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Science Journal Club

Missouri Academy
of Science, Mathematics, and Computing
The fear of Ebola is very justified, but it is also for the wrong reasons. As the outbreak continues to spread, doctors will rampantly try to find a way to subdue the side-effects caused by the immune system in response to the virus’ presence.

The virus itself may have no cure and is considered one of the most dangerous viruses in the world, but the virus itself is not what causes patients to die. The virus is the indirect killer in this situation. In all reality, the true killer is the body’s immune system. When a patient's body recognizes that the Ebola virus is present, it begins a cytokine storm, in which the brain sends a signal to every cell and tells it to use every single autoimmune response available, hoping to defeat the virus. The process eradicates a large percentage of the virus, but the repercussions are severe. The cytokine storm results in the destruction of blood vessel and a large release of nitric oxide throughout the body. The result of these two effects amounts to the leaking of blood and plasma from the patients’ arteries, veins, and capillaries, along with the body’s immune system hasn’t or can’t produce.

Ebola is a disease caused by one of five strains of the Ebola virus. Four of the strains cause symptoms in humans, including: Ebola virus (Zaire ebolavirus), Sudan virus (Sudan ebolavirus), Tai Forest virus (Tai Forest ebolavirus), and the Bundibugo virus (Bundibugo ebolavirus). The fifth strain, Reston ebolavirus, causes symptoms in non-human primates. The virus typically causes symptoms within 2 to 21 days, giving a very large range for when the virus strikes after infection. The virus is not contagious, however, until symptoms begin showing.

In a perfect world, when a pathogen enters the body, an immune response is triggered, and the body rids itself of the invader. Afterwards, the body remembers how it dealt with the pathogen by producing immunoglobulins. These immunoglobulins continue to circulate even after the initial infection has passed and ensure that the person never becomes “ill” because of that pathogen again. Anyone in this state is known as a convalescent, and their serum, the liquid component of blood excluding the red blood cells, can actually be useful in helping those who do not overcome an illness on their own by giving them the antibodies that their immune system hasn’t or can’t produce.

The idea of transferring the blood of a recovered patient to a still-struggling patient is not a new one. In fact, popular studies on vaccinating against mumps in the early thirties tested the use of convalescent serum treating boys as a method of avoiding the disease entirely, and results proved positive. New relevance has been found in a fairly major area, though: the Ebola outbreak in Africa. Because of the high death toll -- the WHO reports a total of 70.8% of definitive cases ending in death in this outbreak alone -- as well as the fact that successful treatment for Ebola has not been found, the current pandemic has the medical community in a frenzy over finding a way to mitigate fallout of the disease, and convalescent serum appears to offer one of the best chances at accomplishing that task.

The most famous clinical record of the successful care for Ebola hemorrhagic fever using the blood of Ebola patients was documented in the mid-nineties, during the last major outbreak in the Democratic Republic of the Congo. In the study, eight patients were given blood and cared for, of which only one patient died. Though the test group was small, the 12.5% death rate presented was a significant decrease from the average of 80% seen throughout the case as a whole, and other instances of success followed to bolster its appeal. Due to this, when missionary Dr. Richard Sacra contracted Ebola and was transported back to the US, the US had already survived Ebola, the help of which may have ensured Sacra’s survival of the disease. Additionally, when determining what therapies should be considered in the face of an unprecedented outbreak, convalescent serum was one of the most closely considered by the WHO, and in the near future the organization is expected to publish interim guidelines for the implementation of the therapy in quarantined and pandemic-stricken areas.

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The virus cannot handle the toxicity caused by the large amount of blood in parts of the body where it does not belong.

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TENSION HEADACHES

Andrew Kaiser

Headaches are a significant issue for millions of Americans, but many people do not understand the causes or effects of the headaches they have. There have been plenty of studies done on the underlying causes of headaches, some of which are important for understanding the truth behind headaches.

The International Headache Society released a new classification system of headaches in 2005, giving health care professionals a simpler way of diagnosing the pains. According to this new classification system, there are three main kinds of headaches: primary, which includes tension headaches, migraines, and cluster headaches; secondary, which include post-concussive headaches, sinus infections, and diseases such as meningitis; and cranial neuralgia with facial pain. Because they are more common than others, the main focus of this article will be on tension headaches.1

1 in 20 Americans suffer from tension headaches daily. Tension headaches often start from the back of the head and move forward. Recently, researchers have proposed that tension headaches may be caused by a shift in the levels of neurotransmitters, chemicals used by the brain to transfer electrical impulses. Factors that may trigger a change in neurotransmitter levels include: stress or anxiety, holding your head in one position for extended periods of time, fatigue or overexertion, skipping meals, or clenched jaw or grinding teeth.2

Whatever the reason, there are certain risk factors that everyone should look out for that increase the possibilities of tension headaches. While these are not definite signs that the pain is coming from tension headaches, the following is a good list of factors that may increase your risk for tension aches: gender (females are more likely to have tension headaches), stress, skipping meals, too much or too little sleep.3

With so many potential causes of these headaches, it has been very hard for research scientists to pinpoint the most effective way to treat them. Because of the wide reach tension headaches have on the population, there is extensive research being conducted on these headaches and how they can be treated. There are, however, some fairly effective lifestyle changes that can help reduce and even prevent tension headaches. These are simple changes that can significantly benefit the public. These small changes are as follows: getting extended periods of time, fatigue or overexertion, skipping meals, or clenched jaw or grinding teeth.4

As you can see, there are many causes of tension headaches, but there are also many ways that anyone can go about reducing the effect tension aches inflict on them.5

-effects of Tobacco and Liquor in Human Body

HyunJun Kim

According to a survey, two of the most common New Year resolutions are to quit smoking and drinking. It is easy to set such goals, but it is painful and almost impossible to accomplish them. Some people take this failure to keep these New Year resolutions as their lack of diligence. However, it is somewhat understandable after learning about the chemical and biological effects of alcohol and tobacco that eventually lead to addiction. This article will explore how chemicals in tobacco and alcohol produce these effects on human bodies.

