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Consumption of Sugary Beverages Increases Cancer Risk

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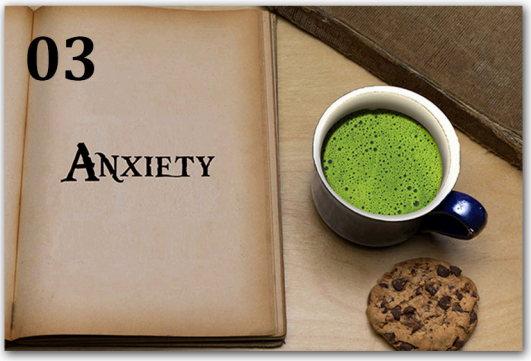

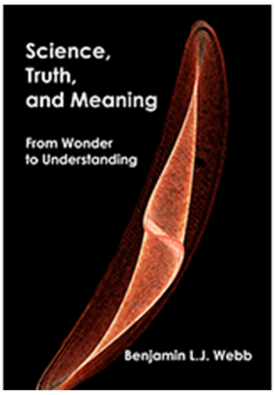

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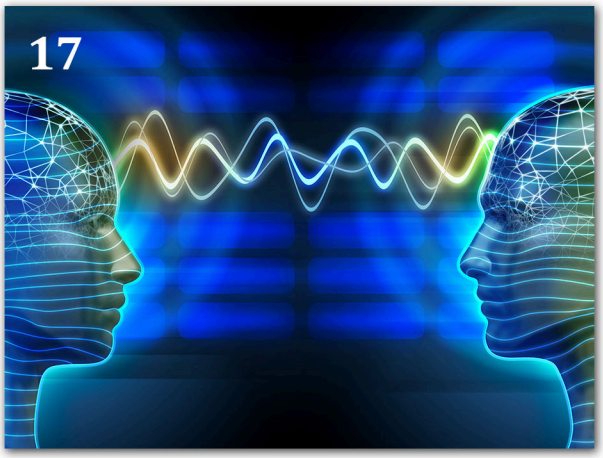

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Longevity: Physical Activity in Middle and Older Age is Crucial

Study shows that engaging in long-term physical activity can help middle-aged and older adults lower their risk of diseases and mortality. The benefit of exercise is regardless of previous levels of physical activity when the person was younger.

World Health Organisation guidelines recommend 150 minutes per week of moderate-intensity physical activity for maintaining good health. Several studies have shown that level of physical activity is linked with risk of diseases by all causes, cardiovascular disease, risk of death and cancer. Though not much research has been done to understand how long-term changes in levels of physical activity can impact health of the general population.

A new study published on June 26 in *BMJ* has investigated long-term effects of being physically active during middle and older age. The study included data of 14,499 men and women (of ages 40 till 79 years) from the European Prospective Investigation into Cancer and Nutrition-Norfolk (EPIC-Norfolk) study conducted between 1993-1997 in the UK. All participants were analysed for risk factors at the start of the study, then three times in 8 years and every participant was followed up for additional 12.5 years. Physical activity energy expenditure (PAEE) was calculated from self-reported questionnaires and this was combined with movements and heart monitoring. The array of physical activity included first, type of work/job a person did (sedentary office, standing work or physically laborious tasks), and second, leisure activities like cycling, swimming or other forms of recreational activities.

After weighing in physical activity and other general risk factors (diet, weight, history, blood pressure, cholesterol etc), analysis showed that increased levels of physical activity even if started from middle age was associated with lower risk of death. Every 1kJ/kg/day per year increase in PAEE was associated with 24% lower risk of death (by any cause), a 29% lower risk of cardiovascular mortality and 11 percent less risk of cancer death. This data was irrespective of whether the person was physically active or not when younger or before middle age. The persons

who were already very physically active but even further increased their activity level had 46 percent lower risk of mortality.

The current study was conducted on a large-scale, with long-follow up and repeated monitoring of participants. The study shows that if middle aged and older adults become more physically active, can reap longevity benefits irrespective of past physical activity and established risk factors and even if they have a medical condition. This work lends support to the health benefits of physical activity in general and also suggests that maintenance of physical activity during middle to late life can be beneficial.

Source

Mok, A. et al. 2019. Physical activity trajectories and mortality: population-based cohort study. BMJ.
https://doi.org/10.1136/bmj.l2323

