area responsible for speech. Broca accumulated 8 cases of what he called aphémie (now known as aphasia, defined as the inability to understand or produce speech due to brain damage) and each one was correlated with damage to the area of the left frontal lobe that is now called "Broca's area".

Neuroscience today

With the rise in technology, neurosurgeons are now using more technological methods for treatment. For example: Researchers at UC San Francisco have developed an AI-enhanced brain-computer interface (BCI) that enables a paralysed man to control a robotic arm using only his thoughts. Unlike previous BCIs, this device functioned for seven months by adapting to natural shifts in brain activity. The participant trained on a virtual robotic arm to refine his ability to imagine movements accurately, then, he successfully using a real one to pick up objects, open a cabinet and use a water dispenser. The key breakthrough was understanding that while brain activity patterns shift slightly each day, their overall structure remains stable. The AI model learned to adjust to these changes, allowing long-term, consistent control. Researchers are now working on improving movement speed and testing the system in home environments. While this technology offers greater independence for people with paralysis, it carries risks such as infection due to nerve damage, and potential harm to brain tissue.



Researchers from Barcelona's Hospital del Mar have discovered that human neurons can recognise people or objects regardless of the context, allowing them to form higher relationships. This constitutes "the basis of human intelligence". Previous studies on animals showed that neurons reacted differently depending on the situation. For example, a rat's brain responded differently to the same object depending on where it was found, suggesting that memories were stored in separate groups of neurons. However, the new study, led by Rodrigo Quian Quiroga, challenges this idea. Researchers analysed brain activity in nine patients with refractory epilepsy from the UK and Argentina with implanted electrodes to monitor the functioning of specific neuron groups individually. When told two stories with supporting images of the same person in different contexts, the same group of neurons activated each time. Even when patients recalled the stories themselves, those neurons were activated before mentioning the person. This happened for both stories. Quian Quiroga explained that humam memory is encoded in a more abstract and flexible way than in animals, which may be a key factor in human intelligence.

Future of neuroscience

Alzheimer's may possibly be treated:
A team of scientists from the University of Vermont, led by Dr. Mark Nelson, has discovered a new way blood flow is controlled in the brain. Their research introduces a process called Electro-Calcium (E-Ca) Coupling, which connects electrical and calcium signals in capillaries to ensure the brain gets the right amount of oxygen and nutrients. The brain needs a constant supply of blood because it has high energy demands, since humans are constantly thinking and recalling memories, but it can't store a lot of energy. It adjusts blood flow based on activity, increasing supply to busy areas. This process, known as neurovascular coupling (NVC), is essential for normal brain function and is the basis of brain scans like fMRI. Until now, scientists believed electrical and calcium signals controlled blood flow separately. However, this study reveals that they work together through E-Ca Coupling. Electrical signals spread through capillary networks, while calcium signals fine-tune blood flow. The research showed that electrical signals increase calcium activity by 76%, strengthening the brain's ability to regulate blood flow. This discovery is important because poor blood flow is linked to conditions like stroke, dementia, and Alzheimer's disease. By understanding how E-Ca Coupling works, scientists may develop new treatments to improve blood flow and protect brain health.

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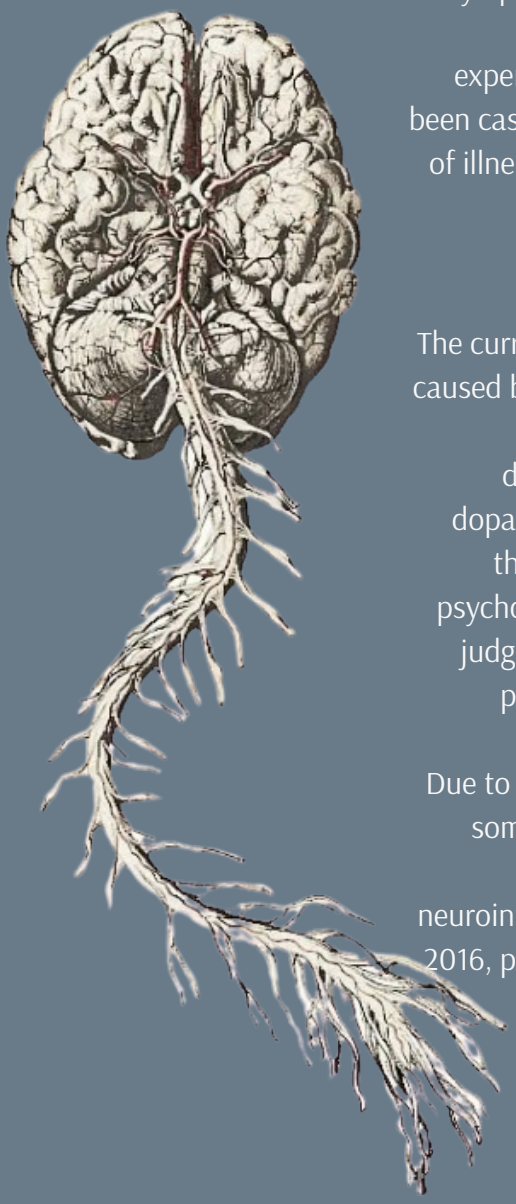
Maame A

Neurobiology of Psychois

“Is when people lose some contact with reality.”

These are the first words written on the overview page for Psychosis on the NHS website. Psychosis is when an individual experiences a disconnection between themselves and the environment around them; which could take the form of hallucinations (sensing something that doesn’t take a physical presence in the individual’s immediate reality); delusions (unwavering beliefs in something inherently false); and confusion, (disorganised patterns of thoughts) [NHS, 2023].

Psychosis is less of a mental health condition – “a clinically significant disturbance in an individual’s cognitive, emotional regulation, or behaviour… Associated with distress or impairment in important areas of functioning,” [World Health Organisation, 2022] – and more of part of the symptomatology to many other health conditions ranging from psychological causes like disorders such as schizophrenia or bipolar, to conditions that could trigger a psychotic episode like HIV/AIDS, Malaria. Substance misuse from drugs like amphetamine (speed) and alcohol could induce a psychotic episode and even lack of sleep can cause a period of psychosis [NHS, 2023]. Due to the nuanced nature of the symptom, it is hard to accurately measure the amount of people who develop it: but studies estimate that out of 100,000 people each year, 15-100 of them would experience psychosis. Usually begins in young adulthood to mid-20s but there have been cases where it has been experienced by those younger and older due to the range of illnesses that share psychosis as one of its symptoms [National Institute of Mental Health, 2023].

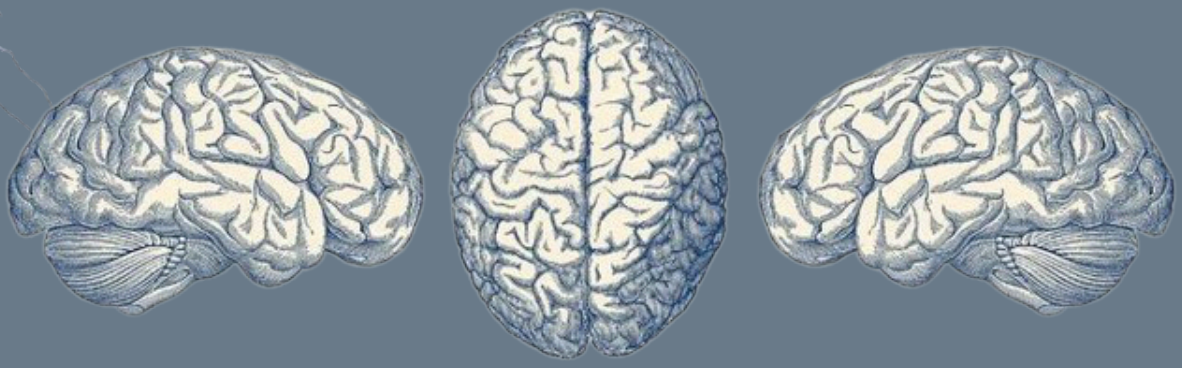


Neurobiology:

The currently accepted model for what occurs in the brain during psychosis is that it is caused by imbalances of neurotransmitters in the brain. Specifically, disruptions to the mesolimbic pathway (reward pathway) due to chemical imbalance caused by dopaminergic activity (activity involved with the release of the neurotransmitter dopamine) [Stahl, S.M. 2018, p.187-191] [Georgi, P. 2024, p.1784-1798]. Dopamine is the neurotransmitter linked to the reward pathway and research has shown that psychosis involves the Ventral Straitum (brain pathway crucial for helping individuals judge what will be rewarding or important, also driven by dopamine), which further proves this link. However, there have been disagreements on whether dopamine imbalances are the main cause of psychosis.

Due to the interconnectedness between the nervous, endocrine and immune systems, some studies proposed that the mechanisms triggering the psychosis span across the body with gut microbiomes, neuroinflammation (inflammatory response within the brain or spinal cord [Damon, D. 2016, p.136-153]) and mitochondrial dysfunction, can contribute to psychosis through their interactions with one another [Neha, S.R. (2024)].

There has also been increasing research to show how the Salience Network plays a role in psychosis. The Salience Network acts like a sort of filter, helping to direct an individual's attention to their internal thoughts and the external events occurring around them whilst at the same time ignoring irrational thoughts. This is from a study where they compared the MRI brain scans of individuals with a genetic disorder called 22q11.2 Deletion Syndrome; a syndrome that does cause psychosis [Erin, D. (2024)]. In reality, this shows that mental health is more complex and physiological than what was believed in the past, and shows how the physiological health and cognitive health of individuals are individually linked. In the future as research progresses, there may be less stigmatisation against mental health and disorders as more research showing the neurobiological side of the human anatomy is explored.



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Maxine J

The future of Neural Repair: Can we heal the brain like we heal the skin?

The human brain, composed of approximately 86 billion neurons, governs all bodily functions, cognition, and consciousness. However, its ability to regenerate after injury remains highly restricted. In contrast to peripheral tissues such as skin, which heal through well-coordinated cellular repair processes, neurons in the central nervous system (CNS) face significant barriers to regeneration. These barriers include a lack of proliferative neural stem cells (NSCs), inhibitory factors within the glial scar, and the absence of axonal guidance cues. Consequently, traumatic brain injuries (TBIs), ischemic strokes, and neurodegenerative disorders (e.g., Alzheimer's and Parkinson's disease) often result in irreversible damage and functional loss.

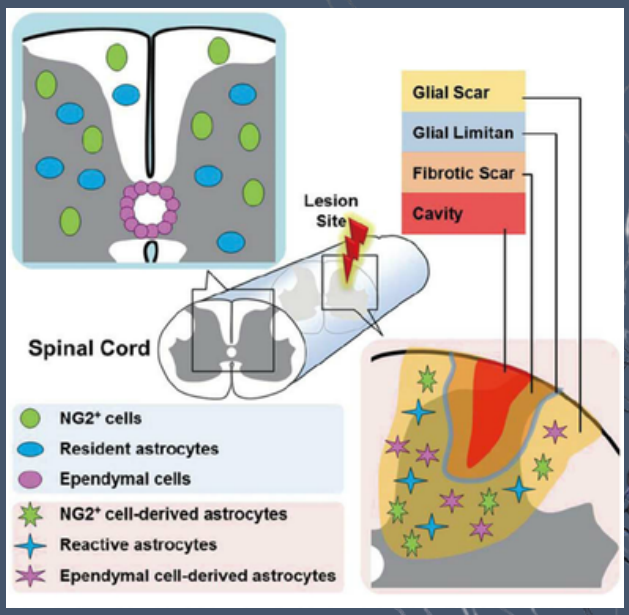
Current treatments for neural injuries focus primarily on symptom management rather than cellular repair or regeneration. However, recent breakthroughs in biotechnology and neuroengineering have proposed novel solutions that could allow for functional neural repair and recovery. This article examines key advancements, including stem cell transplantation, gene editing techniques, and bioengineered neural repair technologies, that may transform the future of neuroregeneration.

Mechanisms of Neural Damage and Regenerative Limitations

In peripheral tissues, such as skin, injury triggers rapid cell proliferation and extracellular matrix (ECM) remodelling. Keratinocytes and fibroblasts migrate to the wound site, forming new tissue, and angiogenesis ensures an adequate blood supply for regeneration. However, in the CNS, damage often leads to:

- Neuron loss without replacement – Unlike skin cells, most neurons do not divide postnatally.
- Glial scar formation – After injury, astrocytes and microglia form a dense scar, which prevents further damage but also inhibits axonal regrowth.
- Inflammatory responses – Chronic neuroinflammation contributes to secondary neuronal loss.

Overcoming these barriers is the primary goal of neuroregenerative medicine.



Schematic of the cellular origin of glial scar formation following spinal cord injury (SCI). Astrocytes (blue), ependymal cells (rose) and NG2 + progenitor cells (green) can give rise to a heterogeneous scar-forming astrocyte population within the glial scar

Emerging Strategies for Neural Repair

1. Stem Cell Therapy: Inducing Neurogenesis in the CNS

Stem cells are multi-potent or pluripotent cells capable of differentiating into specialised cell types. Several studies have investigated their role in neurorepair:

- Neural Stem Cells (NSCs): NSCs derived from the brain or induced pluripotent stem cells (iPSCs) have shown promise in replacing damaged neurons and restoring function in animal models of stroke and spinal cord injury.
- Mesenchymal Stem Cells (MSCs): MSCs derived from bone marrow or adipose tissue have demonstrated paracrine effects, secreting neurotrophic factors that reduce inflammation and promote synaptic plasticity.
- Clinical Trials: A Mayo Clinic study reported functional improvements in traumatic spinal cord injury patients following autologous stem cell transplantation.

2. Gene Therapy: Reprogramming Neural Repair

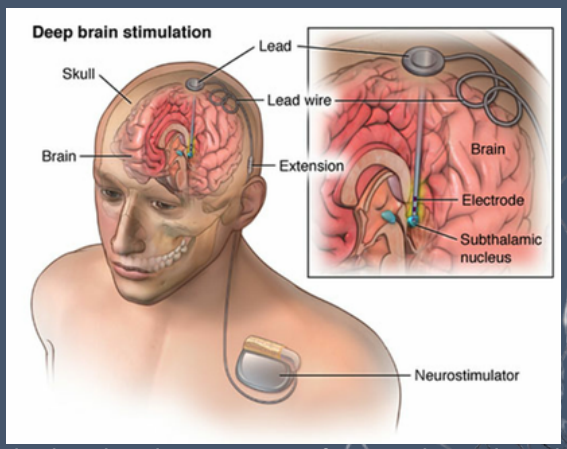
Gene therapy introduces or modifies genetic material to promote neuroprotection, neuronal survival, and axonal regeneration.

- Neurotrophic Factors: Brain-Derived Neurotrophic Factor (BDNF) and Nerve Growth Factor (NGF) gene delivery have been shown to enhance neuronal survival and synaptic plasticity.
- Glial Scar Reversal: Gene therapy techniques targeting chondroitin sulphate proteoglycans (CSPGs) have successfully reversed inhibitory glial scars, facilitating axon regeneration.
- Clinical Advances: The University of California, San Diego (UCSD) is conducting a BDNF gene therapy trial for Alzheimer's disease, aiming to restore cognitive function.

3. Bioengineered Neural Repair Spray: A Future Innovation

A promising concept is the development of a Neural Repair Spray, inspired by regenerative processes in cutaneous wound healing. This spray would deliver:

- Biodegradable nanoparticles containing growth factors such as BDNF and IGF-1.
- Stem-cell-derived extracellular vesicles (EVs) to facilitate neuronal repair.
- Hydrogel-based scaffolds for axonal reconnection.