Now, alcohol has also been a problem for a long time. Alcohol does not seem to be as harmful to the human body as tobacco, but alcohol has different effects on specific parts of our body. First of all, alcohol affects our brains, making it harder for us to think clearly and rationally. This is the reason that we find drunk drivers, who cannot make coherent decisions, causing many of the major car accidents. Secondly, alcohol affects our heart. High blood pressure is one of the symptoms of frequent alcohol use and can often lead to strokes, which take many people's lives. Lastly, high usage of alcohol endangers the immune system and raises the risk of cancer in many parts of our body – the mouth, the esophagus, the throat, the liver, and the breasts.6

Clearly, there are many negative effects of tobacco and alcohol. According to scientific research, it is best to not start at all, since quitting is the hardest part. For smokers and drinkers, talking to a specialist or physician about quitting is one way to majorly improve health.

**DRINKING DURING MEALS**

Jinwoo Choi

When I first came to the USA, one of the culture shocks was the free refills at restaurants. I still remember the days back in Korea where I had to save some of my drinks to finish my meal without thirst. I do not have to worry about that anymore since I can get my drinks refill unlimited/unlimited drink refills in the Union. Since then, drinking a lot of soda during the meal became my habit since it is free. Yet, just because it seems so natural, it doesn't necessarily mean that drinking while eating is a good habit. Obviously, it helps us swallow food more easily/easier and intensify the flavors. However, drinking while eating has negative effects on our health.

Before talking about drinking while eating, drinking sodas and juices itself has disadvantages as they have high calories. Although it varies depending on each individual's weight, height, and level of activeness, the optimum amount of calories consumed per day for teenagers around our age is around 2000 to 2500. Drinking sodas can take up to about one fifth of this amount. Suppose someone drinks one can of Pepsi during each meal, a can has 150 calories and with a bigger cup in the Union, the number gets even bigger. Hence, by only eating normal meals and drinking several cups of soda a day, the adequate amount can be exceeded.

In addition, there are many other negative effects of sodas and juices, such as its correlation to teeth cavities. Yet, what many people do not realize is the effect of drinking any liquid during meals on digestion. Digestion involves various chemical reactions that are catalyzed by enzymes. When we chew, for instance, saliva breaks down food with an enzyme called amylase which digests carbohydrates. Next, food molecules go down into our stomach and are broken down further by many types of enzymes and stomach acids. During this process, liquids can be harmful. First, additional liquids other than the enzymes and stomach acids needed for digestion make the concentration of enzymes and acids lower, thus slowing down the rate of breaking down food molecules. In some cases, before even digesting any food molecules, some enzymes can be washed away by the liquid that one takes in during the meal. Furthermore, since most enzymes are proteins, they are affected by temperature and pH. Cold drinks that we consume can decrease the activity of digestive enzymes. Consequently, this diluted, inactive digestive system will not allow our bodies to effectively absorb the necessary nutrients. In addition, many sodas are acids, therefore, they changes our the pH in our stomach, which can interrupt enzyme functions.

Although there are debates going on about whether these negative effects are significant, it seems to be a good habit to avoid drinking during meals. Chewing itself is sufficient. However, it is not easy to avoid the temptation of drinks. When drinking while eating, at least try to obtain warm drinks so that the drinks are closer to our body temperature. If giving up soda with ice in the student Union is just too hard, drinking less would be a good alternative.

Is drinking while eating a good thing? No, one should try not to drink during the meal; it will be a hard decision since temptation to drink has always been a habit. Regardless of this danger, I will still drink soda for my meal. This question always remains as a mystery. Which drink should I pick for lunch? I wish I can ask the cafeteria for a "random" option on the drinks machine.

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**EV-D68**

Min Soo Kim

As soon as the school year started, Enterovirus D68, also known as EV-D68, has driven the US into a tense situation, infecting children across the nation. It has now hit around 400 children in exactly 42 states without a distinct cure for this virus. On October 2, 2014, according to buzzfeednews.com, the Centers for Disease Control and Prevention found out that four people had died from Enterovirus D68, including a girl named Emily Otrando, who died of a second infection. Doctors were overwhelmed, still trying to figure out how Enterovirus assists in people's death.

The symptoms for Enterovirus include coughing, high fever, shivers, and dyspnea (difficult breathing). However, the Centers for Disease Control and Prevention has suggested a new theory that EV-D68 could later develop neurological disorders, including paralysis and muscle ache, because the virus constantly mutates itself. An investigation of nine children, who visited a hospital in Colorado for Enterovirus D68 since this August, supports such a claim. They stated that the central nervous system, which affects the spinal cord, could have been injured by EV-D68, eventually leading to paralysis. However, solutions for this frightful disease are yet to be found.

In fact, Enterovirus D68 is not new – it had been discovered in the 1960s. However, the virus was so rare back then that doctors did not pay much attention. This year, the rapid infection among children in 42 states has shed new light on Enterovirus D68.

Noticing that Missouri was one of the two states spotted with EV-D68, doctors are emphasizing that prevention of this virus will do more good than harm since there is no cure for it yet. Doctors recommended that they wash their hands for more than 20 seconds with soap and not touch their eyes and mouths with hands. In addition, even if the symptom is temporary or small, it is preferable to go to the hospital immediately and get medical care as soon as possible.