■

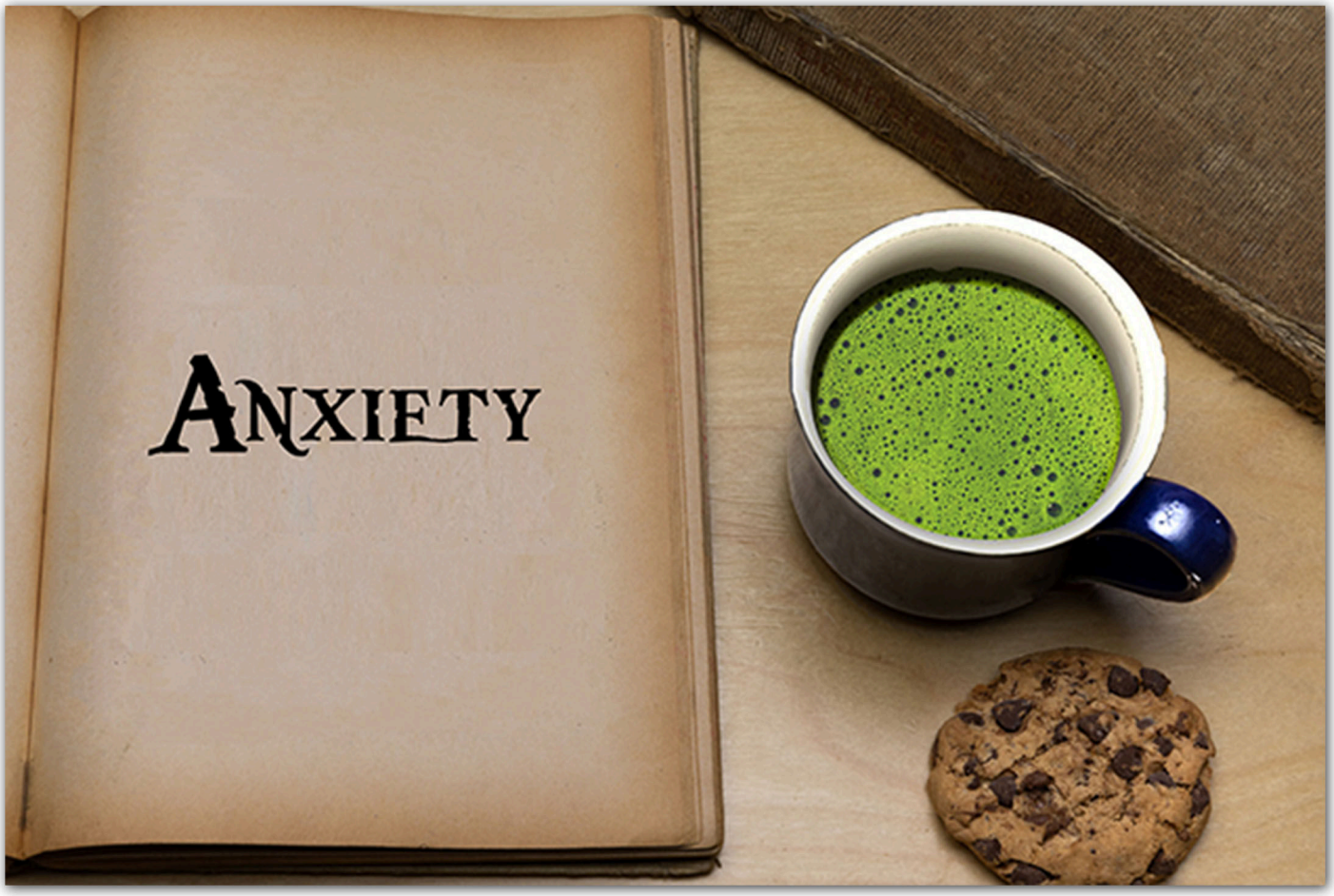
Anxiety: Matcha Tea *Powder and Extract* Show Promise

Scientists have demonstrated for the first time effects of Matcha tea powder and extract in reducing anxiety in an animal model. Matcha is a safe, natural alternative to relieve anxiety and elevate mood.

Mood and anxiety disorders are becoming commonplace in our fast-paced and often stressful lives. Anxiety disorders and fear has been linked to disturbance in dopaminergic and serotonergic systems in our brain. Anxiety symptoms also increases risk of other medical disorders and affects overall wellbeing of a person. Anxiolytic (or antianxiety) agents like benzodiazepines and serotonin inhibitors are generally used for treatment as they reduce or inhibit anxiety. However, they have many side effects, sometimes even adverse, and they also increase dependency. Safer, natural alternative need to be developed for anxiety management.

In Japan, 'Matcha' has been used since a long time for different medicinal purposes. Matcha is a finely grounded power of new leaves from tree plant called *Camellia sinensis* which is allowed to grow only in shade. Matcha powder is used for making Matcha tea by adding it directly to hot water. It is also used for adding flavour to food. Matcha tea is different from regular green tea in its content mainly because of differences cultivation and processing. *Camellia sinensis* plant is rich in L-theanine, epigallocatechin gallate (EGCG), caffeine, vitamins and amino acids and thus consuming Matcha provides several benefits attached to these bioactive substances. It is commonly used in Japan for healing, relaxation and even treatment of skin conditions. However, very limited scientific evidences are available to support the above claims. Also, the effects of Matcha powder on behaviourial aspects has not been explored up till now.

A study published in *Journal of Functional Foods* has investigated and demonstrated the effects of Matcha tea powder, hot water extract and ethanol extract for antianxiety activity in an animal model (here, mice). Researchers conducted an elevated plus maze (EPM) test in healthy animals. EPM



involves use of an elevated plus-shaped platform which has two open arms and two closed arms with walls around it. It is a commonly used anxiety test in which animal subjects which are anxious try to stay on the safe area of the plus where they cannot fall off.

The animals were orally administered Matcha powder and extract or fractions dissolved in water. Results showed that the animals who had consumed Matcha had reduced anxiety. The strongest effect was seen in Matcha extract derived using 80% ethanol when compared to extract derived from hot water. This meant that poor water-solubility of Matcha has better antianxiety effect than when it was easily water soluble. The ethanol extract was fractioned further into hexane soluble, ethyl acetate soluble and water-soluble fractions which exhibited similar results. Behavioural analysis showed that Matcha power and extract reduce anxiety by activating dopamine D1 and serotonin 5-HT1A receptors which are closely linked to anxious behaviour.

The current study conducted on mice demonstrates that Matcha tea powder and extract have a positive calming effect and reduce anxiety by activating dopaminergic and serotonergic systems in the brain. Matcha is a safe and natural alternative for alleviating anxiety.