Although still theoretical, such a system could provide localised treatment for stroke-induced cortical damage or traumatic brain injuries.

4. Electrical Stimulation & Brain-Computer Interfaces (BCIs)

Neuroelectronic devices offer an alternative method of neural repair. Brain-computer interfaces (BCIs) and deep brain stimulation (DBS) have been utilised in Parkinson's disease, and ongoing research suggests that electrical stimulation may promote synaptic plasticity.

Challenges and Ethical Considerations

Despite these advancements, several challenges remain:
1. Immune Rejection: Stem cell therapies may trigger immune responses and require immune suppression.
2. Uncontrolled Cell Growth: The risk of tumorigenesis remains a major concern in stem cell and gene therapy applications.
3. Ethical Issues: The use of embryonic stem cells (ESCs) and CRISPR-based gene editing raises ethical dilemmas regarding human genome modification.
4. Long-Term Efficacy: The durability of neural grafts and genetic modifications needs further investigation.

Conclusion: A New Era of Neural Repair?

Advancements in stem cell therapy, gene therapy, and bioengineered neurostimulation are paving the way for functional neural repair. Although the brain does not naturally regenerate like the skin, emerging biotechnologies and regenerative medicine offer realistic prospects for restoring lost neurological functions. Future research will determine whether these therapies can be safely and effectively applied in clinical settings, potentially transforming the treatment of neurological disorders and brain injuries.

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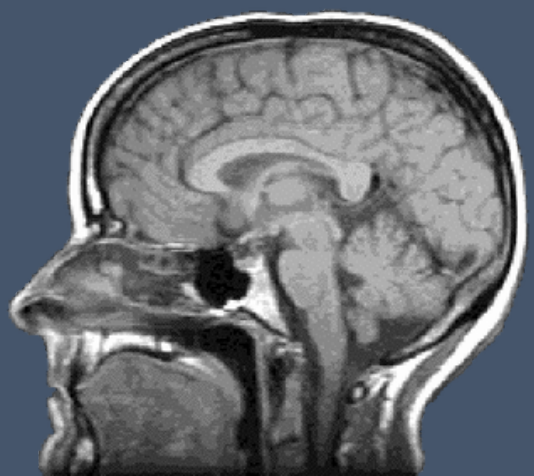
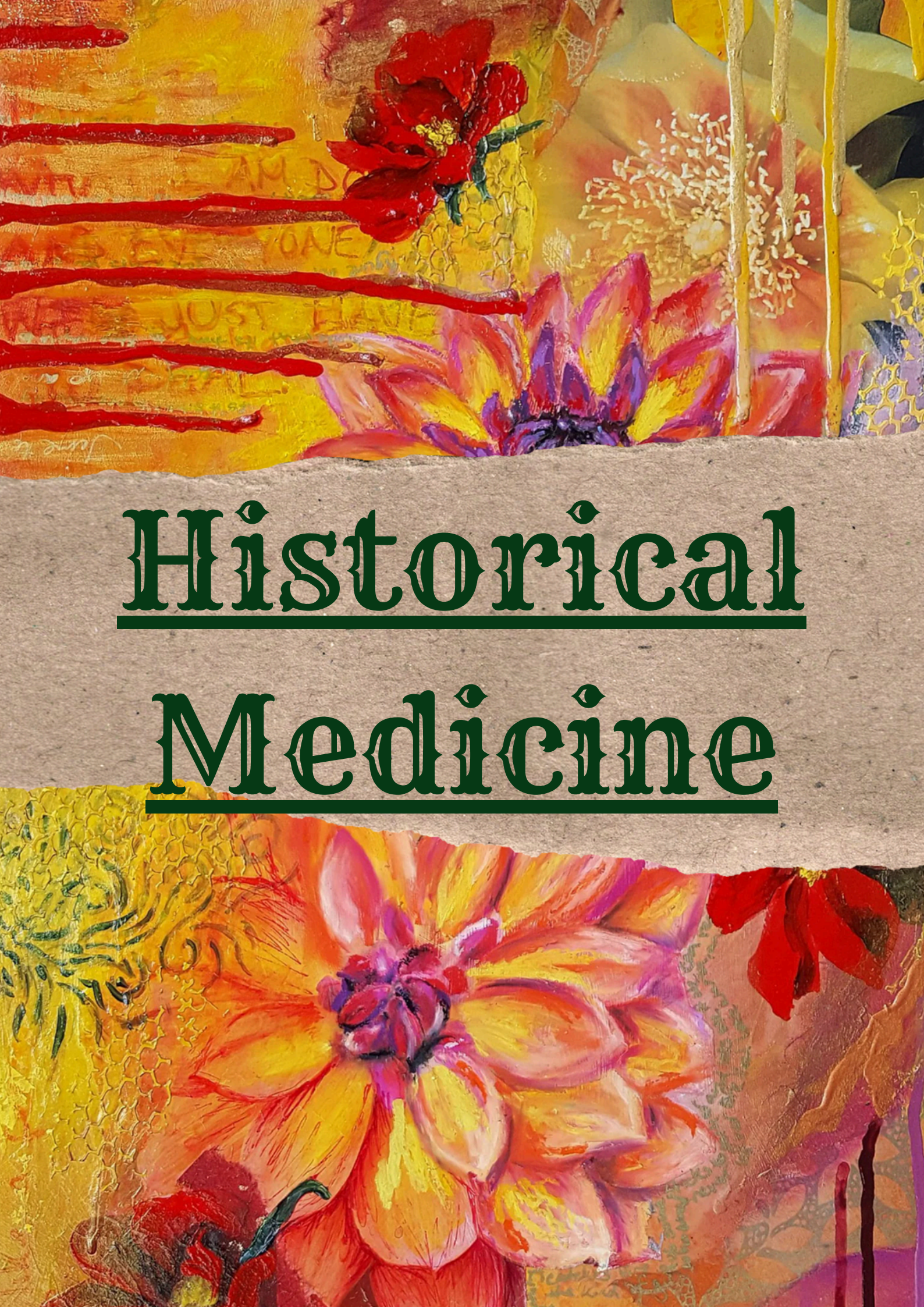
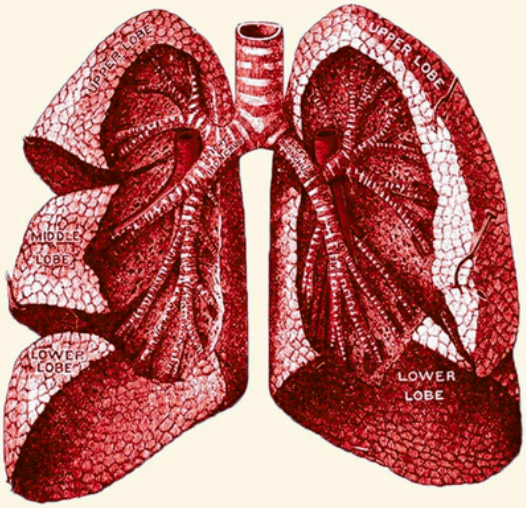
By Vaishnavi R





Historical Medicine

Chinese Medicine



Dating all the way back to 200BCE, traditional Chinese medicine is one of the oldest medicine systems. It seeks to prevent or heal illness/disease by restoring one' s yinyang balance. A balance between these two complementary forces is sought after, so according to traditional Chinese medicine, if the yin and yang is balanced that person is healthy. If the equilibrium of yin and yang has been disrupted, then that person is deemed to be ill.

Chinese medicine vs western medicine

In Western medicine, they will first assess the symptoms of the patient and give a suitable diagnosis and then use a scientifically proven and effective treatment. In Chinese medicine, the doctor will treat the person as a whole, rather than just the symptoms in visible.

Eastern medicine treatments are more holistic and therefore more personalised to each patient, with the main focus when treating disease not only being how to get rid of it but also finding the root cause of why it occurred and how to prevent it from appearing again.

Basic theories in Chinese medicine

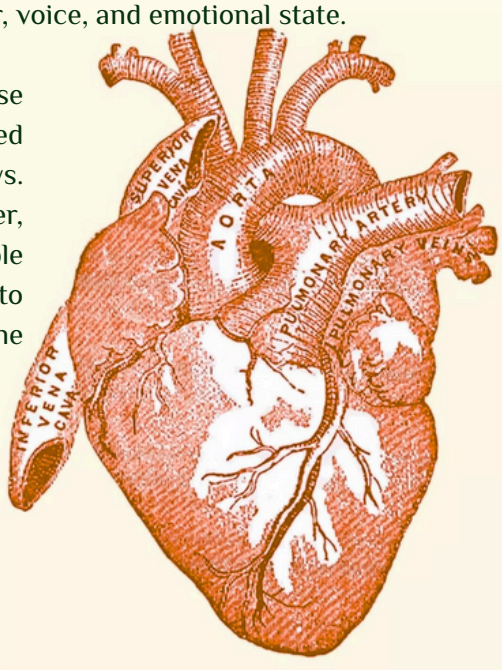
The basic theories in traditional Chinese medicine aim to explain the nature of our life cycle and their interaction with the environment along with disease changes. There are five main theories:

Yin and Yang
The five elements
How to direct one' s strength
Zangfu
Channels

The overall concept of ying and yang has been looked at above. The balance between yin and yang serves as the basis to maintain the regular activities of the human body and if the balance is disturbed, then disease occurs.

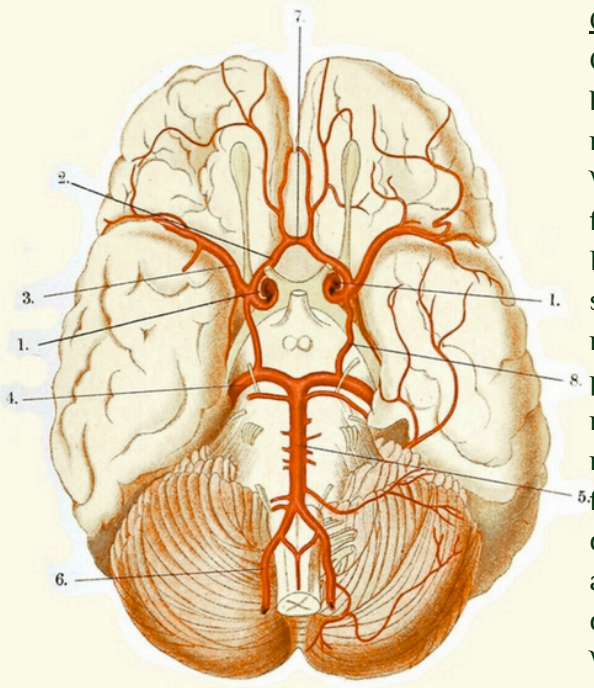
In Chinese medicine, the five elements (water, wood, earth, fire and metal) are a fundamental concept used to explain the link between body, mind and spirit. Each element is associated with specific organs, emotions, seasons and environmental influences. Due to these inter-relationships, when one element is out of balance, it will affect the other elements. This imbalance can manifest in individuals with different signs and symptoms, a few being: change in facial colour, voice, and emotional state.

Zangfu refers to the various yin and yang organs identified in Chinese medicine. A yin organ is called 'zang' and a yang organ is called 'fu' . The Zang consists of the heart, spleen, liver, lungs, and kidneys. The Fu consists of the small intestine, large intestine, gall bladder, bladder, stomach, and san-jiao. The san-jiao is a three part invisible metabolising organ in Chinese medicine. Each organ is considered to have its own function and role but far wider than in Western medicine where these organs have a purely physiological role. .



Energy channels otherwise known as meridians are an energy (qi) network connecting organs, tissues, nerves, cells and consciousness. There are 12 major meridians in the body. In an acupuncture, fine needles are inserted into the body to tweak meridians and readjust the flow of qi to balance the body' s yin and yang.

A Chinese medicine practitioner would use these five theories when determining a patient' s condition. For example, if the patient complains about getting a headache daily at around 4pm, the practitioner would be able to link that to the bladder and know the bladder qi is disrupted and therefore come up with suitable treatment.



Chinese medicine efficacy

Chinese medicine usually faces criticism of its efficacy as it' s largely theoretical and its personalised treatment for each patient means each treatment is rarely similar to each other whereas in Western medicine, doctors and scientists prefer evidence gained from clinical trials to treat patients with similar symptoms.

However, this is not to say Chinese medicine doesn' t work. In studies comparing the efficacy between Chinese and Western medicine towards IVF, it was actually found that Chinese medicine produces results twice as effective compared to Western medicine. Chinese herbal medicine continued for more than four months led to clinical pregnancy rates of 60% whereas using IVF for 12 months led to only 30% in clinical pregnancy rates. The big difference in pregnancy rates seems to be because of different approaches. In Chinese medicine they use the menstrual cycle quality as a diagnostic tool which is a lot less invasive than Western medicine' s approach.

Chinese medicine meets Western medicine

Despite the two medicine systems being completely different in approach, they can be complementary to in certain areas. An integration of the two can be used to treat cancer. For many patients with cancer who have undergone chemotherapy, Chinese medicine can be used to treat its side effects. A certain herb in Chinese medicine generally used to treat thirst or general weakness has been prescribed to deal with the effects of radio/chemotherapy. A randomised, double blind, placebo-controlled study proved that this use of medicine was effective in reducing fatigue associated with cancer treatment. Research has also shown that medicinal herbs used in Chinese medicine exhibit anti-cancer products with fewer side effects than chemotherapy and radiotherapy.

By Michelle W

Indigenous Medicine

Introduction:

Indigenous medicine refers to the traditional healing systems developed by Indigenous communities across the world. It is rooted in centuries of cultural knowledge and spiritual practices, in which these systems are holistic by nature, often focusing on the balance between the physical, emotional, and spiritual aspects of health. This contrasts to western medicine which tends to isolate specific symptoms or diseases. Indigenous medicine instead views illness as an imbalance in a person' s entire being and their relationship with their environment. Indigenous medicine is often misunderstood by modern science; however, it continues to play a vital role in healthcare and healing for many communities globally.

Traditional Remedies and Healing Practices

Traditional Indigenous healing encompasses a wide variety of remedies and practices which are deeply rooted in cultural beliefs and the deep knowledge of the natural environment. Many are based on the medicinal use of plants and natural elements like herbal infusions, and poultices; to treat physical symptoms. Whilst also having remedies based on spiritual rituals in which altered states of consciousness are achieved to restore balance and connection. These remedies are formed from generations of knowledge being passed down, in which healing is not just physical but also practices helping the emotional, spiritual, and communal wellbeing of a person.

Healing in indigenous cultures is not confined to the body this is where rituals such as drumming, chanting, and the use of sacred symbols and ceremonies are often essential to Indigenous treatment. These practices are believed to realign the body, spirit and its environment restoring the natural harmony in which the imbalance is what causes the illness. Healers play a crucial role in this process, acting as both spiritual guides and health practitioners within their communities.

Indigenous medicine is built upon the principle that health comes from harmony, between mind, body, spirit, and the natural world. Illness is said to be caused by imbalances, spiritual disconnection, or even ancestral disturbances. The role of the healer is to identify the source of imbalance and use physical, spiritual, and ritual tools to restore equilibrium. Diagnosis may come from observation, dreams, or spiritual insight, and treatments are often tailored to the individual rather than being standardised for a disease. In this sense, Indigenous medicine is deeply personalised and preventative, often promoting balance and wellbeing before illness even arises.