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Footnotes:

**Importance of Sleep in Human Body**

Hyoung Jun Lee

Everyone needs sleep in their lives. There is a reason why we feel tired and exhausted without sleep. It is meant to be essential to human health and body. In order to be lively and energetic throughout the day, you need enough amount of sleep the day before. It is like recharging your battery and without fully recharging it you can’t function properly and effectively. Sleep plays various important roles in the life such as repairing your bodily functions and helping you to remember things better. Sleep deprivation can lead to health issues such as diabetes and growth issues.

Sleep is responsible for replenishing your body after a long day. It relaxes your body and recharges the body and prepares it for the next day. With a good amount of sleep every day, it helps the body to be more immune and restores vessels in the body such as heart and blood vessels, which are responsible for keeping your body healthy and constantly providing blood regulation. Sleep also improves one’s ability to remember things for a longer duration of time and increase learning ability. During deep sleep, your brain organizes the new data that has entered into one’s brain and makes it easier for the brain to recall data more quickly and easily. Access of the data recorded in the brain is easier through having a deep sleep after learning.

Lack of sleep can cause many health issues. While the body is sleeping, hormones are important for the growth and development of the body. When adolescents who still are capable of growth lack sleep, their bodies can’t grow to their full potential. Sleeping is essential and responsible for the right amount for certain types of hormones to be released inside the body. Sleep deprivation can cause diabetes and obesity. Diabetes is caused by high levels of blood sugar or blood glucose. Without enough sleep, the hormones which moderate one’s blood glucose level (insulin) fail to effectively function, increasing the levels of sugar in the blood. This increases the risk of diabetes in the body. Furthermore, sleep is responsible for balancing two types of hormones in the body which make one feel hungry and full. However, when there isn’t enough sleep, the hormone level that makes one feel full decreases and one feels hungrier as they stay up later. One eats more than usual and this can lead to obesity. As the amount of times staying up late increases, one feels hungrier as their hormone level that makes one feel full decreases and one feels hungrier as they stay up later. One eats more than usual and this can lead to obesity. As the amount of times staying up late increases, one feels hungrier as their hormone level that makes one feel full decreases and one feels hungrier as they stay up later. One eats more than usual and this can lead to obesity.

This is why sleep is important to our body, because it helps many beneficial things to happen and without sleep, there can be issues which are detrimental to one’s health.

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**Parasitic**

Jin Chul Rhim

Disguising is one of the common perceptions of parasites. Even scientists despise those small, malicious creatures degenerated from once prospective, self-sustaining eukaryotes. Some scientists did not even believe that God had created those blood-sucking creatures that make hosts suffer in inhumane ways. Humans had been hosts of parasites as other animals were. During the history of civilization, parasites survived and evolved in the human body. Because civilization was based on dense population, it became the perfect target of parasites. A fossil record shows that parasites have been living in the human body for more than 30,000 years. Otzi the Alps iceman, mummified 5,300 years ago by cold Alps weather, had whipworm, an intestinal parasite in his body. Before the development of medications, almost every person had at least 10 to 20 kinds of parasites in their body.

The glorious history of parasites met fiasco when technology and public health improved. The development of anti-parasite medicine in the 19th century almost ended their long history of coexistence with humans. Various effective medications removed parasites from our body, and in most well-developed nations, these creatures were almost extinct. An anti-parasite campaign during those periods was based on simple and obvious assumptions that parasites are ‘bad’; it seemed obvious that those little creatures are undermining our health and causing troubles. For decades, because of the lack of technology, parasitologists could only observe the dead specimen of parasites. Therefore, parasitologists speculated that parasites are only harmful to the immune system since there was no such technique to observe living parasites’ movement in intestines or bloodstream and analyze the chemicals they synthesized.

However, ample information about the human immune system and improvements in understanding of microscopic organisms led to a new perspective on those small creatures bathing in our bloodstream and intestine. The new research found out that an extremely small number of parasites that lived in the human body actually ‘relieve’ allergy, asthma, coughing, and multiple other diseases caused by a hyperactive immune system attacking our own body cells. These astonishing new results of research can be explained by the long history of coexistence between humans and parasites.

Evolution taken place during the long history of parasitism has made both parasites and hosts’ immune system to adapt to each other: parasites only absorb what they need, and human immune system does not attack those parasites, which will only cause more troubles. The result of these almost symbiotic relationships is a balanced immune system that would not attack intestine and parasites. Chemicals made by parasites diminished the aggressiveness of immune cells, softened hostility of immune reaction, and benefited the human body. Where new drugs disturbed the equilibrium between host body and parasites. Parasites were releasing relaxant that would slowly alleviate the overactive immune cells, even medical technology today cannot mimic the chemicals they infuse in our body. Without its long term comrade, the human immune system soon becomes hyperactive again, looking for targets to attack. However, since there is nothing to attack, it starts attacking our own body. Those kinds of diseases caused by an over-excited immune system are what people nowadays suffer from. The well-developed western hemisphere, where parasites are almost extinct, the population suffering from diseases caused by hyperactive immune systems is constantly increasing. Digestion problems, multiple sclerosis, and Crohn’s disease are common symptoms of an unbalanced immune system.

In order to restore the equilibrium state, doctors had subscribed 2500 pig whipworm eggs for 3 weeks to patients who are suffering from Crohn’s disease, caused by an overactive immune system in intestine. The effect was amazing – almost 85% of patients was cured of this painful digestive disease with red, aching intestines after 8 months. Now, multi-disciplinary researchers are called together to utilize parasitology in the medical field for new generation diseases caused by our own body system. Some scientists are even researching about a parasite diet that would be helpful for losing weight. Theoretically, it is possible because intestine parasites absorb nutrition in intestines, which may prevent obesity without harming our body. However, the diet is hard to realize since parasites only eat a small amount of food, compared to what humans eat. Parasites, with these newly discovered facts, can finally take off their notorious reputation.