Source

Kurauchi, Y. et al. 2019. Anxiolytic activities of Matcha tea powder, extracts, and fractions in mice: Contribution of dopamine D1 receptor- and serotonin 5-HT1A receptor-mediated mechanisms. Journal of Functional Foods. https://doi.org/10.1016/j.jff.2019.05.046 ■

Singlet-Fission Solar Cell: An Efficient Way *to Convert Sunlight into* Electricity

Scientists from MIT have sensitized existing silicon solar cells by singlet exciton fission method. This can increase efficiency of solar cells from 18 percent to as high as 35 percent thus doubling energy output thereby reducing costs of solar technology.

It is becoming imperative to reduce our dependency on fossil fuels and build technologies for a sustainable future. Solar power is a renewable source of energy where Sun's light is converted into electrical energy. Solar cells are most commonly made of silicon which uses photovoltaic process to transform sunlight into electricity. Tandem cells are also being designed which generally include perovskites cells where every section of the solar cells can harness Sun's energy from its varied spectrum and thus have higher efficiency. Solar cells available today are limited by their efficiency which is just 15-22 percent.

A study published on July 3 in *Nature* has demonstrated how silicon solar cell efficiencies could be raised to as high as 35 percent by applying an effect called singlet exciton fission. In this effect a single particle of light (photon) can generate two electron-hole pairs as opposed to only one. Single exciton fission is seen in many materials since its discovery in the 1970s. The current study aimed to translate this effect for the first time into a viable solar cell.

Researchers transferred single exciton fission effect from tetracene - a known material which exhibits it – into crystalline silicon. This material tetracene is a hydrocarbon organic semiconductor. The transfer was achieved by placing an additional thin layer of hafnium oxynitride (8 angstrom) between excitonic tetracene layer and silicon solar cell and coupling them.

This tiny hafnium oxynitride layer acted as a bridge and made possible the generation of high energy photons in the tetracene layer which then triggered release of two electrons in the silicon cell as opposed to the usual one. This sensitization of silicon solar cell reduced thermalization losses and enabled better sensitivity to light. The energy output of the solar cells doubled as more output was generated from green and blue parts of the spectrum. This can enhance the efficiency of solar cells to as high as 35 percent. The technology differs from the tandem solar cells as it just adds more current to the silicon without adding additional cells.

The current study has demonstrated improvised singlet-fission silicon solar cells which can exhibit increased efficiencies and thus reduce the overall energy generation cost of solar technology.

Source

Einzinger, M. et al. 2019. Sensitization of silicon by singlet exciton fission in tetracene. Nature. 571. https://doi.org/10.1038/s41586-019-1339-4

Science, Truth, and Meaning

The book presents a scientific and philosophical examination of our place in the world. It reveals the journey mankind has made from the philosophical enquiry of the early Greeks to how science has profoundly influenced our conception of existence.

'Science, Truth, and Meaning' is the title of this book because it presents a scientific and philosophical examination of our place in the world. It celebrates the diverse, interconnected, scientific knowledge that mankind has constructed, and describes how it is reducible to a shared foundation. The book explores scientific truth, and confronts whether truth is absolute or relative to who and what we are. It reveals the journey mankind has made from the philosophical enquiry of the early Greeks to how science has profoundly influenced our conception of existence.

The first chapter is entitled 'Philosophy and science: Paving the way to modern science', and discusses how questions about the workings of the Universe were once the domain of philosophers, and that that this led to modern science, and scientific method, which became our proven method of determining useable truths about physical reality. The application of scientific method through integrated disciplines utilising a common set of expanding proven principles and rules, enabled us to start to delineate the processes of the Universe. Yet, since science is constrained by the rules governing the interaction of force and matter, philosophical enquiry has, and continues to, enable us to probe possibilities limited only by the creativity of the mind. Hence, philosophy is can be a guide as to what might be, whereas science uses this to determine what is.

Chapters 2 and 3 address the physical world as described by classical and quantum theories. The development and details of these two models encapsulate our current understanding of the fundamental nature of physical reality. Classical, and the later quantum, physics describe with incredible accuracy the behaviour of the largest and smallest objects in the Universe, respectively. Yet, primarily, they are incompatible and conflicting theories. Classical physics defines the processes of the very large (such as galaxies)

acting over huge expanses of space and time, whereas quantum theory explains the behaviour of the very small (such as subatomic particles). To unite these two independently accurate descriptions into one grand theory of everything is the holy grail of science.

Chapters 4 and 5 are concerned with the biological world- what we are and how we came to be. Though the theories of the previous chapters underlie how force and matter interact to produce physical phenomena, they don't describe the way humans understand all macroscopic behaviour, and principally not that of living things. This chapter discusses both the physical mechanisms that enable a living entity to live, and how organisms and species evolve over many millions of years.

Having assessed what we are, how we came to be, what is the space in which exist and how is it constructed, we are able to come full circle and re-address the fundamental questions of the philosophers of the first chapter. Chapter 6 and 7 are, thus, concerned with what 'mind' is, and how it interacts with the world. Man's search for meaning using the framework of science as a foundation reveals that though some questions about our existence can be answered, the added knowledge adds new problems that weren't apparent before. We conclude that there is much we still do not know, and may never know. Indeed, we find that truth is a relative not absolute concept.

The difficulties in obtaining the truth we seek about our place in the Universe are linked not only to our understanding of many concepts, such consciousness, free will, and determinism, but also the very limitations on our mental capacity imposed on us by reality itself. Yet, in finding that certain questions cannot be answered, a firmer grounding of what is possible for a human mind to understand enables us to focus of what is important and achievable.