A Focus on American and South American Indigenous Cultures

In North America, many Native American tribes have developed complex healing traditions that remain active today. The Navajo use healing chants and sand paintings as part of elaborate ceremonies meant to restore balance. Smudging, the burning sacred herbs such as sage, cedar, or sweetgrass, is another widely practiced ritual believed to purify the body and mind. Many plains tribes use sweat lodges for detoxification and spiritual rebirth.

In South America, Indigenous communities in the Amazon have developed rich botanical knowledge that includes thousands of medicinal plants. Ayahuasca, a psychoactive brew made from the Banisteriopsis caapi vine and other ingredients, is used by shamans(healers) in countries like Peru and Brazil for spiritual and psychological healing. These ceremonies often involve guided visions and are believed to treat trauma, depression, and even addiction. Another example is the Kallawaya people of Bolivia, who are known for their travelling healers, as well as their encyclopedic knowledge of plant-based medicine.

Indigenous Medicine in the Modern World

In recent decades, Indigenous medicine has undergone a process of modernisation, not in the sense of being altered or diluted, but rather through its growing recognition alongside contemporary medical systems. In countries like Bolivia and Peru, traditional healers are now legally recognised and integrated into national healthcare services. Clinics in rural areas may include both biomedical doctors and traditional healers, giving patients the option to choose from both forms of treatment.

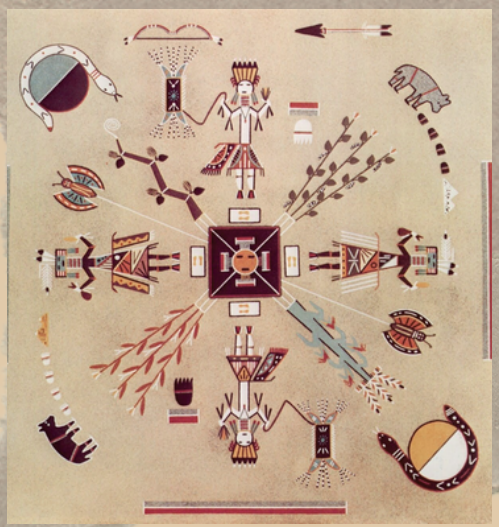
Furthermore, some Indigenous remedies are now being scientifically studied for their medicinal properties, leading to the development of new pharmaceuticals. This however also raises concerns about biopiracy and the exploitation of Indigenous knowledge without fair compensation or cultural respect. Researchers are encouraged to work alongside Indigenous communities to preserve knowledge and protect intellectual property rights.

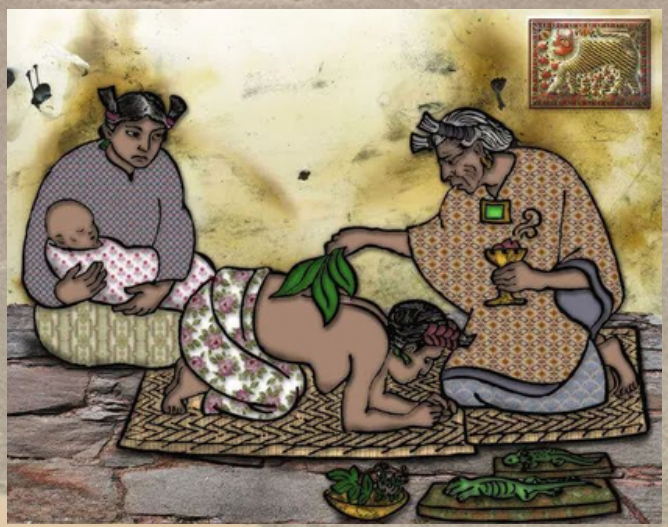
Bridging the Gap: Indigenous and Western Medicine

Indigenous and Western medical systems have often been separated by cultural and philosophical differences. However, growing efforts are being made to integrate both, recognising their distinct strengths. Western medicine excels in acute care and advanced technology, while Indigenous healing offers a holistic approach that nurtures emotional, spiritual, and physical balance. Rather than viewing them in opposition, there is increasing recognition that they can complement one another.

Many health institutions are now incorporating Indigenous perspectives through cultural competency training and partnerships with traditional healers. At the same time, Indigenous communities continue to preserve and practice their healing traditions, not as alternatives but as parallel systems of care. True integration requires mutual respect, equal recognition, and a willingness to dismantle colonial assumptions. By embracing both traditions, healthcare can become more culturally inclusive, responsive, and effective; honouring diverse ways of understanding health and healing.

By Sansitha J






TECHNOLOGICAL
MEDICINE

Genetics in Disease development and Treatment

Our genetics play a crucial part in many common diseases that we encounter every day. In fact, every single disease has a genetic component, but the extent to which genes contribute to it can vary by a large extent. It is estimated that roughly 40% were strongly linked to genetics, from diabetes and cancer to cardiovascular diseases and neurological disorders. By understanding how our genes influence disease development, doctors may be able to make breakthroughs in their treatments and even develop preventative measures to further improve healthcare services and reduce the impact of disease in our everyday lives.

Examples

One commonly known example of a genetic disorder is type 1 diabetes. However, it is a common misconception that you either inherit a gene that gives you diabetes, or you don't. It is a combination of genes that increases a person's susceptibility to the disease, one of which is the TCF7L2 gene. Another example is certain types of cancer. Mutations in specific genes may be linked to higher risks of cancer, affect the cell cycle, and promote tumour growth. Alzheimer's disease is also associated with the APOE gene, which affects the metabolism of fats in the brain. Fat droplets may start to form in the brain's immune cells due to a mutation in the gene, causing them to release neuron-damaging chemicals.

Human Genome Project

This international scientific research project led to the successful complete mapping of the human genome, allowing us to determine exactly where each of our 25000 genes was located. Genetic markers of monogenic and complex diseases have been identified, leading to accurate, targeted research into how those specific genes affect disease development and how they can be treated.

Genetics in diagnosis

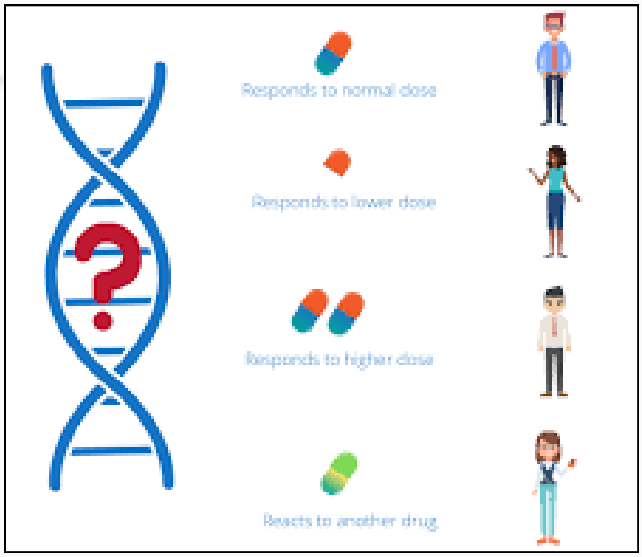
As technology has advanced, it has become possible to carry out diagnoses and preventative screening using the increased knowledge of human genetic makeup. Simply by taking blood samples or cheek swabs, DNA can be extracted and sequencing techniques applied to identify the presence of genetic disorders by looking for mutations.

Genetic screening is a preventative way of identifying potential risks of genetic disorders. There are several types, including carrier screening (those who carry the recessive gene), parental screening, newborn screening, and even population screening to test for prevalence. The probability of the disease appearing can be calculated, however the challenges in achieving a high accuracy can pose ethical implications.

Treatment and precision medicine

Finally, another way in which the study of genetics has been greatly useful is leading to breakthroughs in personalised medicine. By tailoring healthcare based on each individual's genetic makeup, treatments become far more effective and successful. One such example is in cancer therapy. The identification of specific mutations in cancer-related genes has led to the development of targeted therapies that attack cancer cells while sparing healthy tissue, instead of radio or chemotherapy which leads to high radiation exposure of heathy cells.

Furthermore, pharmacogenomics, which studies how genes affect an individual's response to drugs, has allowed doctors to prescribe medications and dosages specific to patients. This mean that efficacy is improved while reducing adverse side effects. Finally, a new but promising technology has emerged – gene therapy and editing involves inserting healthy copies of genes directly in the patient's genome. This could have enormous potential in curing previously untreatable diseases such as cystic fibrosis.

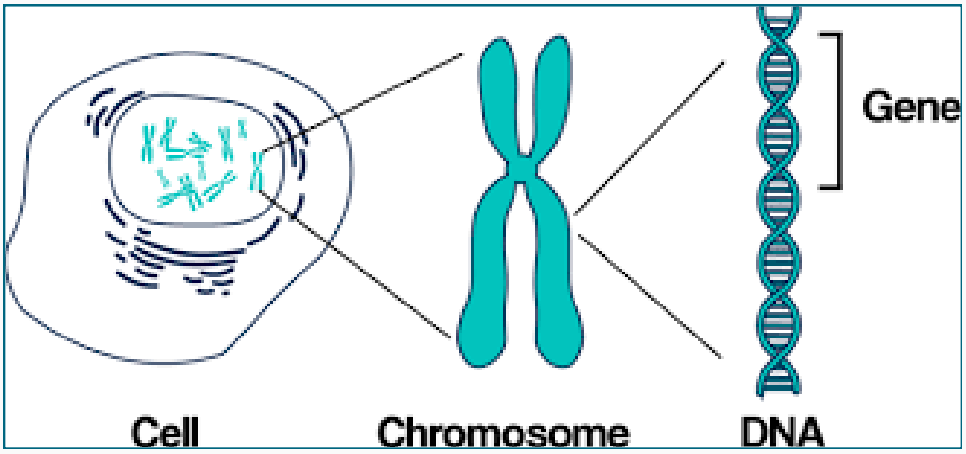


Considerations and limitations

It is evident that by expanding our understanding of genomics in healthcare, it could have incredible benefits to patients to improve their quality of life. However, there are certain limitations that must be taken into account, especially on controversial topics such as religion.

Many consider such medical interventions to be “playing God”, or murder due to research being carried on human embryos. By being able to screen foetuses for disorders or gender, serious ethical implications will arise about discrimination or taking away a potential life’s right to live. Furthermore, the high costs and inaccessibility of these treatments may mean that they are only available to the wealthy, spurring on inequality in society.

By Erin L



Technology within dentistry

Introduction

The field of dentistry is constantly adapting to meet the needs of patients in more convenient and precise ways, introducing new technologies and equipment to improve and build upon existing procedures. The use of these new methods by dentists has been highly advantageous, allowing them to provide improved treatment for their patients, helping them to receive the best results possible. However, it is also important to consider whether technology can be flawed and the disadvantages of increasing reliance on technology. This can be done by focusing on specific examples.

Use of CAD

Traditional methods have been greatly moved away from with the use of computer-aided design (CAD) and computer-aided manufacturing (CAM) within dentistry since 1985. This technology is used for designing and creating dental restorations such as crowns, bridges and dentures using methods which are more advantageous and convenient for both the dentist and the patient.

An example of a piece of equipment used is the intraoral camera which dentists use to scan a patient's mouth and capture detailed 3D images. These images can then be used to develop the required dental restoration. The intraoral camera has replaced the traditional method of taking a physical mould of the patient's mouth, requiring extra time, cost and discomfort for the patient.

This is an example of where introducing new technology has made procedures quicker and easier for the dentist and more comfortable for the patient. Further advantages of using CAD/CAM within dentistry include the higher quality and accuracy that they allow dentists to work at which is key in ensuring improved oral health and lowering the risk of problems arising in the future after the procedure.

The Dental Laser

Another example of new technology that has created great changes within dentistry is the dental laser, first used in the 90s. The laser, which stands for 'light amplification by the stimulated emission of radiation' emits light in a narrow and highly concentrated beam which can react with tissue allowing for it to be removed or reshaped. Soft tissue lasers are used in procedures such as reshaping gum tissue or removing inflamed gum tissue. Hard tissue lasers are used in procedures where cutting is required such as teeth whitening or removing enamel. Lasers are used in replacement of drills which may have previously been a cause for anxiety for patients, therefore laser dentistry is another example of where replacing traditional methods has improved patient comfort and experience.

Further advantages of using lasers include minimised bleeding and less frequent need for sutures and anaesthesia which makes procedures easier for dentists to carry out, also showing the conveniences of new technology.

However, laser dentistry remains limited in comparison to traditional methods. Some procedures cannot be carried out with lasers due to pre-existing components involving the teeth and gums, such as fillings, and there is a possibility of damaging pulp. This shows that despite the advantages, this new technology still has its flaws and cannot be used to completely replace traditional methods.

Potential Risks and Disadvantages

Despite the many advantages of incorporating a greater level of technology within dentistry, it is also important to keep in mind the potential risks and disadvantages. The more that technology is relied upon the more security risks must be dealt with. These include problems such as hacking which will lead to confidential patient information, such as the impressions taken in CAD/CAM dentistry, being at risk.

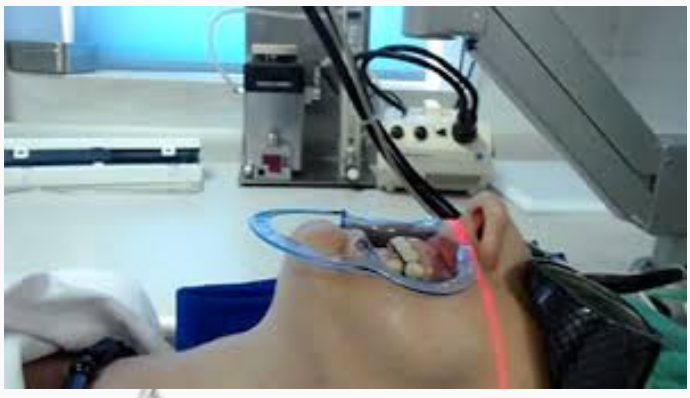
The possibility of computer failure may also mean that important data and information is lost, causing issues for a dental practice and preventing them from being able to successfully carry out treatments. Furthermore, ethical issues relating to the use of technology must be taken into consideration.

New technology and equipment are expensive and comes with higher costs than traditional methods and often this cost gets passed onto the patients. This means they may not be accessible to all, and some patients are unable to receive these new treatments because of these increased costs. Accessibility is further limited by the fact that new dental technology is not available everywhere, such as in rural areas. Limited accessibility is disadvantageous since it results in unequal access therefore not everyone will be able to benefit from new technology within dentistry.

Conclusion

It is without a doubt that new dental technologies have led to the field of dentistry adapting towards providing greater convenience for both patients and dentists as well as better results for treatments. However, it is important to keep in mind the potential risks of increasing dependency on technology and to act cautiously to make sure problems do not arise. Efforts must also be made to widen access to the new treatments made possible with these technologies to make sure a greater number of people can benefit from them and to further enhance the role of technology within dentistry for the better.

By Marnia M



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Nanomedicine vs Cancer

Introduction

Cancer. The leading killer in our world today, taking around 10 million lives in 2021. It is caused by the malfunctioning of the body cells' mitosis regulation, leading to rapid and uncontrollable growth of abnormal cells. Many treatments have been provided nowadays to battle the disease, such as chemotherapy and radiotherapy – these methods are very powerful in eliminating the disease. But it is at the expense of the surrounding healthy tissues, which can cause severe side effects in the patient. Additionally, some types of cancer may not respond to this treatment either! So, is there another way to tackle this malignant disease? Well, to find the answer, instead of looking big, we need to look small – some may even say nano.