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The Development and Effectiveness of Influenza Vaccines
Jamie Wise

Each fall, many people go to their local hospitals, clinics or pharmacies to receive their yearly flu shot—but many do not. According to the Center for Disease Control (CDC), only about 42% of Americans got the seasonal influenza vaccine last year. Many of those who opt out question the overall effectiveness of the vaccine.

The influenza virus is challenging to vaccinate against due to its dynamic and mutative qualities. In some cases, such as spring 2009, novel viruses, like influenza A (H1N1), can cause widespread pandemics. On average, it takes 5-6 months for a new vaccine to be derived for a pandemic virus. World Health Organization (WHO) labs begin the process with hybridizing the virus strains in chicken eggs. The strains move to manufacturers, where they are purified into antigens that are active ingredients in the vaccine after passing the verification that the vaccine strain is a match for the occurring virus. Following extensive quality control and clinical trials, the vaccine is released to the public.

Professionals attend conferences set to project which influenza strains should be included in the upcoming winter’s vaccine. The final decision is approved by the U.S. Food and Drug Administration (FDA) during the spring of each year. This year, H1N1 is included in the seasonal vaccine, along with influenza A (H3N2) and different B strains.

Of the three types of influenza viruses, influenza A is likely the most well-known. The nomenclature of influenza A virus is defined by the types of glycoproteins on the outer membrane of the virus: hemagglutinin (H) and neuraminidase (N). Additionally, flu viruses can be identified by their host of origin, such as ovine, equine, or bird.

Influenza vaccines work like many others by strengthening the immune system against the active virus by inducing the production of antibodies before infection. However, this imitation infection can result in minor flu-like symptoms as the body adjusts. It causes many to hesitate, fearing that being injected with a form of the virus will only make them contract it—it is, admittedly, a risk.

However, the CDC still highly recommends vaccination, especially for children, the elderly and those with chronic illness. Last flu season, 105 pediatric deaths due to influenza were reported in the United States—90% had not been vaccinated against the virus.

Due to the seriousness of these cases, researchers evaluate the efficacy of seasonal influenza vaccines based on both randomized and observational studies. They compare the recipients of the vaccine to those who did not receive it or were given a placebo based on whether or not they contracted the illness each year. The CDC published their estimate that the vaccine for 2013-2014 was 61% effective for all age groups. Overall, the effectiveness of each vaccine depends on the individual health of each recipient and the closeness that the vaccine matches the actual viruses circulating during the flu season. This ongoing challenge to create a fully effective vaccine continues in future medical research.

Venom vs. Poison
Caleb Brown

In the eyes of humans, one fear that is overly prevalent is the fear of snakes, spiders, and creatures of toxic association in general. Many of these fears are rooted in the misguided opinion that the animals are poisonous, when in all reality a much more frightful and gruesome term can be used to label them — venomous. In this article, the differences between venom and poison will be addressed, along with the different types of venom.

The main difference between a general poison and a venom is that venom is only from specialized glands within animals and is injected to the blood stream in some way; whereas a poison is any toxic substance that can harm the body in small doses. Poisons can come from anything – from berries and other plants, to chemicals, food, and, of course, chemicals produced by animals. Along with the distinction from other poisons, there are differences between the different types of venom.

There are four common types of venom in nature: hemotoxins, neurotoxins, cytotoxins, and myotoxins. Hemotoxic venoms are venoms that attack hemoglobin, or blood cells. The damaging of blood cells causes significant tissue damages and can also result in organ failure, if the venom reaches or enters near the person’s vital areas. Neurotoxins attack the nervous system, causing paralysis and other frightening permanent damages, including asphyxia (deprivation of oxygen), resulting in death. Cytotoxic venom is the most threatening because it attacks cells in general. Any and all cells are vulnerable to this potent substance, and infection with the cytotoxic venom can result in massive internal bleeding, organ swelling, and organ failure. Myotoxic venoms forces muscle systems to shut down, resulting in paralysis and eventually permanent muscle and kidney damage. Myotoxic venom helps the predator eat its prey in peace without the fear of it escaping.

Toxins produced by animals are generally mislabeled and misunderstood. A greater respect can be developed for these animals with a greater understanding of their potentials.

**Effect of Endocrine Disrupting Chemicals**

JiHyun Kim

Hormones are substances produced from cells in our body to affect a target cell. They are produced in small amounts and run through our blood streams to manage our body system. Hormones stimulate the growth of cells and organs, control blood pressure and heart rate, and carry out many more functions throughout the human body.

Endocrine disruptors are chemicals that disrupt the hormone system of mammals. They are also known as environmental hormones because they are formed outside of the body and get absorbed by an outer source. The chemicals that are released to the environment by industrial activity function as hormones when they enter our bodies. Some inhibit the reaction of hormones, while some strengthen them. Others significantly affect growth and body functions even in miniscule doses. There is no identified research that directly supports the detrimental effects of the endocrine hormones; however, most results tend to sway towards the harmful side.

Currently, there are 67 known endocrine disruptors. BPA, Dioxin, Atrazine, Phthalates, Perchlorate, Lead, and Arsenic are some of the serious, disrupting chemicals. Plastics contain BPA that functions as estrogen when they enter our bodies. It can cause breast cancer, obesity, early puberty, and heart disease. Dioxin affects the reproductive ability of mammals and can build up in years, affecting the immune system or causing cancer. Atrazine shows similar carcinogenic effects and disrupts puberty. Phthalates stimulate a part of a cell, causing them to die earlier. In short, disruptors in general change hormones, affect reproductive abilities, or cause obesity or cancer. These effects have made endocrine disruptive chemicals an issue because of the risks they can impose on human bodies.