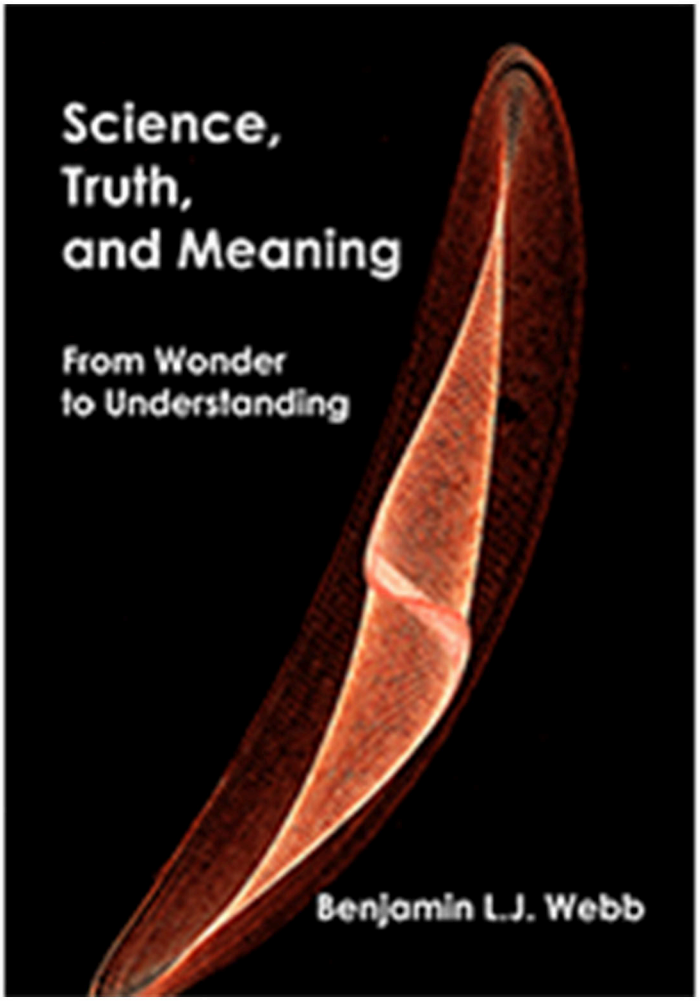


IMAGE CREDIT: Benjamin L.J. Webb

ABOUT THE AUTHOR

Benjamin L.J. Webb
Dr Webb is a biochemist and molecular biologist by profession, with expertise primarily in virology and cancer research, both in academia and currently the biotechnology industry. His PhD was obtained at Imperial College London, followed by research positions at institutions such as University College London and Cancer Research UK. His interest in the topics covered in this book started as a personal research journey 20 years ago, with the aim of obtaining a broader understanding of how accurately science can explain physical reality. These studies culminated in this book.

Tooth Decay: A New Anti-Bacterial Filling *That Prevents* Reoccurrence

Scientists have incorporated a nanomaterial having antibacterial property into composite filling material. This new filling material can effectively prevent reoccurrence of tooth cavities caused due to virulent bacteria.

Tooth decay (called dental cavities or dental caries) is a very common and widespread bacterial disease in school-going children and adults. Virulent bacteria like *Streptococcus mutans* accumulate on the surface of the tooth and start to dissolve hard tissues. Once bacteria settle on the tooth surface, it leads to secondary (or recurrent) tooth decay at the edges of dental filling due to production of acid by cavity-causing bacteria which now reside in the interface of dental filling and the tooth. Tooth decay caused by bacteria is responsible for failure of dental restoration material affecting 100 million patients every year. Recurrent tooth cavities and decay leads to tooth extraction and root canal treatments.

In the earlier time, amalgam fillings composed of metal alloys was used for dental restorations. These fillings did have some antibacterial effect but also had disadvantages of solid colour, mercury toxicity and lack of adhesion to the tooth. Now composite resins are used in dental restorative materials, however, they lack antibacterial property which is a major drawback. Also, gradual release of any soluble agents from the resin affect their mechanical properties resulting in porous or weak resin. Many of the combination materials tested are time-limited and may also be toxic towards neighbouring tissues especially since they require high dosage. Resin-based composite fillings which exhibit bacterial inhibitory activity can deter the development of widespread oral diseases like tooth decay.

In a study published on May 28 in *ACS Applied Materials and Interfaces,* researchers describe a new enhanced material having intrinsic potent antibacterial capabilities which can be used for novel dental fillings to prevent recurrent tooth decay. Same team of researchers had discovered in their earlier work that self-assembling building block Fmoc-pentafluro-L-phenylalanine-OH (Fmoc) has potent antibacterial and also anti-inflammatory properties. And, it contains both functional and structural subparts. In the current study, researchers functionally incorporated Fmoc nanoassemblies inside resin-based dental composite material using novel methods developed by them.

The antibacterial capabilities of this new filling material was subsequently evaluated. Researchers also analysed its mechanical strength, optical properties and biocompatibility. When resin-based composites are added with antibacterial nano-assemblies it gets the ability to inhibit and hinder growth and viability of bacteria. The new material was non-toxic and the mechanical or optical properties of the nanaoassemblies remains unaffected by the integration. The antibacterial activity against bacterium S mutans required very low dosage of the new material.

The current study demonstrates antibacterial activity of Fmoc nanoassemblies and its functional incorporation into dental resin composite filling to develop a biocompatible resin composite amalgamated material. The new filling material is pleasant looking, mechanically rigid, has high purity, is inexpensive and can be easily embedded within resin-based filling materials.

Source

Schnaider, L. et al. 2019. Enhanced Nanoassembly-Incorporated Antibacterial Composite Materials. ACS Applied Materials & Interfaces. 11 (24). https://doi.org/10.1021/acsami.9b02839 ■

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Consumption of Sugary *Beverages Increases* Cancer Risk

Study shows a positive association between consumption of sugary beverages and 100 percent fruit juices with increased risk of overall cancer and breast cancer. The study adds evidence to support policy decisions to restrict consumption of sugary drinks by general population.