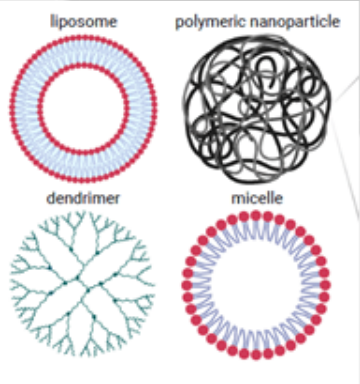
Nanotechnology

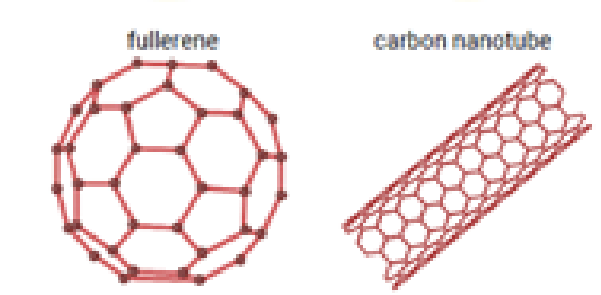
Firstly, what is nanotechnology? Nanotechnology is the understanding and control of matter which have dimensions between approximately 1 to 100 nanometers, as stated by the National Nanotechnology Institute. These particles can present many unusual, yet useful, physical, chemical, and even biological properties, making them useful for a wide range of applications.

There are many different types of nanoparticles, and they are divided into different classes:

Inorganic – these nanoparticles are composed of atoms not involving a carbon-hyrdogen bond. These would include elemental metals, metal salts or metal oxides.

Organic – these are nanoparticles which are composed of carbon-containing compounds. These would include liposomes, polymeric nanoparticles, micelles or dendrimers.





Carbon-based – these are nanomaterials which are primarily composed of carbon atoms. Examples include fullerenes, nanotubes or graphene sheets

Nanomedicine and its uses against cancer

Nanomedicine is the application of nanotechnology for medical purposes. Scientists are using nanoparticles in targeted treatment.

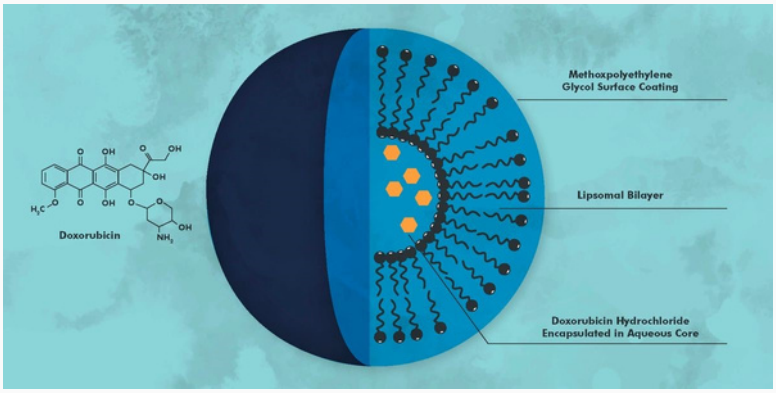
- One method is called photothermal therapy, which uses inorganic nanoparticles, such as gold nanoparticles. Nanoparticles are sent to the area of the tumour, where they are exposed to certain wavelengths of light. The light is absorbed and converted to heat; this is targeted towards the cancer cells, which kills them.
- The targeted transportation of a drug to the tumour site is another way nanoparticles are used. This utilises nanocarriers, such as dendrimers. These have a structure consisting of a central core, branches, and terminal units, which allows the carrying of several drugs or imaging agents, which can then target the cancerous tissue.

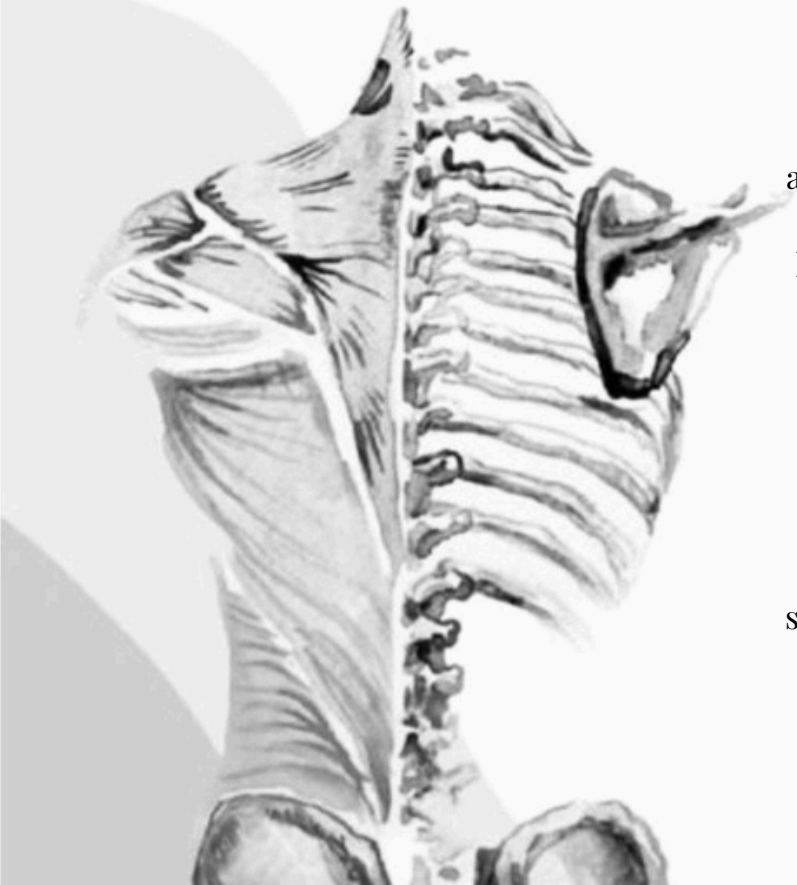
- Liposomes are the most advanced type of nanomedicines which are used and are also a type of nanocarriers. These are vesicles made of phospholipid molecules (which are the same molecules making up our cell membranes). The liposomes are then loaded with drugs and travel through the bloodstream, accumulating in tumours, since blood vessels are much leakier when a person has cancer. These liposomes can be triggered to release the contained drugs, via a light, pH or enzyme stimulus. This is passive targeting. Liposomes can be made to actively target tumour cells by modifying them with antibodies, which are complementary to certain markers on the cancer cells. This allows the liposome to stick to the tumour cells, increasing precision.

Nanoparticles can also improve radiotherapy and make it more targeted. The nanoparticles made with elements which have high atomic numbers can amplify the effects of traditional radiotherapy – this allows a lower dosage to be administered, therefore reducing harm to the surrounding tissue.

An example of nanomedicine in current cancer treatment

There have been many liposomal formulations, but the most successful and first approved formulation was Doxil. Doxil is used to treat ovarian cancer, breast cancer, AIDS-related Kaposi's sarcoma (a type of skin cancer), and multiple myeloma (a cancer of plasma cells). Doxil acts as a capsule for the drug doxorubicin, and this circulates in the blood. It has many advantages over conventional medicine itself, as it can remain in the blood for longer periods of time and it also minimises the contact of the drug with healthy tissue, which reduces damage.





Challenges that come with the use of nanotechnology

Although nanomedicine sound quite promising, it is important to also acknowledge the challenges that come alongside such developments. They are quite a new technology, so the effects on the human body are not fully understood yet. It is critical that the nanomedicine formulations wouldn't have any adverse effects on the patient's body, by eliciting an immune response for example, otherwise the treatment would do more harm than good. The manufacturing of the technology itself brings obstacles; it has a high cost since it is very complex – this, in turn, makes it less accessible for the patients who could benefit from them.

The body is a huge maze for such a small particle, and on top of that, it is a harsh environment, so nanoparticles must be designed with the properties allowing them to withstand various extreme conditions and still being able to deliver the drug to its intended destination.

Furthermore, it is also difficult to maintain the stability of the nanomedicine, since it is so small, which is a key challenge in its manufacturing.

Overall, nanomedicine is an exciting technology, which provides new pathways to battle this deadly disease. As we make more developments in this field, we may see it become a more effective, integrated, and lifesaving aspect of cancer treatment programmes in the future.

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By Manasvi B

Biosensing Tattoos

INTRODUCTION

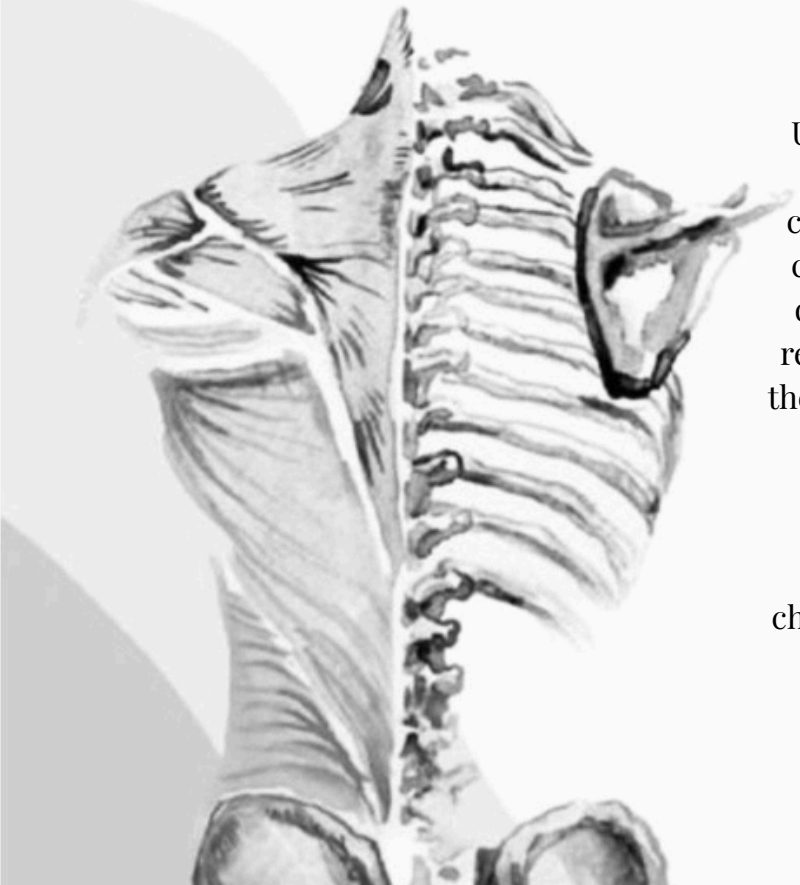
Tattoos have been becoming increasingly popular in the last century for their individuality and symbolism. While they have traditionally served as a form of self-expression, recent breakthroughs in medical science have found a new, potentially life-saving purpose for body ink.

Researchers at the Technical University of Munich in Germany have developed biosensing tattoos, which actively monitor your health: they contain chemical sensors that change colour to reflect levels of substances like pH, glucose, and albumin in your body. With this new technology, healthcare won't be limited to hospitals and clinics – it will be visible right on your skin.

WHAT THEY DO

Biosensing tattoos monitor the levels of key substances in the interstitial fluid (the clear fluid surrounding skin tissue cells), which closely resembles the contents of the blood – a reliable indicator for chemical imbalances. Currently, the following substances are being researched:

- pH (how acidic/alkaline your body fluids are) abnormal pH levels may indicate infections or respiratory conditions
- glucose (sugar used in respiration to release energy) observing glucose levels allow diabetic patients to monitor their blood sugar, preventing hypoglycaemia and hyperglycaemia
- albumin (protein in blood which maintains oncotic pressure) low levels of albumin suggest kidney/liver disease or malnutrition



HOW THEY WORK

Unlike traditional tattoos that use coloured ink, biosensing tattoos are created using chemical dyes that react to changes in body chemistry. These dyes are injected into the dermis (the middle layer of skin) just like a regular tattoo, but instead of simply staining the skin, they act as chemical sensors. As each dye detects a specific substance (such as glucose or albumin), fluctuations in the concentrations of each substance in the interstitial fluid trigger a visible colour change, providing a simple yet obvious way to identify imbalances in the body.

These tattoos may, in the future, be able to be paired with mobile apps which scan and track the colour, allowing changes to be observed over time and sending alerts to users and doctors when abnormal levels are detected.

SIGNIFICANCE

For people managing chronic illnesses, such as diabetes or kidney disease, monitoring certain biomarkers is a constant and often invasive process. Traditional methods require repeated finger pricks, urine samples, or blood tests. This can be painful, expensive, and impractical for daily life.However, with biosensing tattoos, these problems can be resolved:

- No blood is required
- Monitoring is continuous
- Patients make fewer trips to clinics or hospitals to test their blood
- Doctors can receive more frequent data from patients between visits

These tattoos aren't limited to keeping track of chronic illnesses – it's also useful for athletes, elderly patients who require passive monitoring, and people who live in areas with limited medical services. It can also detect diseases early on, allowing the patient to be treated and the disease prevented. Moreover, biosensing tattoos, like regular tattoos, can be designed in any way, meaning people are more likely to prefer them to bulky medical devices in terms of aesthetics.

CURRENT STATUS & POTENTIAL ISSUES

This technology is currently still in the research and development phase; biosensing tattoos are being tested in laboratories, using pig skin and synthetic skin to simulate human response.

The following factors must be tested before large-scale clinical trials can be launched:

- Long-term safety assesses irritation, toxicity and allergies over longer periods of time
- Durability assesses whether sensors fade or degrade over time or continue working accurately
- Reversibility assesses whether biosensing tattoos can be removed, for example, by laser removal

One challenge in developing biosensing tattoos is gaining approval worldwide – tattoo inks are currently under regulated in many countries as they are considered cosmetics.

The introduction of medical dyes used in biosensing tattoos will need rigorous testing from multiple health authorities before they are accepted.

Another problem is that these tattoos may not be effective and visible across all skin tones. The technology relies on detecting shifts in colour, but observing these colour changes may be difficult on darker skin since there is lower contrast between tattoo dye and the natural pigmentation of the skin.

This raises questions about accuracy and accessibility, as individuals with darker skin tones may not be able to distinguish colour changes with the same clarity or may not be able to get biosensing tattoos at all. Scientists are exploring ways to improve dye contrast so that biosensing tattoos are equally effective for all skin types, but further research is required to make the technology truly inclusive.