There has been a lot of experiments related to the effect of endocrine disrupting chemicals on animals. For mammals, the case of Baltic gray seals and Dutch harbor seals has provided insight. Because of PBC (Primary Biliary Cirrhosis) contained in their food chain, reproduction and immune functions of the seals were disabled. Population declined, and the mortality rate increased due to morbillivirus infections. In the United Kingdom, estrogenic effects demonstrated in estuaries and other marine environments showed that the fish population had endocrine disruption. Therefore, the sea population with endocrine disruption.

Although the experiments do not fully support the harmful effect of endocrine disrupting chemicals, the experiments surely imply the risk it can have on organisms. If left alone, this issue will become a global problem. The rate of chemicals in animals has increased compared to the past, and the number of cases of premature puberty is increasing. For a preventive measure, it is recommended that people avoid using materials that may include endocrine disruptors, such as Styrofoam and plastics, in ways that the materials can be absorbed to the human body.

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**The Effects of Perfectionism on Well-Being**

Claire Ames

Perfectionism is a disorder that can be detrimental to one's well-being. A perfectionist always strives for perfection and sets unrealistic goals, which can only be attained by superiority. This disorder can have a profound effect on the mental and physical health of an individual. Perfectionism is known to cause high stress levels, as well as severe anxiety and depression. Individuals with this disorder suffer from the fear of failure and making mistakes. When they make mistakes, such individuals are struck with a feeling of intense distress. Those who suffer from perfectionism are found to have higher risks of developing such issues as eating disorders and anxiety disorders. Perfectionists also have a higher death rate because of the constant amounts of high stress placed on the body.

Obsessive-compulsive disorder (OCD) can be related to perfectionism. Individuals may continuously revise or rewrite work, seek reassurance from others, or procrastinate tasks due to the need to have things done perfectly. OCD can be an outlet for anxiety.

Perfectionism has an effect on an individual's social life as well. Fear of rejection can prevent individuals from interacting with others. Many perfectionists resist trying new activities for fear of failure. Although it is accepted for an individual to make mistakes when trying a new activity, perfectionists feel the need to perform flawlessly on their first try. They believe that they are constantly judged by others, which can cause them to stay distant from their peers. This distance and constant self-criticism can eventually evolve into depression.

However, perfectionism is not always a negative thing. In fact, it can sometimes be helpful to one's health. For example, a person who has type 2 diabetes and perfectionism often strictly adheres to the dietary rules and religiously checks their blood sugar levels. Studies show that such individuals have a lower risk of death than those without the disorder. People with perfectionism are less likely to participate in high risk behaviors, such as smoking or drugs. Individuals with this disorder set high standards and goals for themselves, which is one of the positive sides to perfectionism. It is the inability to adapt and learn from errors that makes this disorder so detrimental.

Perfectionism is a grueling battle. The constant need to be perfect can cause an overbearing strain on your health. Perfectionists often have little time to care for themselves because they spend all of their time striving for perfection. On the other hand, this disorder can improve your health by decreasing participation in risky behaviors. There are two sides of perfectionism, and often times the dark side outweighs the benefits of the disorder.

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Stress is a reaction to a stimulus that causes a disturbance to our physical or mental equilibrium. Stress causes a physiological response called the general adaptation syndrome, sometimes referred to as the "fight or flight" response. This response causes the body to divert its blood flow to large muscles and away from the digestive system and organs that do not assist in either fleeing from danger or fighting. Although modern stressors usually do not require spontaneous physical activity, psychological stressors are still capable of causing physical reactions. Stress is attributed to numerous physical disorders including immune system disturbances. Sheldon Cohen, a professor of psychology at Carnegie Mellon University, led a team of researchers to study the impacts of chronic psychological stress in relation to the body's ability to regulate the inflammatory response. Cohen's research found that the effects of psychological stress promote the development and progression of disease.

A hormone called cortisol is responsible in part for the regulation of inflammation. When the body is stressed, the brain signals the adrenal cortex to produce cortisol. However, prolonged stress alters the efficiency of cortisol to adjust inflammatory response as the response reduces tissue sensitivity to the hormone. When cortisol is restricted from serving its purpose, inflammation becomes uncontrolled. Immune cells become insensitive to cortisol, and in turn causes unregulated inflammation to promote the progression of disease. Cohen's research experiment necessitated 394 healthy subjects to be given nasal drops containing one of five pre-chosen respiratory viruses, including rhinovirus type 2, 9, and 14, respiratory syncytial virus, and coronavirus type 229E. A separate 26 subjects were given saline nasal drops to be used as the control group. The subjects were then put in quarantine for five days and were monitored to observe the development of infection and symptoms of disease. The more stress people reported, the more the subject's probability of infection increased. The rates of both respiratory infection and clinical colds increased with the increase of psychological stress. These results support Cohen's finding that prolonged stress is associated with a cell's inability to respond to hormonal signals responsible for the regulation of inflammation, most importantly being cortisol.

A person's reaction to environmental stressors is best characterized by the "fight or flight" response, in which the body prepares itself to either run from danger or fight. This response triggers the redirection of blood flow away from the immune system in order to transfer more blood to muscles and vital organs. However, modern stressors are now more likely to be psychological stress. Although psychological stress does not require an immediate physical response from the body, it has profound and negative impacts on the human body. Prolonged stress weakens the immune system's ability to combat disease and infection, causing widespread damage to the body.