More and more people of all age groups worldwide are regularly consuming sugary drinks. The consumption of sugary and artificially sweetened drinks is at an all-time high especially in western countries. Sugar drinks include naturally or artificially sweetened beverages, fizzy drinks containing soda, 100 percent fruit juices and boxed juices. Several evidences have shown that higher consumption of sugary drinks is associated with increased risk of obesity, greater risk of diabetes, hypertension and other cardiovascular diseases. Evidence linking sugary drinks with risk of cancer has been limited so far. Though, obesity caused by their consumption is the strongest risk factor for cancer.

A study published on July 10 in *BMJ* has investigated the associations between higher consumption of sugary drinks, artificially sweetened beverages and 100 percent fruit juices with increased risk of cancer. The findings have been reported from Nutri-Net-Sante cohort study in France which included 101,257 healthy male and female adults of average age of 42 years. All participants filled out two daily 24-hour questionnaires which measured their normal dietry intake of 3,300 various foods and beverages. All participants were followed up for nine years. Medical records and health insurance databases validated first cases of cancer. Risk factors of cancer like age, gender, medical history, smoking status, exercise levels etc were noted. In the study, the risk was assessed for overall cancer and in particular breast, prostate and bowel cancers.

In the participants' follow-up, 1100 cancer cases were validated with average age of diagnosis being 59 years. Analysis showed that 100 ml increased daily consumption of sugary drinks was associated with increased risk of cancer – 18 percent overall cancer and 22 percent breast cancer. Both boxed fruit juices,

100 percent fruit juices and other sugary drinks was associated with high level of overall cancer. No link was found with prostrate and colorectal cancers. Interestingly, consumption of artificially sweetened beverages did not show any association. The understanding id that consumption of such drinks affects visceral fat in our body – the fat stored around vital organs like liver and pancreas. They also affect blood sugar levels and cause increased inflam mation which leads to increased cancer risk.

The current study reports a positive association between consumption of sugary drinks and increased risk of overall cancer and breast cancer after adjusting various influential factors. The study advocates to strictly limit consumption of sugary drinks and advises policy actions including modifying existing nutritional recommendations, adding appropriate taxation and putting marketing restrictions. Sugary drinks are widely consumed in western countries and thus restricting their consumption may help in cancer prevention.

Source

Chazelas, E. et al. 2019. Sugary drink consumption and risk of cancer: results from NutriNet-Santé prospective cohort. *BMJ.* https://doi.org/10.1136/bmj.l2408

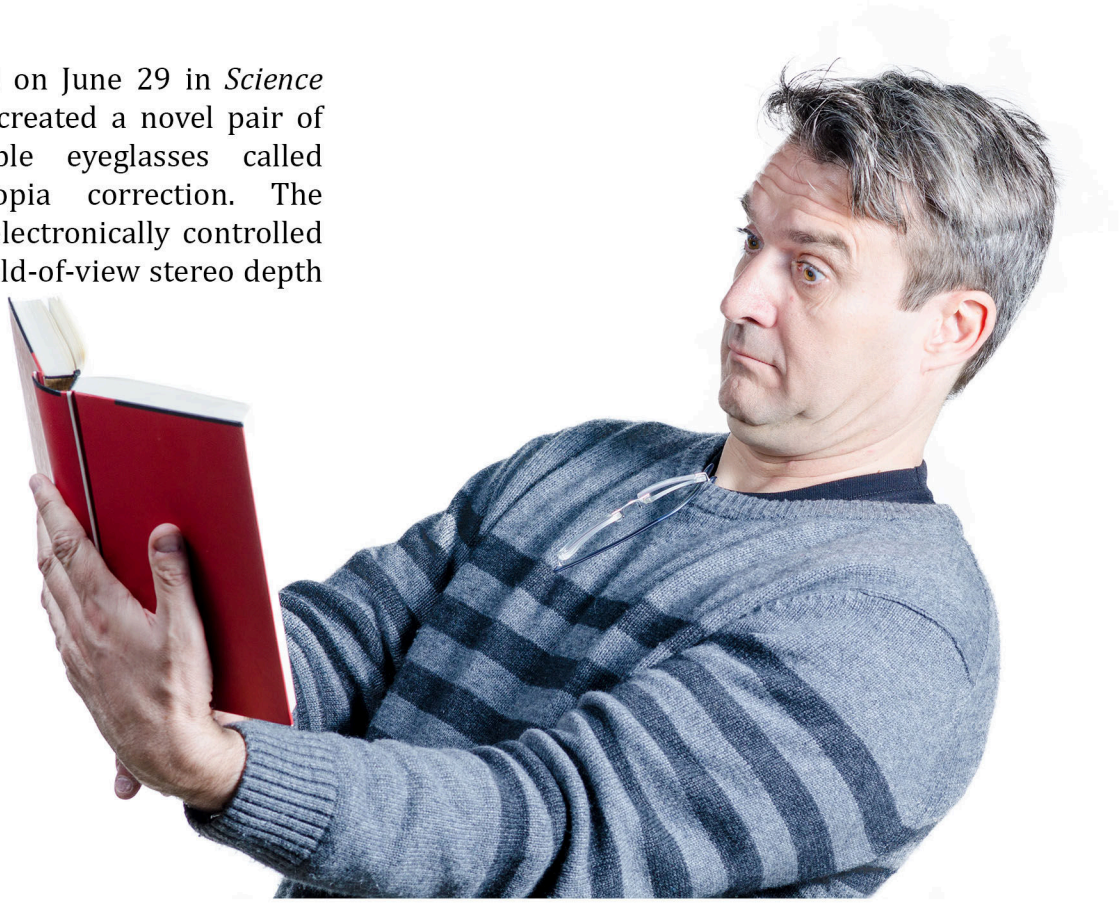
'Autofocals', a Prototype Eyeglass to Correct Presbyopia (Loss of Near Vision)

Scientists from Stanford University have developed a prototype of auto-focusing eyeglasses which automatically focus on where the wearer is looking. It can help correct presbyopia, a gradual age-related loss of near vision faced by people of 45+ age group. Autofocals provide a more effective and accurate solution than traditional eyeglasses.