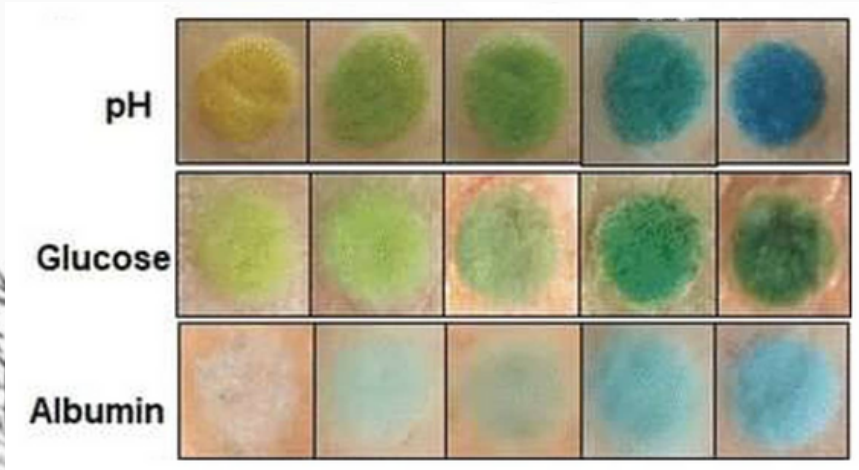
CONCLUSION

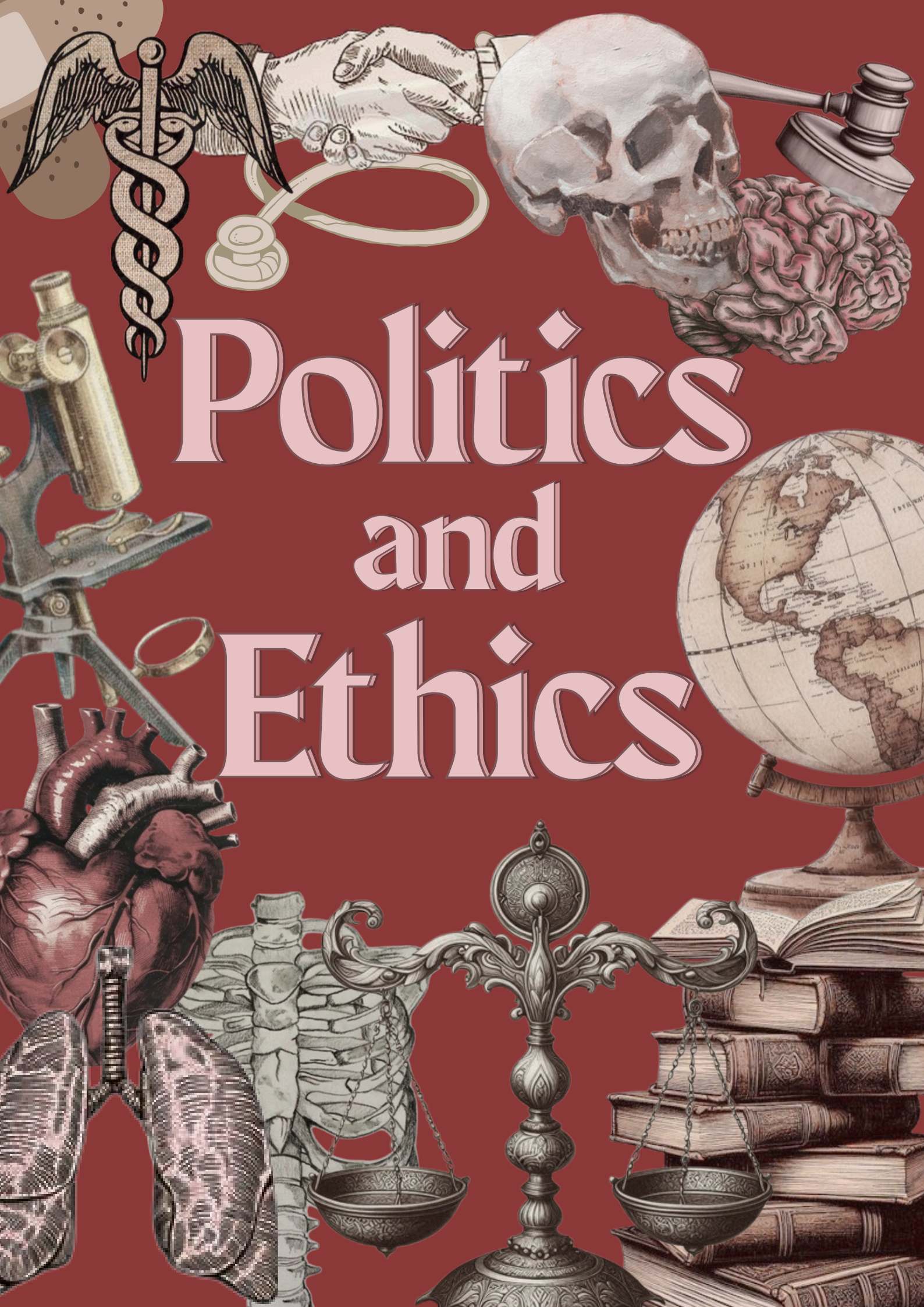
In conclusion, biosensing tattoos hold the potential to revolutionise the way we monitor health, blending art with advanced medical technology to create a system that is both functional and personal.

By offering a non-invasive, continuous, and visually accessible method of tracking key health markers, this innovation could ease the burden on both patients and healthcare systems. While challenges around safety, regulation, and inclusivity remain, ongoing research is steadily paving the way toward making these tattoos a practical reality.

As the technology matures, biosensing tattoos could become a vital tool in preventive medicine, chronic disease management, and accessible healthcare worldwide.

By Charvi K




Politics
and
Ethics

How should medical professionals approach health inequality in the 21st century?

by Ginika O

The blame for the existence of health inequalities should not be placed on medical professionals anymore. The fact that 30-55% of health outcomes are influenced by social determinants of health (WHO, 2025) proves that medical professionals are already doing their part "to treat all people equally and equitably" (Medical Protection, 2024). However, we cannot go on to blame those in a lower socio-economic background, who in many cases did not choose the quality of their early life.

Who is responsible for the cause of and tackling health inequalities?

The goal of this essay is to refute subjective beliefs surrounding the stigmatised topic and analyse what initiatives have been taken in the past. This enables the formation of a modern approach to lessen the disparities in health that can be undertaken by medical professionals.

What is health inequality?

NHS England (2023) defines health inequalities as differences in health across a population and between different groups within society. Controversies have arisen between different occupations and socio-economic groups, with some arguing that these differences are "unfair" and "avoidable". Others disagree with this viewpoint, as they believe that those who are less financially secure have put themselves in these situations, for reasons such as inequalities will always exist, and not everyone deserves to be supported. While it may not be able to simply eradicate healthcare inequalities, taking steps to identify and understand the wider determinants of health can enable us to reduce their prevalence in society today.

What are the causes of inequalities in health?

As implied earlier, the primary cause of health inequalities is not due to the NHS, but rather differences in the "circumstances into which we are born, grow up, live, work and age" - the wider/social determinants of health (British Medical Association, 2011).

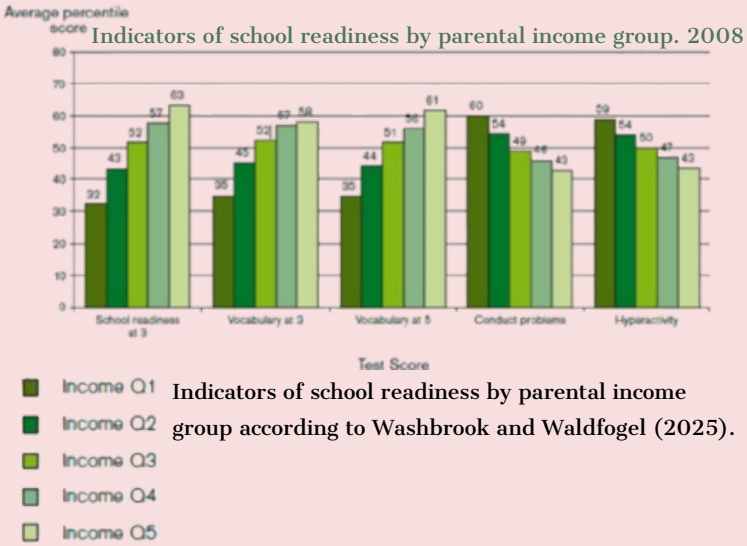
The "social determinants of health" highlights that inequalities in health are due to the increasing scale of inequalities in wider society and emphasises that inequalities in health cannot be reduced if the barriers people face economically and socially are not removed. WHO outlines the determinants of health, which can be categorised into the 'primary' and 'secondary' determinants.

'Primary' Social Determinants of Health	'Secondary' Social Determinants of Health
• income and social protection • eduation • unemployment and job security • working life conditions	• food insecurity • housing, basic amenities and the environment • early childhood development • social inclusion and non-discrimination • structural conflicts • access to affordable, good-quality health services

Social determinants according to WHO, 2025. Categories according to article author.

The 'primary' social determinants of health are almost identical to the definition of socio-economic status (SES), which according to the American Psychological Association (APA, 2023) includes "income", "educational attainment" and "occupational prestige". This contradicts the opinion that health inequalities are unavoidable, as by improving the average educational attainment of the population, more people will be able to access better jobs and incomes, allowing them to access and achieve better health results.

The APA goes on to say that socio-economic status "reflects quality of life"; housing, childhood development and access to affordable health services of decent quality are examples of these. The graph below from the BMA, 2011, is an example of the close link between the socioeconomic status that one is born into (in this case parental income) and how their quality of life is impacted, through no fault of their own (here, it is their readiness for school).



Indicators of school readiness by parental income group according to Washbrook and Waldfogel (2025).

Research like this helps to disprove the ideology that health inequalities are fair – children do not choose the family they are born into, and so the level of education they achieve or the quality of health they receive is not up to them. This automatically leads to health inequalities very early on in life.

<u>Who are the victims of health inequalities?</u>

As we have discussed what causes health inequalities, it is important to identify who they affect the most in order to develop tailored strategies to combat it.

The NHS (2023) identifies high deprivation areas, minority ethnic communities, individuals with learning disabilities, autistic individuals, inclusion health groups, and long-term health conditions as more likely to experience inequalities due to poor local services, low access to childcare and transport, negative past experiences, and language barriers.

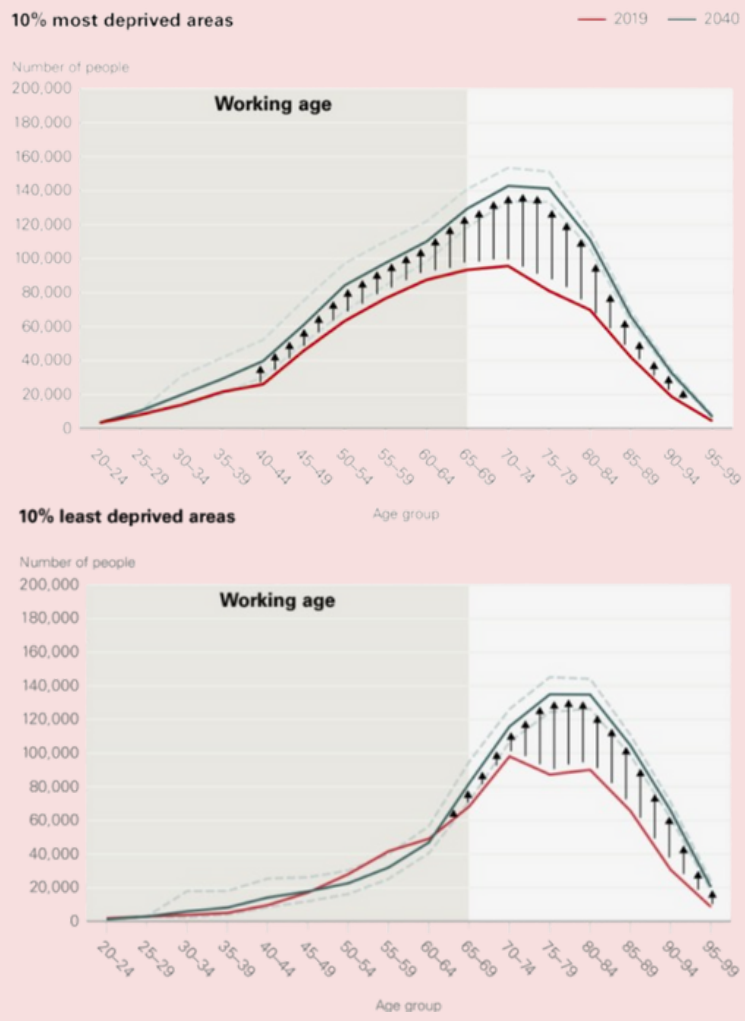
If healthcare inequalities are not addressed at a fast enough pace, the consequences will be dire for those in these demographics.

Following the major research programme led by the Health Foundation's Real Centre in partnership with the University of Liverpool, it has been predicted that the number of people across all age groups with major illness will be greater in 2040. What is more alarming is that this figure will be significantly greater across all age groups (20-99) in the 10% of the most

deprived areas of the UK, whereas in the 10% of the least deprived areas of the UK, the increase will be seen in those above working age.

The Health Foundation's Real Centre and the University of Liverpool's research predict a rise in major illness among all age groups in the UK by 2040. The increase is particularly concerning as it will be much greater amongst the working age population in the 10% of the UK's most deprived areas, in contrast to the least deprived. This will cause the disparities in health to increase, as the issue of those in most deprived areas having poorer access to health will be exacerbated.

Number of people with major illnesses by age, 2019, projected for 2040, 10% most and least deprived areas, England



Analysis of linked health care records and mortality data conducted by the REAL Centre and the University of Liverpool, 2024.

The COVID-19 pandemic also aggravated these healthcare inequalities, which prompted action from the NHS to create the eight "urgent actions to address inequalities in NHS provision and outcomes" in addition to measures in the "NHS Long Term Plans"

<u>What can modern medical professionals do to reduce the gap in access to health?</u>

The government has been trying to reduce the gap in access to health since the "welfare reforms of the 1940s". According to the Institute for Fiscal Studies (2023) this saw the introduction of the 1944 Education Act, 1946 National Insurance Act and the 1948 National Assistance Act. Each of these aimed to help tackle socio-economic inequalities which impacted the social determinants of health, whilst the creation of the National Health service in 1948 directly focused on reducing inequalities in access to health.

A more recent public health initiative to address healthcare inequalities is the NHS' National Healthcare Inequalities Improvement Programme (HiQiP). The programme outlines five priority areas, aiming to "prevent and manage ill health" in groups experiencing healthcare inequalities. The NHS plans to implement strategies, policies, initiatives, and programs to reduce healthcare inequalities, but 21st-century doctors need to take action differently.

A way in which medical professionals can approach healthcare inequalities is by educating patients about holistic medicine. When taking steps to help a patient with their healthcare by helping them to make lifestyle changes, doctors can take more time during appointments to outline why they are taking this approach, both on an individual level, but also on a national level to help the patient, who may be from a more deprived area or minority ethnic community, to feel more integral to the reduction in healthcare inequalities.

Another way is through increased community outreach – medical professionals can go to

nurseries and schools in areas where locals have a lower average socio-economic status to discuss the topic of healthcare inequalities with teachers & parents. By making leaders in schools and those who play a key role in early childhood development more aware of how these healthcare inequalities can arise and providing small ways they can give the children the best start in life, the scale of some these wider determinants of health can be reduced.

Lastly, medical professionals can also look inwards and communicate more with colleagues concerning their experiences of healthcare. Medical professionals and NHS staff come from a wide range of socio-economic backgrounds, and it is worth evaluating how the experiences of members of staff may reflect within the general population for medical professionals to find ways they can approach their practice differently.

Conclusion

Even though the NHS offers 'free healthcare' funded by taxes, health inequalities still exist and are not fair or unavoidable. The responsibility to address these inequalities should not fall solely on the NHS and its staff. Medical professionals should take a more personal and regular approach by educating patients, members of the community, and communicating with colleagues. This helps provide better support to those affected by healthcare inequalities, without the need for large-scale legislation and programmes to be put in place, as has been seen in the past.