Stress has a larger impact on a person's physical health than most people realize, and can severely affect their way of life. To put it another way, the more positive a person is, the less stress they undergo, which causes the mind to put less physical stress on the body. Another explanation as to why happy folks are healthier could simply be that jolly people have a tendency to live more beneficial lifestyles. Whether these people are consciously improving themselves or it is a product of their happiness, the result is the same. Being in good health requires work, but staying cheerful is usually the easiest thing you can do to improve your body.
HUMAN EMOTION AND HEALTH

Chae Won Ryu

Recent studies in the field of science suggested some controversial issues of the relationship between human emotions and health. Some neuroscientists and psychologists claim that one's emotions are dependent on one's health. On the other hand, others claim that this is true vice versa; that one's health depends on one's emotions. Although it is still a hotly debated topic, nowadays many scientists conclude that the two factors have mutual influence. However, as the theme of this journal is "General Health," the influence of human emotions toward human body or health will be the main discussion of this article.

Negative emotions such as anger and fear may induce cardiovascular disease in our body. According to Laura Kubansky, PhD, MPH, a professor at the Harvard School of Public Health in Cambridge, Mass., people with high anger levels have a higher possibility in getting a cardiovascular disease. Psychologically speaking, anger activates the "fight or flight response" of our body, which results in secretion of stress hormones such as cortisol and adrenaline. These hormones speed up our heart rate and raise our blood pressure to give tremendous energy for a short period of time. If this sequence happens continuously, our body will be in a state of tension for a long time and it causes a negative effect on one's heart. The "wear and tear" of our heart might lead to a serious cardiovascular disease as well as other physiological diseases.

There are not as many studies and results of the relationship between positive emotions and health as that of the relationship between negative emotions and health. Still, some data shows that good feelings such as happiness and optimism are closely linked with the well-being of individuals. As that of the relationship between negative emotions and health. Still, some data shows that good feelings such as happiness and optimism are closely linked with the well-being of individuals. For example, meditation is very helpful for our brain to think positively and optimistically. Active interactions with others will be a good catalyst for our happiness and health. Thus, happiness is discovered by experts. For example, meditation is very helpful for our brain to think positively and optimistically. Active interactions with others will be a good catalyst for our happiness and health. Thus, happiness is discovered by experts.

How Dehydration Affects Human Body

EonHo Chang

Have you ever felt sudden dizziness or grogginess while walking down the street? Have you ever lost your temper toward your close friends or family for trivial reasons? Have you ever felt tired, even though you did not do any high-intensity cardiovascular exercise? If you have been in one or more of these situations, here is your panacea: water.

Before we go deeper into the subject, let us first review the basic knowledge about water. All living organisms depend on water. It is crucial for life both as a medium and a solvent for critical metabolic reactions. In anabolism, water is removed from molecules (condensation reaction) to form larger molecules. In catabolism, macromolecules are broken down into smaller molecules by water breaking the chemical bonds (hydrolysis). In respiration, cells reform water and CO2 while oxidizing the hydrogen and carbon (cellular respiration).

DIZZINESS1
Dizziness can result from not having enough water in your blood. Blood is 94% water, and water dominates our blood pressure. Therefore, without water, the amount of blood in your body decreases, and thus your blood pressure drops.

Eventually, shortage of water will cause shortage of oxygen and other nutrients needed in our cells, tissues, and even organs in severe cases.

BRAIN ACTIVITY2
As the situation deteriorates, lack of water may affect our cognitive activities. If our brains are oxygen-deprived, they will lose consciousness. Brain cells will weaken, and the transfer of information among cells will not function as normal. Also, the frontal lobe, part of the brain related to emotions, will not operate normally, and we therefore may become cranky and impatient.

DIGESTION
We need water in the whole process of digestion, and lack of water makes our stomach uncomfortable. Water is used for hydrolysis, which is one of the steps in which food get dissolved and cleaved. It also plays the role of carriers of nutrients from the digestive system to the living cells.

FATIGUE2
Water is essential for providing energy for the body as well. Poor hydration will lead to less energy production, which eventually will result in unexplainable fatigue.

Most people drink only when they are thirsty. Also, many people only drink soda, coffee, or tea. Caffeine contained in the drink will cause diuresis (increased amount of urine), which could possibly lead to dehydration.

SO DRINK WATER FREQUENTLY!
Ladies, here is another reason you should drink water—elasticity of skin. Drink water as often as you can, and you will find yourself looking younger every day!


Polyunsaturated fats, monounsaturated fats, saturated fats, and trans fats are different kinds of fats that are known today. There are categories that these kinds of fats are classified as. Polyunsaturated fats and monounsaturated fats are known to be called “healthy fats,” which decrease LDL and increase HDL. In contrast, saturated fats and trans fats are the “unhealthy fats,” which increase bad cholesterol. The main difference between these two major types of fats is that in saturated fats only single bonds can be found, but the unsaturated fats contain some double bonds.

Saturated fat is often found in everyday life. Butter, cheese, chocolate, fats in meat, and French fries are known to have one of the highest calorie counts. Saturated fat has been considered dangerous as it increases risk on the human body. However, because of its addictive taste, many people seek for the saturated fat foods even though they know it is harmful. In fact, people are not really aware of the danger of it.