Around 1.2 billion people worldwide are currently affected by a naturally occurring age-related eye condition called presbyopia which starts to affects one's near vision around the age of 45. As we age, the crystalline lenses in our eyes stiffen and lose the elasticity which is required to focus on nearby objects and thus due to presbyopia people struggle to view close objects in sharp focus.

Various eyeglasses and contact lenses are available for correcting presbyopia and people have to typically start using them after 40. The existing methods use fixed focal elements to approximate vision that would be comparable to what a crystalline lens would achieve in a healthy eye. However, these methods have many problems. The traditional reading eyeglasses are for one, cumbersome to carry as they need to be used or not used depending upon whether user is going to read. These eyeglasses are not much useful for other activities, for instance driving. The traditional progressive lenses of today require the wearer to align their head in the correct direction to be able to focus clearly and this alignment takes time. Since there is no or very little peripheral focus, this visual shift makes it very challenging and inconvenient for the wearer to focus during daily activities. Surgery is an option to reduce stiffness of lenses but it is an invasive procedure and its long-term reliability is not completely clear. Thus, an optimal solution for correcting presbyopia is not available.

In a new study published on June 29 in *Science Advances*, scientists have created a novel pair of experimental focus-tunable eyeglasses called 'autofocals' for presbyopia correction. The autofocals consist of (a) electronically controlled liquid lenses (b) a wide field-of-view stereo depth camera, (c) binocular eye-tracking sensors and (d) a custom software which processes the information. The 'autofocal' system in these eyeglasses automatically adjusts the focal power of the liquid lenses based upon the input received from the eye trackers. i.e. what the wearer is looking at. They do this by mimicking the natural 'autofocus' mechanism of the healthy human eye. The fluid-filled lenses in the eyeglasses can expand or contract as the field of vision changes. Eye-tracking sensors pinpoint where a person is looking at and determine the precise distance. Finally, a custom software built by researchers processes eye-tracking data and makes sure that lenses are viewing the object with sharp-focus. The refocusing in autofocals is seen to be faster and more accurate compared to traditional eyeglasses.



Researchers tested the autofocals on 56 people with presbyopia. There was a marked improvement in visual task performance and the new prototype eyeglasses were ranked by majority users as a 'preferred' correction method. In another study involving 19 users, autofocals exhibited improved and better visual acuity and contrast sensitivity compared to conventional presbyopia methods. Authors aim to reduce size and weight of the prototype and make it lightweight and practical for everyday use.

The prototype eyeglasses 'autofocals' described in the current study uses the available lenses, available eye tracking technology and has created a software which can process the information and help to view close objects with sharp focus more accurately and efficiently than traditional eyeglasses. Autofocals will play an important role in near vision correction in the future.

Source

Padmanaban N et al. 2019. Autofocals: Evaluating gaze-contingent eyeglasses for presbyopes. Science Advances, 5 (6).
http://dx.doi.org/10.1126/sciadv.aav6187 ■