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The Charlie Gard Case: A Legal and Ethical Analysis

by Kalista F

The Charlie Gard case remains one of the most significant legal battles in medical law, capturing global attention and sparking intense debates about medical ethics, parental rights, and the role of the court in life-and-death decisions. Charlie Gard was an infant born in London in 2016 who had a rare genetic disorder called mitochondrial DNA depletion syndrome (MDDS), which causes progressive brain damage and muscle failure. At the heart of the case was a fundamental legal question: Who should have the final say over a child's medical treatment – the parents or the doctors? This case not only highlighted the complexity of medical law but also raised significant ethical concerns about experimental treatments and end-of-life care.

The Legal and Ethical Dimensions of the Charlie Gard Case

The legal battle surrounding Charlie Gard's treatment was rooted in conflicting perspectives. On one side were Charlie's parents, Chris Gard and Connie Yates, who sought to take their son to the United States for an experimental treatment known as nucleoside therapy, believing it could offer him a chance at survival. On the other side were the doctors at Great Ormond Street Hospital (GOSH), who argued that the treatment would not improve Charlie's condition, and that further intervention would cause unnecessary suffering. The case eventually reached multiple courts, culminating in a final ruling that prioritised the principle of the child's best interests over parental preferences.

The Legal Battle and Court Decisions

The dispute progressed through several stages:

- High Court (April 2017): The court ruled in favour of GOSH, determining that continuing treatment was not in Charlie's best interests due to the lack of evidence supporting nucleoside therapy's effectiveness for his condition.
- Court of Appeal & Supreme Court (May - June 2017): The decision of the High Court was upheld, affirming the precedence of medical expertise in determining a child's best interests.
- European Court of Human Rights (June 2017): The parents' appeal was rejected, reinforcing the legality of the previous rulings.
- Final Decision (July 2017): Following new medical evidence that treatment would no longer be effective, Charlie's parents ended their legal fight. He was moved to palliative care and passed away on 28 July 2017.

Legal Principles at Play

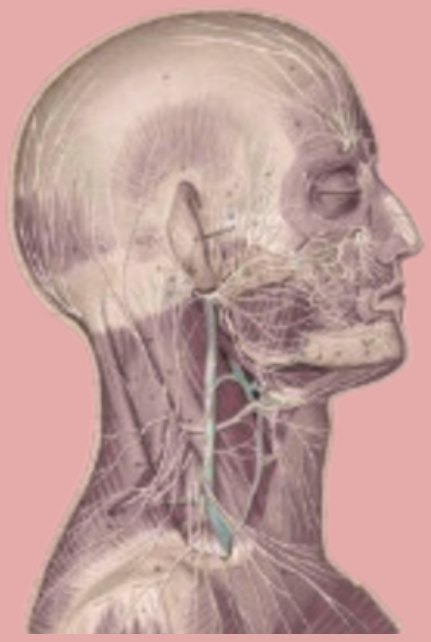
1. The Best Interests Principle: Under the Children Act 1989, Section 1, courts are required to prioritise the welfare of the child above all else. In this case, medical experts successfully argued that further treatment would only prolong suffering.

Legal Principles at Play

1. The Best Interests Principle: Under the Children Act 1989, Section 1, courts are required to prioritise the welfare of the child above all else. In this case, medical experts successfully argued that further treatment would only prolong suffering.
2. Parental Rights vs. Medical Opinion: The case questioned whether parents should have the ultimate authority over their child's treatment or whether medical professionals' recommendations should take precedence.
3. The Role of the Courts: The judiciary was required to weigh medical evidence against parental wishes, ultimately setting a legal precedent for future cases involving experimental treatments and end-of-life decisions.

Ethical Implications

1. Medical Futility: A central ethical issue in the case was whether continuing treatment for a terminally ill child with no chance of improvement was justifiable or whether it amounted to prolonging suffering unnecessarily.
2. Access to Experimental Treatments: The case sparked broader debates about whether patients should have the right to seek unproven treatments abroad, even against medical advice.
3. Impact on Future Cases: The case reinforced the principle that the courts have the final say in medical disputes involving minors, influencing similar cases in subsequent years.



Conclusion

The Charlie Gard case serves as a landmark ruling in medical law, reinforcing the principle that courts will prioritise a child's best interests over parental preferences. While the case underscored the authority of medical professionals in life-and-death decisions, it also raised important questions about parental rights, the accessibility of experimental treatments, and the ethical limits of medical intervention. Moving forward, it highlights the need for clearer legal frameworks to navigate the intersection of parental authority, medical expertise, and the rights of the child.

Understanding the Labour Government's Changes to the NHS

by Rianna S

The National Health Service (NHS) has long been a focal point of political debate, with each government seeking to implement reforms aimed at improving efficiency, patient outcomes, and workforce sustainability. Since coming into power in 2024, the Labour government has introduced a series of significant changes to the NHS[1]. These include the abolition of NHS England, increased NHS funding, the introduction of Martha's Rule, and the development of a 10-year health plan. In this article, I will discuss each of these changes in detail, explaining their purpose, potential impact, and what they mean for the future of healthcare in the UK.

Abolition of NHS England

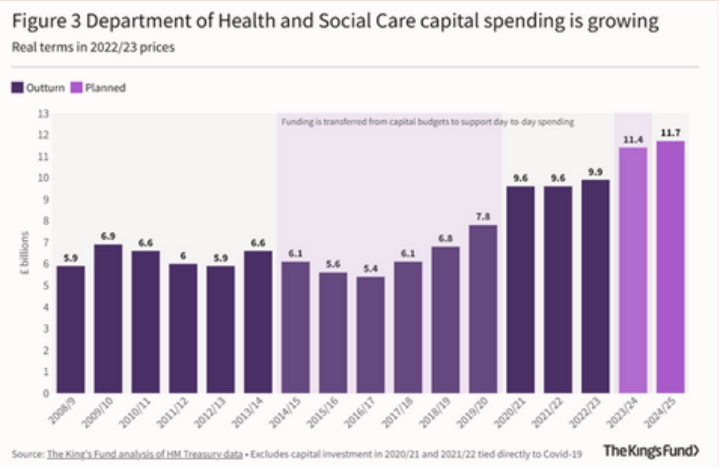
One of the most striking changes introduced by the Labour government is the abolition of NHS England, the body responsible for overseeing healthcare delivery, commissioning services, and setting long-term priorities[2].

The government argues that removing NHS England will streamline decision-making and reduce bureaucratic inefficiencies, allowing for more direct government accountability in healthcare management. By centralising control, Labour aims to make the NHS more responsive to national policies and funding decisions. The restructuring is expected to save £500 million annually and reduce around 9,000 administrative roles[3].

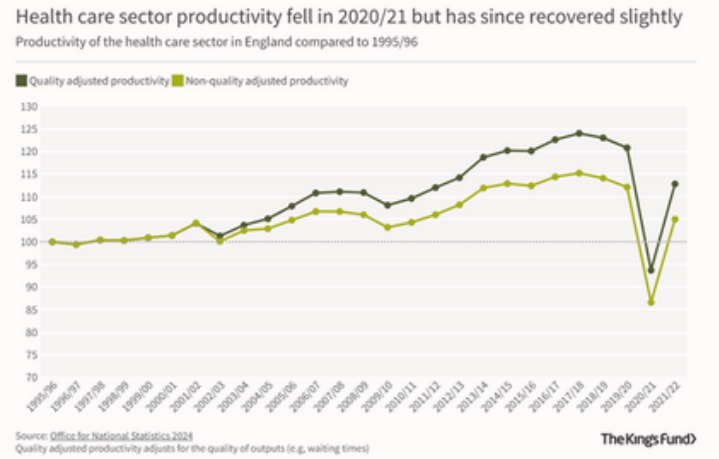
However, critics warn that this restructuring could lead to short-term disruption. NHS England played a crucial role in coordinating national healthcare initiatives, and its removal raises concerns about who will take on these responsibilities. Some fear that shifting decision-making to the government could lead to greater political interference in healthcare rather than improvements in efficiency. Furthermore, there are concerns that reducing managerial staff could exacerbate existing inefficiencies and negatively affect frontline services. Experts also warn that reabsorbing NHS England's functions into the Department of Health and Social Care could undermine the system's overall efficiency by diverting focus from its broader responsibilities[4].

Increased NHS Funding

A critical element of Labour's NHS reform proposal involves significantly increasing NHS funding to ensure the health service can meet growing demands and address existing challenges. For example, the UK government's recent budget announcement allocated £25.7 billion in funding for the NHS over two years, marking the largest increase in NHS spending since 2010. This funding will support key initiatives, including the addition of 40,000 extra elective appointments each week to reduce waiting times and an investment of £1.5 billion to create new surgical hubs and expand diagnostic capacity[5].



While increased funding is vital for enhancing patient care and reducing backlogs, evidence suggests that it alone may not resolve systemic inefficiencies within the NHS. Studies have shown that despite financial boosts, the NHS has experienced a decline in productivity, with fewer patients treated compared to pre-pandemic levels[6]. Therefore, alongside financial investment, comprehensive structural reforms are essential to ensure that funding translates into tangible improvements in patient care and operational efficiency.



Introduction of Martha's Rule

Martha's Rule is a new patient safety initiative that enables patients, families, and healthcare staff to request an urgent review if they feel a patient's condition is not being adequately addressed. The rule was introduced following the death of 13-year-old Martha Mills, who developed sepsis while in hospital. Her family's concerns about her health were not responded to in time, which contributed to her tragic outcome.

Martha's Rule empowers both patients and medical staff to escalate concerns if they feel the standard processes are not working. It ensures that patients are asked regularly about how they feel, and if concerns are raised, they can be directed to another medical team for further review. This initiative is currently being tested in pilot sites across the country, with plans for broader implementation. It aims to improve communication between patients, families, and healthcare professionals, ultimately enhancing patient safety[7].

Development of a 10-Year Health Plan

The NHS's 10-Year Health Plan, announced in October 2024, aims to prepare the healthcare system for future challenges by focusing on three key shifts. First, it seeks to move care from hospitals to communities, responding to the growing number of people with complex health conditions, especially in deprived areas. Second, the plan aims to make better use of technology, including AI and electronic patient records, to improve care quality and efficiency. Finally, the plan emphasizes prevention over treatment, aiming to tackle the root causes of illness and promote early detection. This holistic approach is intended to reduce pressure on health services and ensure the NHS remains fit for the future, meeting the needs of an ageing population with increasing health demands[8].

Conclusion

Understanding the Labour government's changes to the NHS is essential for future doctors, as these reforms will shape the healthcare environment in which we will soon work. The abolition of NHS England, increased funding, and initiatives like Martha's Rule are designed to address patient safety and workforce challenges. As we prepare for our medical careers, it's important to understand how these changes will influence patient care, resources, and the broader healthcare system. Being informed about these shifts will help us navigate the evolving landscape of the NHS and our roles within it.

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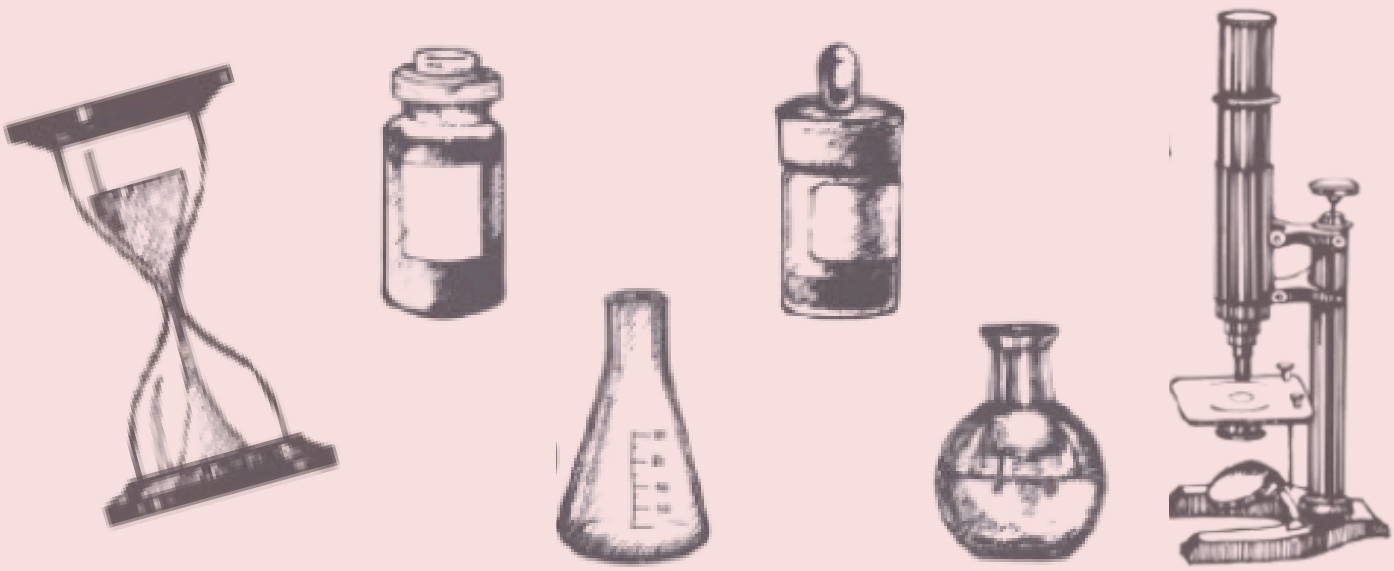


Organ Donation and Transplantation in the UK: is the opt-out system truly beneficial?

by Sachee K

Organ donation and transplantation play a vital role in saving and improving lives across the UK. Currently, nearly 7,000 people are waiting for an organ transplant, from major organs, like hearts and livers, to corneas that can restore sight. While the medical advancements enabling these procedures are improving daily, the demand for organs continues to far outweigh supply.

To help address this gap, England, Scotland, Wales, and Northern Ireland have adopted an opt-out organ donation system, where all adults are presumed to be donors unless they have explicitly stated otherwise. While designed to increase donation rates, this approach remains controversial, raising ethical questions about consent and individual autonomy. Transplant recipients are not simply prioritised by time spent on the list. Instead, patients are evaluated using various criteria, including urgency, compatibility, lifestyle factors, and their long-term health prospects.

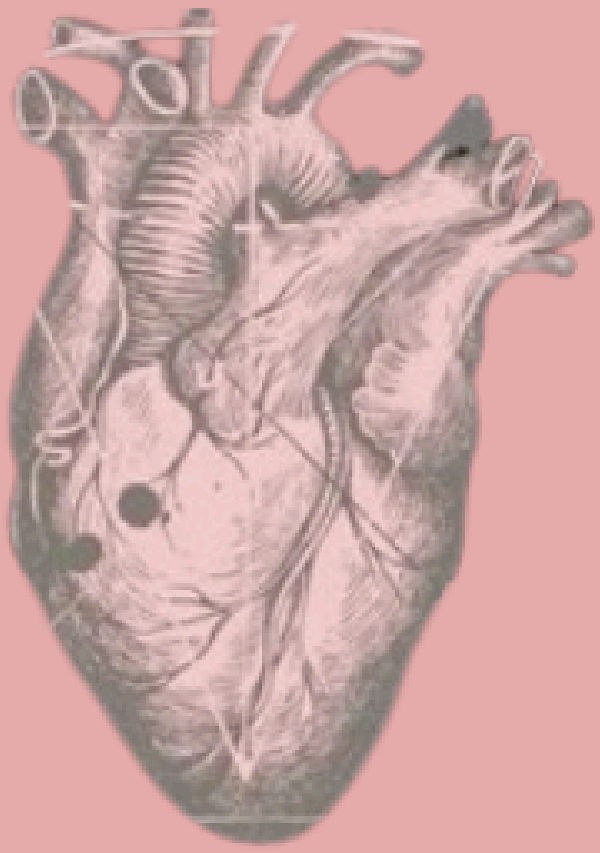
How does organ donation work?