To begin with, consuming the food with a high density of saturated fat is very dangerous as it raises the cholesterol level in the blood stream. Cholesterol is not always detrimental to the human body, but it is actually an essential substance for the body’s normal functioning. However, if cholesterol levels in the blood get too high, it can lead to risk of heart and blood vessel disease, stroke and cancer. As one takes in more calories than the body requires to maintain itself, plaques in the blood stream can be built up due to cholesterol. This built-up plaques are very harmful as it clogs the blood stream like a blocked pipe. This kind of situation can lead to heart attack and stroke.1

Furthermore, the foods containing high levels of saturated fats such as butter, creams, and meats are often high in calories and it is obvious that eating a high-calorie diet causes many side effects. When a person eats a high-calorie diet with more calories than the person burns, the extra energy will be stored as fats for future use. When there is too much extra energy in the fat cell, it will finally cause conditions such as obesity and high blood pressure. Therefore, it is important for people to balance their diet and avoid an excess of saturated fat in the diet.

In conclusion, GMOs have to go through rigorous steps before we can meet them at supermarkets. The problem with it is that the only words we hear associated with GMOs are words like biotechnology, biosafety, genetic injection, transgenic food, gene therapy, and so on. According to the Australian Department of the Environment and Heritage, genetic modification means “the manipulation of an organism’s genetic make-up in order to create or enhance desirable characteristics from the same or another species.”

GMOs (Genetically Modified Organisms) are deliberately processed organisms by changing their genetic structure. The problem with it is that the only words we hear associated with GMOs are words like biotechnology, biosafety, genetic injection, transgenic food, gene therapy, and so on. According to the Australian Department of the Environment and Heritage, genetic modification means “the manipulation of an organism’s genetic make-up in order to create or enhance desirable characteristics from the same or another species.”

GMO genetics are manipulated by extracting the useful or needed gene from the organism and putting it into the target organism. To do this, restriction enzymes are initially used to cut out the specific gene. These enzymes recognize the sequences of the DNA strands and cut out the exact places. Then, the vector, which is capable of getting into the host cells, is used to carry the extracted genes inside the host cells of the target organism. Of course, harmful toxins or viruses get eliminated before the extracted genes are put into the organism. Because the process of genetic modification is technically demanding, there is a common misconception that GMOs are unhealthy and might bring severe circumstances.

In response to these concerns, the errors that might be made during the challenging GM processes undergo strict safety tests referring to the official regulations. Of course GMOs can be dangerous, if errors weren’t found and got consumed by people. That is why strict regulations are required for GMOs. They need to get permission from the country regarding its regulation of GMOs. For instance in EU countries, GMOs are evaluated particularly in two areas.

Firstly, when injecting newly developed genes into the organisms, generally new proteins are formed. These new kinds of proteins should be tested whether it is suitable for human consumption. The safety of these proteins are appraised during the animal feeding tests. There are several criteria for assessing the proteins’ danger, and if one or more criteria are met, this GMO will not be able to get consumed by people.

Secondly, chemical analyses and animal feeding tests are used to minimize the possibility of side-effects. The GMOs nutritional value and content of toxins are measured with those of the other conventional foods. If any differences are shown including the toxin content, that GM food would not be permitted. In the animal feeding test, the whole GM food is fed to the subject animals of the experiment consistently over a long period of time. If there are any negative changes in the subjects’ organs or immune system, the GM food is inadmissible.

In conclusion, GMOs have to go through rigorous steps before we can meet them at supermarkets. The truth is that the GMOs people consume is strictly marked as safety food.


Image 1

Image 1 2
Dietary Strategies for Glycemic Control in Type 2 Diabetes

Min Su Kim

In a society where individuals are highly exposed to an increasing number of processed food, people tend to be indifferent to our daily eating habits. Such indifference has led an overarching number of people to suffer from various diseases and arising complications. Throughout the last few decades, there has been a large growth in the number of patients who have been diagnosed with Type 2 diabetes mellitus. It is classified as type two because its primary cause is due to impaired lifestyle, such as disoriented eating habits, unbalanced nutritional diet, lack of exercises, and obesity. In fact, researchers have firmly claimed that lifestyle modification, especially nutritional and dietary strategies, is the best way to maintain normal blood glucose level. There are several types of dietary strategies that have been suggested to patients with type 2 diabetes mellitus, such as a low-fat diet, low-carbohydrate diet, dietary advice with exercise, and so on. Diabetes can easily lead to numerous complications that may eventually cause death, thus maintaining a stable glycemic index through the implementation of a well-managed dietary strategy is critical.

Until now, numerous researchers have conducted experiments and research on different strategies that can best reduce the blood glucose levels for patients suffering from Type 2 diabetes mellitus and its complications. They have clearly stated that lifestyle modifications such as a low-fat diet and low-carbohydrate diet are some of the best lifestyle modifications that patients must actively adopt.1

The research was conducted to assess the value of a low-carbohydrate diet and a low-fat diet, and concluded that more patients in the low-carbohydrate group experienced faster weight loss than those in the low-fat group in a short term. However, as time progressed, there was a similar weight reduction of about 3.4% in both groups of patients. It can be inferred that both dietary strategies can certainly enhance diabetic symptoms by reducing the weight. Implementation of a low-carbohydrate diet for a year proved to have positive effects on hemoglobin A1C and the measure of average blood glucose.2

Researchers who reviewed meta-analysis of several studies in glycemic control made a conclusion that high-monosaturated-fat diets improve glycemic index profiles and lipoprotein profiles, as opposed to high-carbohydrate diets. It showed that fasting plasma triglyceride concentrations significantly reduces the cholesterol, specifically VLDL cholesterol, concentrations by about 20%. There was a decrease of carbohydrate load through high-monosaturated-fat diets, which is difficult for type 2 diabetes patients to handle readily. Scientists suggest that this specific dietary approach is best encouraged for patients who focus primarily on losing or maintaining weight.3

Taking results from research about various dietary strategies, patients diagnosed with type 2 diabetes must focus their treatment on making changes in their diets. Being fully aware of detrimental effects from implications such as cardiovascular diseases and nerve and kidney damage, patients should take active response in glycemic control.