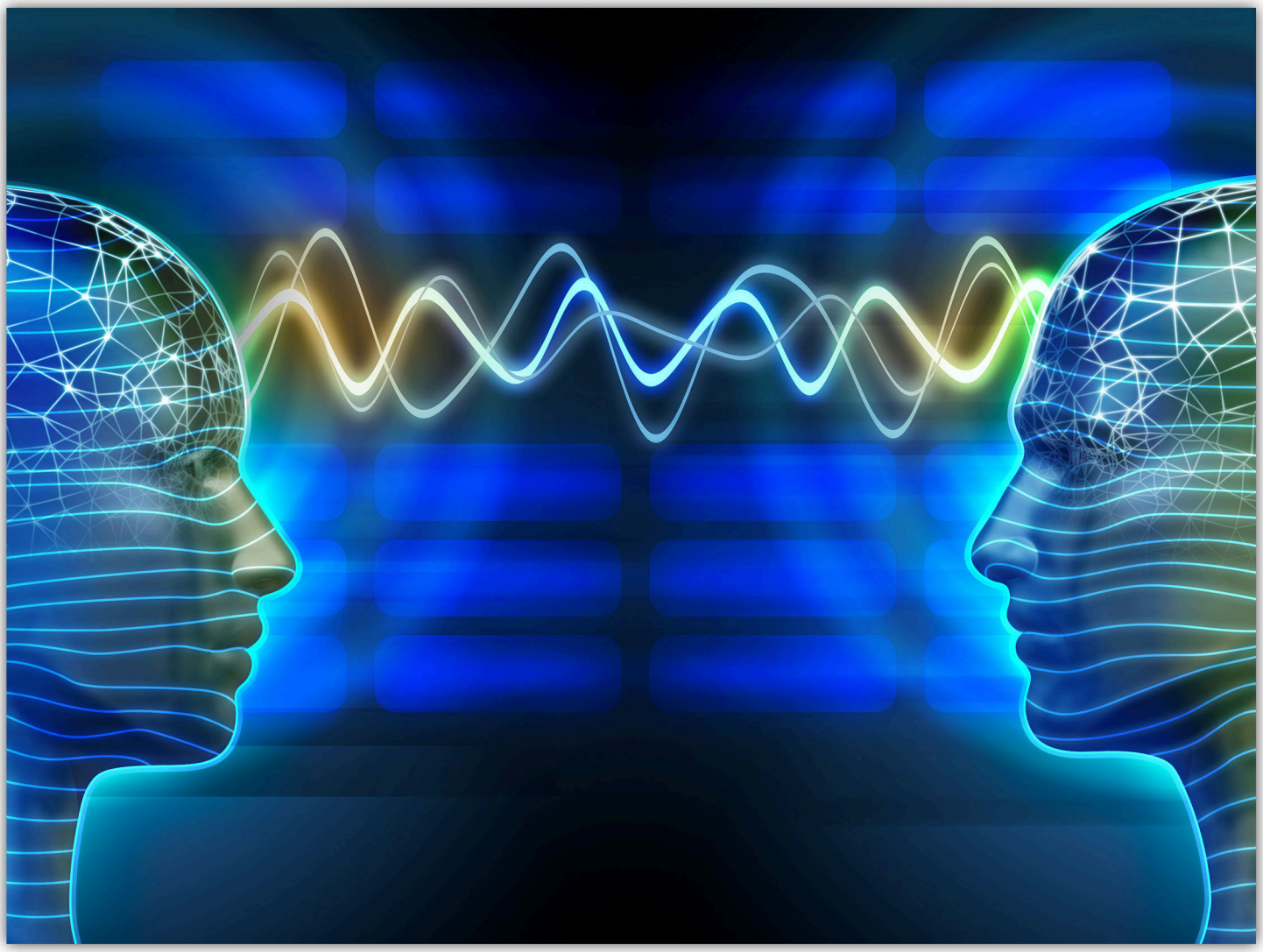
BrainNet: The First Case of Direct 'Brain-To-Brain' Communication

Scientists have demonstrated for the first time a multiple-person 'brain-to-brain' interface where three persons collaborated to complete a task via direct 'brain-to-brain' communication. This interface called BrainNet paves way for direct collaboration between brains for solving a problem.

A brain-to-brain interface in humans is where content from neural signals are extracted from a 'sender' and delivered to a 'receivers' brain via digital technology to enable direct brain-to-brain communication. A brain-to-brain interface can extract and deliver using brain imaging and neurostimulation techniques. Non-invasive methods called electroencephalography (ECG) and transcranial magnetic stimulation (TMS) are used to record brain activity and deliver information to the brain respectively. The concept of brain-to-brain interface has been available in theory for some time, however, the concept in entirety has never been demonstrated until now.

A new study published on April 16 in *Nature journal Scientific Reports* has demonstrated for the very first time a multiple-person brain-to-brain interface - called 'BrainNet' - of three persons communicated and solved a task/problem together by using direct brain-to-brain communication. The three participants – Sender 1, Sender 2 and Receiver worked on a collaborative task – a Tetris-like game. All three participants were present in different rooms at all times and there was no communication between them i.e. they cannot see or hear or talk to each other. Both receiver and senders have been provided with ECG and TMS technologies, thus completely removing the need of any physical movements.

In this Tetris-like game, a block is shown on top of the screen and this block needs to put properly at the bottom to fill a line. Sender 1 and Sender 2 could see the game (the block and the line at the bottom) but could not control the game. Receiver who was playing the game and had total control over it could only see the line at the bottom but didn't know how to reposition the block. To



successfully complete the game Receiver had to seek help from Sender 1 and Sender 2 to get the remaining information. This was to be achieved via direct brain-to-brain communication using BrainNet.

At the start of the experiment, the game was displayed to Sender 1 and Sender 2 on a computer screen. They both then decide how the block must be rotated. The screen showed a 'Yes' and 'No' with LED lights flashing 17 times and 15 seconds per second respectively. When Senders took a decision to 'rotate or not rotate' the block, they concentrated or stared on the corresponding light. The lights flashing in a different pattern can trigger unique types of electrical activity in the brain which their ECG head gear recorded. The computer provided real time feedback to display their choice by moving a cursor to the desired choice. This selection is then translated into a 'Yes or a 'No'.

Next, the information from the Senders needs to be delivered to Receiver. If the answer was 'Yes' (rotate the block), Receiver saw a bright flash of light. Alternatively, when it was 'No' the Receiver did not see any light. Senders's decision is then delivered directly to Receiver brain by Transcranial magentic Stimulation. Then, the Receiver integrates information received from Sender 1 and Sender 2. Receiver also wore ECG head gear, so similar to the Senders, Receiver makes a decision directly from his brain to whether rotate the block or not. Receiver now successfully fills

the line at the bottom and completes the game.

A total of 5 groups (having 3 participants each) successfully completed the BrainNet task. In a total 16 rounds of the game, each group filled the line at least 81 percent of the time i.e.in 13 trials. Researchers evaluated the performance of BrainNet by injecting noise through false positives etc. It was seen that Receiver learned to trust the most reliable Sender solely based on the information transmitted to their brain just like how it happens in real life social interactions and communications.

The brain-to-brain interface BrainNet described in the current study paves way for the future of brain-to-brain interfaces where inter-connected brains of more than one person could work collaboratively to solve problems which cannot be solved by a single person.