When someone dies, their organs may be assessed for donation, but not all organs will be suitable. Viability depends on several factors, including the biochemical condition, physical structure, and functionality of each organ. As a result, many donors may have only certain organs deemed fit for transplant. Once removed, each organ has a limited window in which it remains usable (e.g., a heart must be transplanted within 4-6 hours, while a kidney can remain viable for up to 36 hours). During this critical period, organs are matched with recipients on a national waiting list, considering tissue compatibility, geographic proximity, and whether the hospital can perform the procedure in time.

After the transplant, patients face a lengthy and complex recovery. The surgery itself carries risks, and patients must take immunosuppressant drugs to prevent their immune system from rejecting the new organ. These medications, while essential, significantly increase vulnerability to infections. Even with successful surgery and medication, transplant recipients still face a heightened risk of complications and premature death.

What is the opt-out organ donation system and what are arguments for and against this system?

If the deceased has not registered a preference, their organs are still donated. They have to opt out of this system. Their next of kin, however, can generally opt-out on their behalf after their death.

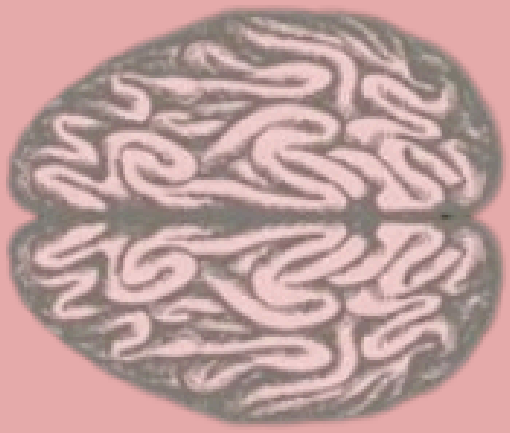


Supporters of the UK's opt-out organ donation system argue that it offers a practical and ethical solution to the country's organ shortage. One of the strongest arguments is based on numbers – by presuming consent, more organs become available, helping to address the current gap between supply and demand. In fact, 421 people in the UK died last year while waiting for a transplant, many of whom might have survived if more organs had been donated. Advocates also highlight the importance of prioritisation, suggesting that in balancing the rights of the deceased with the needs of the living, it is reasonable to give greater weight to those who have a chance to survive. Additionally, the opt-out system helps with normalisation – by making organ donation the default, it becomes a more accepted and expected part of end-of-life planning, which can encourage more people to support and maintain their donor status.

Despite its potential benefits, the opt-out organ donation system is not without criticism. One major concern relates to autonomy – some individuals may be unaware of the system or unsure how to opt out, meaning their organs could be donated against their true wishes simply because they never had the opportunity or knowledge to register a preference. Critics also point to the importance of respecting the dignity of the deceased, particularly in the context of certain religious or cultural beliefs that require the body to remain intact after death. In such cases, presumed consent may be seen as deeply disrespectful. Additionally, some argue that there are alternative approaches that preserve individual choice while still increasing donation rates – for example, by improving public education and encouraging more people to actively opt in, rather than assuming consent by default.

<u>Should organ selling be legalised?</u>

The idea of legalising the sale of organs is highly controversial and raises significant ethical concerns. Proponents argue that allowing organ



sales could help address the chronic shortage of available organs by increasing supply. It might also reduce reliance on the black market, where illegal and unsafe procedures put vulnerable individuals at serious risk and discourage them from seeking medical help if complications arise. However, opponents warn that even in a regulated system – such as one where organs are sold to the NHS and fairly allocated – financial pressure could lead disadvantaged people to sell their organs out of desperation rather than genuine choice. Furthermore, many believe that selling organs is inherently unethical, as it treats parts of the human body as commodities rather than respecting their intrinsic value and the dignity of the individual.

<u>What is living organ donation?</u>

Living organ donation involves a living person donating a whole or partial organ to someone in need of a transplant. This is usually limited to organs that can regenerate or function as a pair, such as the kidney, liver, or lung. Living donation is a vital part of the transplant system, especially as the demand for organs far exceeds the number available from deceased donors. It also offers several advantages – the surgery can be planned in advance, and the organs are often of higher quality, which may lead to better outcomes for recipients. However, living donation is not without risks. Both the donor and recipient face medical and surgical complications, so thorough screening and evaluation are essential to ensure that the procedure is safe and ethical for everyone involved.

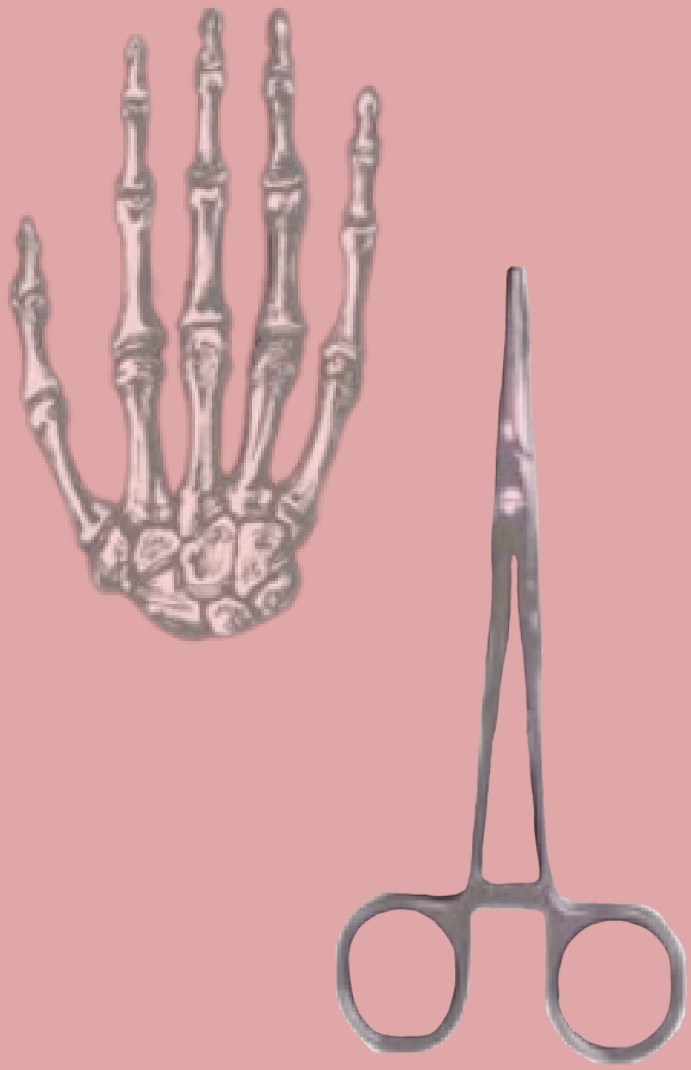
What restrictions, if any, should we place on candidates for receiving organ transplants?

In the UK, several factors influence the prioritisation of organ transplant candidates, ensuring that organs go to those most likely to benefit from them in the long term. Clinical necessity is a key consideration; transplants should be seen as a last resort when other treatment options have been exhausted due to the limited supply of organs. Survival chances also play a role – patients with serious comorbidities that significantly lower their likelihood of surviving the surgery or long-term post-transplant may be deprioritised.

Additionally, candidates must have a support system in place, as the long recovery process requires significant care and assistance. Risk factor exposure is another important factor; patients who are unable to abstain from behaviours that may harm the new organ – like drinking alcohol before a liver transplant – may be deprioritised to prevent organ damage. However, it is crucial that candidates are not penalised based solely on the cause of their condition unless it directly impacts any of these factors. For example, an alcoholic liver disease patient should not be automatically deprioritised if they are abstinent and committed to recovery.

Conclusion

Overall, the UKs opt-out system has shown some promise in increasing organ donation rates, but it's not without its challenges and potential drawbacks. The success of the system will depend on ongoing efforts to improve public understanding, address ethical concerns, and ensure that families and healthcare professionals are adequately supported.



Functional Medicine

Under the Influence:
Anaesthesia Explained

Anaesthesia is a fundamental part of modern medicine, allowing countless procedures that would otherwise be too painful or distressing to endure. The term anaesthesia originates from the Greek word anaisthēsia, meaning "lack of sensation," which reflects its main purpose: to block the perception of pain and sensation. In clinical practice, anaesthesia refers to a medically induced, reversible state that may involve unconsciousness, absence of pain, muscle relaxation, and memory suppression, depending on the type used.

Types of Anaesthesia

There are several forms of anaesthesia, each serving a specific purpose based on the nature of the procedure and the needs of the patient:

- **General Anaesthesia**
  - This type leaves the patient completely unconscious and unaware of their surroundings. It is typically used for major or invasive surgeries, such as hernia repairs or abdominal operations.
- **Conscious Sedation (AKA Twilight Anaesthesia)**
  - Used for minimally invasive procedures, such as endoscopies or wisdom teeth removal. Sedation keeps the patient in a relaxed, drowsy state. Although the patient is technically awake, they are usually unaware of the procedure and experience minimal discomfort. Dr Edna Ma, an anaesthesiologist, explains "this includes light-to-moderate IV sedation with the patient breathing independently."
- **Regional Anaesthesia**
  - This form numbs a larger region of the body, such as the lower limbs or abdomen. Common examples include spinal blocks and epidurals, often used during childbirth or lower-body surgeries.
- **Local Anaesthesia**
  - The mildest type, local anaesthesia involves numbing a small, specific area of the body. It is commonly used for minor procedures like suturing a wound or dental work, and the patient remains fully awake.

How it works

Anaesthesia works by temporarily altering nerve cell activity in the brain and body. While the exact mechanisms are still being studied, it's believed that anaesthetic drugs target specific proteins in nerve cell membranes. These drugs often enhance the effects of GABA, a neurotransmitter that inhibits brain activity, and block glutamate, which normally stimulates the brain. This reduces neural activity, leading to unconsciousness or pain relief. In some cases, anaesthesia also blocks nerve signals to muscles, resulting in temporary paralysis.

The Role of the Anaesthesiologist

Anaesthesiologists are highly trained medical doctors who specialise in anaesthesia, pain management, and critical care. Before surgery, they assess the patient's medical history to determine the safest anaesthetic plan. During the procedure, they
continuously monitor vital signs such as heart rate, oxygen saturation, and blood pressure, to ensure the patient's safety. After surgery, anaesthesiologists help manage pain and monitor recovery as the effects of anaesthesia wear off.

Potential Side Effects

While generally safe, anaesthesia can cause temporary side effects. These vary depending on the type of anaesthesia used, but may include:

- Nausea or vomiting
- Fatigue or drowsiness
- Sore throat (from breathing tubes used during general anaesthesia)
- Muscle aches or back pain
- Headache
- Chills or shivering
- Minor bruising or soreness at the injection site

These symptoms typically resolve within 24 hours.

Duration of Effects

Although patients may feel alert shortly after waking, anaesthetic drugs can remain in the system for up to 24 hours. For this reason, people are advised not to drive, return to work, or make important decisions until the drugs have completely worn off.

Fun fact!

Some people report experiencing uncontrollable hiccups after waking up from anaesthesia. While it sounds funny, it's actually a rare side effect that happens when the diaphragm gets irritated by the anaesthesia. It's more common than you might think and can last anywhere from a few minutes to a couple of hours!

Conclusion

Anaesthesia is a complex yet essential part of modern medicine. It makes it possible for patients to have operations done in a secure, comfortable, and stress-free way. Through ongoing research and the knowledge of anaesthesiologists, anaesthetic techniques continue to advance from simple procedures to large surgery. Knowing the basics of anaesthesia helps to dispel myths about the procedure and emphasises its vital role in modern healthcare.

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By Khushi P

‘Feeling under the weather’:
A deep dive into the common cold

Have you ever woken up fatigued, dreading your alarm as you feel a tickling sensation down your throat as a cough strikes? Taking a sip of water, that discomfort in your throat does not go away, and there you have it – you have caught a cold and now you are feeling under the weather, as you walk to school with an umbrella under the gloomy sky. Sounds like a familiar scene? Well, the cold is an infection from which no person can escape, and it is one of the most common and frequent illnesses people get in their lives. Here is a deep dive into this infection.

What causes a common cold?

A cold refers to a viral infection of the upper respiratory tract, which is also known as an upper respiratory infection (or URI). They tend to present themselves as minor infections lasting for less than a week. They are caused by more than 200 different respiratory viruses and can occur by seasonal trends. They are a common experience shared by the majority of the population, as adults on average experience a cold 2 or 3 times in a year, whereas young children come down with a cold four or more times a year, and it is a contagious upper respiratory infection. No wonder why you got a cold soon after you sat next to a coughing and sneezing individual!

There are several stages of the infection. There are 3 major stages: stage 1 - early, stage 2- active, and stage 3 - late. Stage 1 denotes the phase within one to three days of getting infected. The person usually experiences symptoms such as sneezing, a runny and stuffy nose, coughing and hoarseness. Stage 2 (days 4 to 7) is typically when the symptoms worsen or peak when the person experiences body aches, headaches and fatigue. During stage 3 (days 8 to 10) the cold starts winding down, whether symptoms completely disappear or persist depends on each individual. These are only rough timelines which can differ between the type of strain of the virus and each individual.

What are the most common types of colds?

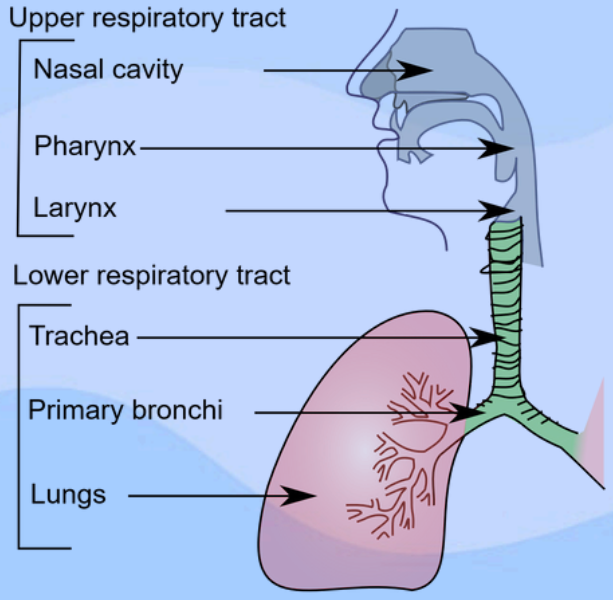
Rhinovirus: According to the American Lung Association, 10-40% of all colds are caused by a rhinovirus.

Coronavirus: There are about six types of seasonal coronaviruses that can infect humans and cause illness. You may be familiar with SARS-CoV-2, which is known for causing Covid-19.

HPIV: This type is most likely to cause symptoms in young children and older adults, and it displays similar symptoms to rhinovirus.

Adenovirus: As well as leading to the common cold, there are about 50 types of adenoviruses, and it can even lead to more serious infections, including bronchitis and pneumonia.