Source

Jiang, L. et al. 2019. BrainNet: A Multi-Person Brain-to-Brain Interface for Direct Collaboration Between Brains. Scientific Reports. 9 (1). http://dx.doi.org/10.1038/s41598-019-41895-7 ■

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The Paralyzed Arms *and Hands Restored* by Nerve Transfer

Early nerve transfer surgery to treat paralysis of arms and hands due to spinal injury is helpful in improving function. Post two years of surgery and physiotherapy, patients regained function in elbows and hands leading to improvement in independence in their daily lives.

People who have tetraplegia (also called quadriplegia) have paralysis in all four limbs - both upper and lower after suffering a cervical spinal cord injury. This affects the patient's independence in daily life and routine activities. Improvement in function of hand is critical for a tetraplegic.

Tendon transfer surgery is routinely done for reconstruction of upper limb function wherein tendon of the functional muscle is moved to a new insertion site in order to reanimate/restore function in the paralyzed muscle. In an alternate new surgical technique called nerve transfer, one end of a healthy nerve is transferred to the site of injured nerve with an aim to restore function. More than one muscle can be reanimated thus many nerve transfers can be completed at the same time. This is in contrast to tendon transfers which require a single tendon to reconstruct a single function. There is also lesser challenge and complication in performing nerve transfers and they have shorter mobilization periods post-surgery while providing more options for reconstruction. Nerve transfers haven't been very successful in most spinal cord injuries so far.

A new study published on July 4 in *The Lancet* aimed to investigate the outcomes of a nerve transfer surgery in its ability to reanimate function of upper limbs in tetraplegics. Surgeons from Australia led by Natasha van Zyl recruited 16 young adult participants (average age of 27 years) who had traumatic spinal cord injury after fall, diving, sports or motor accidents. They suffered early (18 months post injury) cervical spinal cord injury of motor level C5 and below.

All participants underwent single or multiple nerve transfers on one or both their upper limbs. Surgeons took functional nerves from shoulder and transported or rerouted them into paralyzed muscles in the arm, thus bypassing the injury. The functional nerves having healthy connection to the spinal cord above the injury were now connected to the paralyzed nerves below the

injury facilitating nerve growth. 10 of 16 participants had nerve transfers to one arm combined with tendon transfer to the other. Three participants could not complete the program due to reasons unrelated from surgery. In total, 27 limbs were worked on and 59 nerve transfers were completed. The goal was to restore elbow extension, grasp, pinch, opening and closing hand.

Post two years of nerve transfer surgery and rigorous physiotherapy, primary outcomes were measured by arm test (ARAT), grasp release test (GRT) and spinal cord independence measure (SCIM). The results showed significant functional improvement in upper limb and hand function with meaningful improvements in elbow extension. The participants could reach out their arm, open and close their hand, have the strength to grasp objects. Because of restored elbow extension participants could move their wheelchair. They could do several daily tasks independently like feeding, brushing, writing, using tools and devices. This led to significant positive change in their daily lives.

The current study describes the outcome of a nerve transfer surgery which enabled 13 young paraplegic adults with full paralysis to successfully regain movement and function in their upper limbs - elbows and hands. Nerve transfer connects functional nerves with injured nerves to restore power to the paralyzed muscles. When compared to tendon transfer, nerve transfer surgery is seen to restore more natural movement and also finer motor control leading to improvement in function and independence in people with tetraplegia.

Source

Van Zyl, N. et al. 2019. Expanding traditional tendon-based techniques with nerve transfers for the restoration of upper limb function in tetraplegia: a prospective case series. The Lancet. https://-doi.org/10.1016/S0140-6736(19)31143-2

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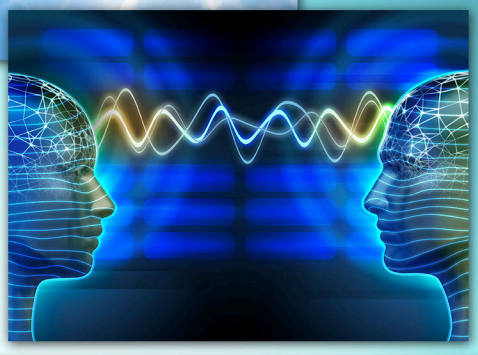
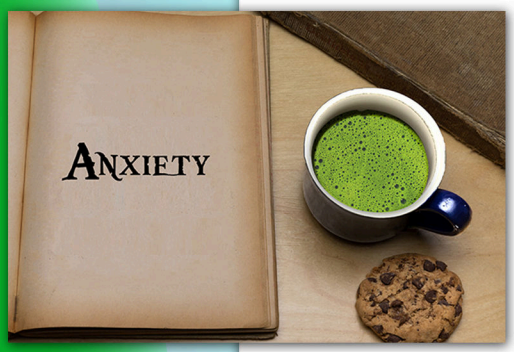
The Secrets of Longevity

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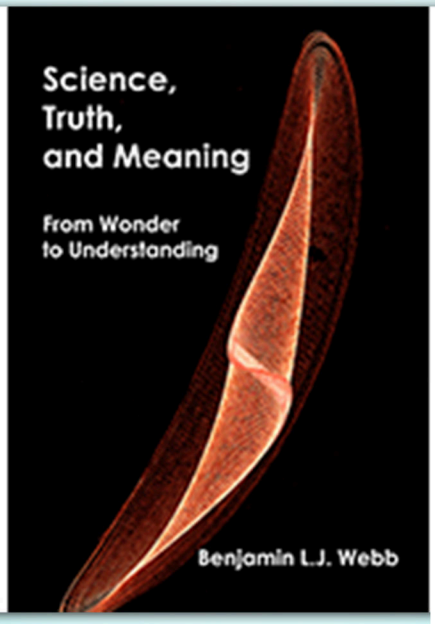
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