RSV: This type of virus can be spread quickly and typically causes mild respiratory symptoms. However, it can progress into more serious infections.



Early History of the common cold

It was in 1930, when an infectious cause for the common cold was first being considered. In an article that appeared in the 'Archives of Otolaryngology', the writer Hilding says, 'a cold seems to definitely to fall into two groups: (1) those due to exposure and (2) those due to infection.'

By 1944, Hilding writes that "it is now well established that the etiological factor is a filterable virus. Krause determined this in 1914. It was collaborated by Foster in 1916 and again by the masterly work of Dochez and his group in the 1920's." This shows the developments of ideas surrounding the causes of the common cold.

In 1954, Gohd reported that the incubation period from the time of contact with infectious material until the onset of symptoms was 24 to 72 hours and that colds would persist for 3 to 7 days. He also reported on the transmission and risks of developing cold.

How do we catch it?

The upper respiratory tract consists of the nose, mouth, pharynx, and larynx. They are structures providing physical and immunological barriers to infectious pathogens and other unwanted particles that enter the tract through the air breathed in and out. In the nose, unwanted particles stick to the mucus and the nasal mucosa warms and humidifies the air. As the shape of the pharynx takes a 90 degree turn downward, larger airborne particles are not able pass down the turn, so they get caught in the mucus. The most common cold viruses, such as the rhinovirus, enter the body through contaminated hands touching the nose or mouth, or when virus-filled droplets are inhaled. The virus invades the mucus membrane of the upper airway causing inflammation of the invaded areas.

What are the symptoms of a common cold?

Inflammation of nasal membranes caused by the virus can result in excessive mucus secretion, nasal congestion, itching, and sneezing. Inflammation in the lining of the pharynx can lead to a sore throat with an itching sensation and difficulties in swallowing food due to pain. When the larynx is irritated due to the invasion of the virus, it triggers a reflex – the cough reflex. It is a protective mechanism to clear the airways of irritants. Fevers are caused as the body warms in attempt to kill the pathogen.

Impacts of the common cold.

Despite many technological and medical advancements in the 21st century, the common cold continues to be a great burden on both human health and the economy. In 2022, 29.3% of sickness absence occurred due to minor illnesses like colds and flu in the UK. This affects both the daily life of the affected individual but also the productivity of the UK economy. Seasonal influenza is associated with a £644 million loss to the UK's economy which is 0.04% of the GDP.

Treatment of the common cold

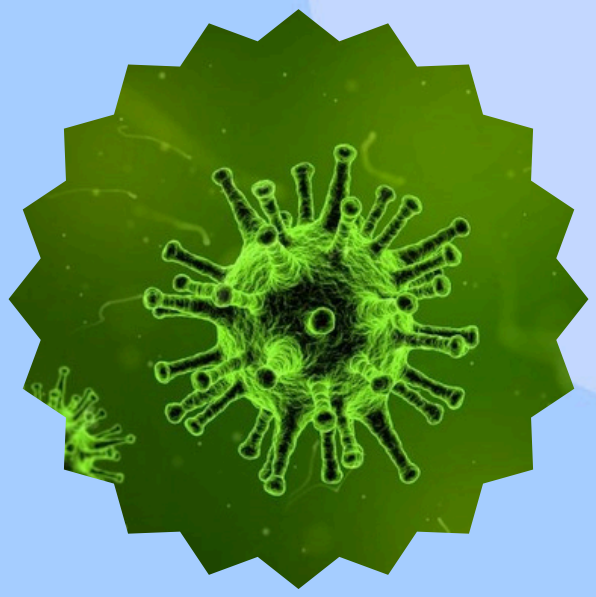
A common cold can usually be treated through home remedies as its impacts on the body are usually minor. The NHS website explicitly mentions that 'You can often treat a cold without seeing a GP. You should begin to feel better in about 1 to 2 weeks.' Some of these home remedies (which you may already be familiar with) are getting plenty of rest, drinking and eating well, saltwater gargling, hot lemon and honey water as well as breathing in steam. Common medications include paracetamol, ibuprofen as well as decongestant nasal sprays, drops or tablets.

In some less common cases, the infection can get severe. A high temperature for more than 3 days, a cough for more than 3 weeks and other prolonged symptoms that do not seem to be getting any better are indications of this severity.

Colds are typically milder than the flu. The flu can cause more severe symptoms and is more likely to lead to significant health complications. The flu is caused by the influenza virus and occurs as per seasonal trends. Certain underlying health conditions can put people at higher risk from the flu such as asthma, history of stroke, diabetes, a weakened immune system and a BMI greater than 30 (obesity). The flu is diagnosed through a swab test and can be treated through antiviral drugs. The severity of the flu is why there are annual vaccination programmes; the influenza virus mutates over time, so people get vaccinated annually.

Can it be eradicated?

The hunt for a permanent cure of the common cold commenced in the 1950s. Shortly after, scientists discovered that the primary group of pathogens causing the cold are rhinoviruses. Since then, scientists have encountered the same prevalent issue; the fact that there are so many different strains. Peter Barlow, an immunologist at the Edinburgh Napier University in Scotland, states 'there's at least 160 different strains, or serotypes, of rhinovirus', 'It's incredibly difficult to create a vaccine or drug that will target all of those 160 [strains]'.



What are the benefits of the common cold?

When considering a contrasting view of catching a cold, we can consider some optimistic benefits of catching a cold. The fact that you are experiencing symptoms is a sign that your immune systems is battling against the pathogen. Getting infected by a mild cold can support the body's defence mechanisms. It also makes you appreciate your body and encourages you to take care of it even better next time.

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By Prethika R

The Effects of Intermittent Fasting on the Human Body

What is fasting?

Fasting is the eating pattern which alternates between the periods abstinence of food and regular eating. This can include time-restricted (abstaining from food between a certain time), 5:2 diet (eat normally for 5 days within a week and restricted eating for 2 days that are spaced out), and alternate-day fasting (fasting on one day and eating however much the next).

Before it was introduced into the medical field, fasting can be observed throughout history within cultures and religions. For example, fasting physiology is built within our species, as before 10,000BC, food was not always readily available and as such, humans had to adapt to long periods without food. Fasting is also observed for spiritual or health reasons in religion. In Hinduism, the most commonly observed fast, Ekadashi, occurs twice a month on the 11th day of each ascending and descending moon. In Judaism, there are 6 main days in a year where fasting is observed - there are two 'major fasts' and four 'minor fasts.' In Islam, fasting is observed for 30 days during the month of Ramadan.

How intermittent fasting affects the body

Research into intermittent fasting dates back to 1935 with McCay et al, a professor at Cornell University, who had researched the growth of rats that were subjected to daily dieting restrictions from an early age. He has found that these rats not only lived longer but were less likely to develop cancer and other diseases as they aged, compared to animals that ate whatever they wanted.

In the next decades of research, advancements into technology and medicine (such as blood biomarkers and brain imaging) allowed for understanding of the effects of fasting.

For example, from historical observations, animal studies and modern clinical research, we now know that after a considerable amount of time after fasting (for example, 6 hours), your blood sugar begins to drop and therefore, your insulin levels decrease. Your body therefore uses stored glycogen, a carbohydrate reserve in the liver and muscles, for energy. After this reserve has been used up, the body begins to burn fat for energy. Ketones (by-products of fat metabolism) start rising, providing an alternative fuel for the brain. Growth hormone level increases, helping with fat breakdown and muscle preservation. Cellular autophagy begins.

Benefits vs. Risks

From the effects of intermittent fasting, we can observe many benefits, here are some examples:

Weight loss – this is due to the low levels of insulin and therefore, the usage of glycogen and body fat for energy, aiding the breakdown of fat. Short term fasting also boosts norepinephrine, which increases calorie burning.

Cognitive function – Fasting boosts the protein BDNF (Brain-Derives Neurotrophic Factor) which supports neuron growth and learning. Autophagy in the brain clears our toxic proteins, reducing the risk of neurodegenerative diseases.

Cancer prevention – Cancer cells rely on glucose; fasting therefore depletes their energy source. Fasting also triggers autography, which helps destroys damaged / mutated cells before they become cancerous.

Gut health – Fasting gives the digestive system a rest which allows the gut lining to repair itself. This also promotes the growth of healthy gut bacteria, which improves digestion.

Despite a large amount of benefits that have risen from intermittent fasting, it could also pose risks if not planned carefully. For example:

Nutrient deficiencies – These occur as extended fasting reduces overall nutrient intake; you can prevent this by eating nutrient-dense meals during windows and/or taking supplements.

Dehydration – Dry fasting (fasting where you can not drink water) causes body to lose water and electrolytes; to prevent this, drink plenty of water during your eating window, or try wet fasting (fasting where you can drink water).

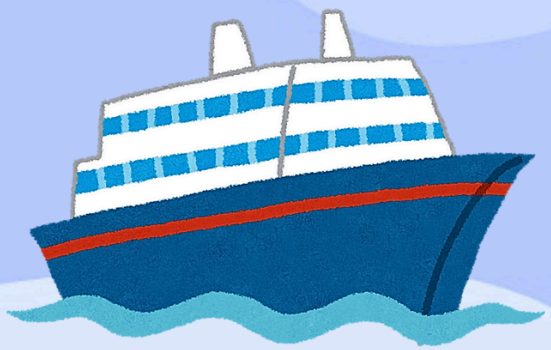
Increase stress – The body perceives prolonged fasting as stress, which can increase cortisol production. To prevent this, get enough sleep and stick to a sustainable fasting schedule.

Intermittent fasting has profound effects on the body from weight loss to enhanced cognitive function and cellular repair to prevent life-threatening diseases, which further contribute to better health and longevity. However, this should be approached mindfully and with care to prevent damage to your physical and mental health, ensuring you are still eating nutrient-dense meals and listening to your body to ensure which type of fasting works best for you. It is also important to note that not everyone have the capability to fast such as pregnant women, people with low blood pressure, children, people with illness, people with eating disorders etc. If you are unsure whether your condition will worsen if you fast, consult a medical expert!

By Afra R

Diseases, Through Flight

During the 'covid years' of 2020 and 2021, the world saw a significant level of stagnation, and this was largely felt by the aviation industry, as measures were quickly implemented in efforts to mitigate the growing pandemic. The number of air passengers in 2020 fell by 60% from 2019, an unprecedented drop; yet the spread of the infection was worldwide, and some argue the measures were barely effective. However, it remains that throughout history, transport has been a large motivator as communicable diseases spread– so the question of where these measures failed and succeeded comes into light.



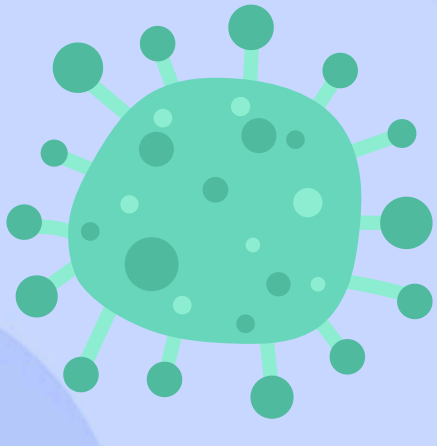
Before developments in technology and travel allowed humans to travel over large distances in relatively short amounts of time, infectious diseases were more contained and limited, spreading as slowly as the current transportation modes allowed. In the 1300s, the plague was spread by fleas carried to destinations along trade routes, mainly by ship. Although the time of travel by ship is significantly longer than some modes of transportation offered today, the devastation was still widespread and detrimental, causing an estimated 50 million deaths.

Considering the advancements made in transportation until today, including commercial air travel and high-speed trains, the rate of disease transmission across continents has naturally grown. A person could board a plane with an infection endemic to that area, and easily carry it across to a destination on the other side of the world within 24 hours. Such journeys would have taken half a year in the 1500s. In this way, diseases are quickly made global, as with COVID-19.

Various challenges are posed by this rapid transportation time. These include longer incubation times, which can lead to a late diagnosis of a disease, by which time an infected person has already introduced the disease to their destination. This is the case with some malaria outbreaks; depending on the species, the incubation time of malaria varies between a few weeks to months, causing it to go undetected by passengers before boarding. This contributes to the difficulty in containing malaria, despite various other efforts to eradicate the disease.

Another challenge specific to vector-borne diseases, such as malaria, is the easy transportation of vectors aboard passenger and cargo flights– in this way, diseases are spread in much the same way that the plague was. As mosquitoes, particularly of the genus Anopheles, arrive at a new destination and bite a person at or near the airport, the infection is successfully introduced to this new area; this event is named airport malaria. It can be difficult to trace the infection back to mosquitoes, especially as the infected person may not have travelled from an area where malaria is endemic, or may have no recent travel history at all. This delays diagnosis, but rarely causes outbreaks, as the malaria-carrying mosquitoes are unlikely to survive in the newer climate. However, this may soon change as climate change and an increase in air travel continue.

Several coronaviruses prior to COVID-19 caused epidemics via air travel. These include the severe acute respiratory syndrome (SARS) outbreak of 2002–2003 and the MERS-CoV epidemic of 2012. Both caused widespread panic, infections, and deaths across several countries, prompting swift action to be taken in the form of screening passengers and travel bans. Although travel bans may seem like a decisive and effective form of pandemic control, evidence has shown that this view is unsupported.



The World Health Organization (WHO) discouraged the implementation of travel bans at the beginning of the COVID-19 outbreak, as "they can adversely impact global health efforts… by dis-incentivising countries to report and share epidemiological and sequencing data". This view may be a result of previous response methods, such as those against the SARS outbreak, which were thought to be successful due to their reliance on collaboration between countries such as the US, UK, and China.

Travel bans that are more targeted (i.e. only applying to travellers from certain countries) are thought to be more ineffective than blanket restrictions, as these can be divisive. However, even blanket travel bans were not recommended to cut the chains of infection. At the beginning of the outbreak, these measures were more condoned, as it allowed for countries to prepare within the delay the restrictions would provide. These measures would become much less effective as the virus had already reached many countries, as all it would achieve was delaying the peak of the outbreak in that country.

The peak of an epidemic is defined as the time during an epidemic at which the number of new daily cases is at its highest. Research has suggested that imposing air travel restrictions during the COVID-19 pandemic delayed this peak by around a month. For a country that imposed restrictions before its first reported case, the peak was reached around 35 days later than in a country that did not impose restrictions until after the first case. This shows that travel bans are more of a delaying measure than a definitive one, and should be remembered as such for future pandemics.
In addition, travel bans are costly and majorly disruptive, and other alternatives are proven to be more effective in containing outbreaks, such as long quarantine periods for infected individuals.

Air travel bans, if not implemented early on, only serve as weak measures that delay inevitable results as diseases spread. Considering that even blanket bans are not absolute, and with the current globalisation in terms of rapid transit, they are an unrealistic and more damaging measure than beneficial. Future responses may be more effective if they are focused around earlier detection and diligent screening at airports, to try to contain diseases as locally as possible, as soon as possible.

By Riya J

Thank you for reading!

Thank you to all for your brilliant contributions!

It was great to see so much enthusiasm from you all, and it was amazing to receive so many articles on a variety of fascinating topics, ranging from exploring the connections between the mind and the body, to how we should be approaching health inequalities in the 21st century!

We hope you enjoyed MediMag+ Edition 9 as much as we did, and we can't wait to see all your contributions for the next magazine!

Yours truly,
The 2025 MediMag+ editors :)