CAUSES AND EFFECTS OF OBESITY

Seunghyun Nam

Pizzas, Hamburgers, Fries, Nuggets, Pasta…. Looks good! Your tongue might feel tastier, but your life will not. Obesity; one of the biggest health problems in the modern society. As I mentioned, there are a bunch of amazing foods that attract us every day. These foods taste good, but these foods are mostly considered as “Fast-Foods”, and contain a lot of fat, MSG, and cholesterols. These foods are in fact, the main causes of obesity.

When you become obese, there are a lot of problems that can happen, you get to weight more, so there could be some difficulties and discomforts while living out. For instance, you might not be able to run fast, sit on small chairs, or might not look good to other people. However, these are not the real problems. Other “Real” problems exist. When a person becomes obese, the likelihood of many serious diseases such as heart diseases, diabetes, and some cancers increases in a significant rate.4 This means, even if a child is obese, there is a possibility those young might get these diseases. Also, obese people get to use more energy than people who are not, so they get to eat more again. This makes obesity even scarier, and explains how severe the consequences of obese can be. Some scientists say that in fact obese is one of the leading causes of death in the globe nowadays. It is absolutely and obviously true that obesity in our society is a major problem to solve.

Now, here’s most important question: How do we solve obesity problems? The most important will be to eat healthy foods, and have a regular diet and living habits. Eating a lot of food such as salads will be helpful, and managing to reduce the amount you eat every time will be one of the most effective ways. Also important, is to do a lot of exercise. Especially doing aerobic exercises such as running every day will be another plus in your diet. So remember these two things: food and exercise. As I said before, the more you gain weight, the harder you get to escape from obesity. At first the methods might not seem to work, so it could be stressful and hopeless about the diet. But if you endure, and keep on the diet, you’ll notice you lost a lot of weight each month! Diet will not only give you smile and confidence right now, but also the rest of your life.


<Image 1>
**Eat and Stay Young**

Sang Weon Suh

If a cell is in contact with oxygen, oxidation occurs within the cell. No matter what type of cell it is, any cell that interacts with oxygen goes through oxidation. This phenomenon can be seen easily in our daily life, but seeing this may not be always so always be pleasant. For instance, browning apples, rancid fish, and even rust on an iron pipe are examples of oxidation that can be seen easily in daily situations, and they are all not pleasant at all. Furthermore, if this oxidation happens on human skin, it can be worse. Simply, if one's skin goes through oxidation, one will appear older than they actually are. Looking at people with many wrinkles, or scars that are easily distinguishable from normal skin color, it is right to say that their skin went through oxidation. There is a medical way that can help in preventing wrinkles and scars, and that is by using antioxidants. Since antioxidants prevents oxidation, which is responsible for making skin getting older, it is crucial for our health.

Organisms that synthesize oxygen to survive are born with an ability to cure themselves from oxidation. However, as they age and get older the amount of oxidation-causing wastes, which are called free oxygen, are stacked in the body; therefore exceeding the amount of waste that can be cured by innate ability. As this ability is not capable of the taking care of the amount of free oxygen, people can get serious illness. For example, excess oxidation can cause cell damage and lead to hardening of arteries, which can be a main cause for one's death. Therefore, people need antioxidants for their health.

Out of my friends, there are several of them who look extremely old compared to their age, and they sometimes have complexion about their appearance. It seems impossible to prevent oneself from getting old but it is actually really easy to slow that process down by using antioxidants.

To put it in an extreme way, oxidation can be part of cancer, diabetes, and other diseases that lead to death. Therefore, consuming food with a lot of antioxidants can not only keep one to looking young, but also can help a person to stay healthy and live longer.

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**All About Vitamin C**

Jee Haeng Yoo

There are three major nutrients that human beings have to consume for a living: protein, carbohydrates, and fat. The three major nutrients are so essential that you may end up dying if you do not consume enough, but there is no need to worry because such nutrients are consumed on a daily basis. However, even though these three nutrients are ‘the three major nutrients,’ it does not mean that these are only necessary nutrients for your body.

Vitamin is one of the essential nutrients that the human body should have in order to stay alive. There are 13 recognized vitamins, and the most popular one is the Ascorbic Acid, widely known as Vitamin C.

Vitamin C is one of the water-soluble vitamins that has a sour taste with yellowish-white color. The human body can neither produce Vitamin C nor store it, so it has to be consumed daily from fresh fruits or vegetables. The importance of Vitamin C was first introduced in the 15th century, when sailors and explorers suffered from the disease called ‘scurvy.’ As sailors stayed onboard ship for a long period of time, they were not able to consume fresh fruits or vegetables, thus leading them to scurvy. ‘Scurvy is the disease that results in hemorrhage, gum disease, or anemia, and eventually leads the human body to death. Sailors realized the importance of Vitamin C and started carrying fresh fruits such as lemon on the voyage.

Other than the cure of scurvy, Vitamin C has so much more usage in the human body that it is now considered the ‘cure-all.’ Vitamin C helps repair and grow many parts of the human body—from blood vessels and tissues to teeth and bones. Vitamin C affects not only the inside of the human body but also the outside. It slows down the aging of the skin and cures wounds. Moreover, Vitamin C is one of the antioxidants that prevent substances called ‘free radicals’ from harming the human body. Since free radicals are related to severe heart disease or cancer, Vitamin C may be the ‘cure-all.’

However, as there is an old saying ‘too much is as bad as too little,’ excessive consumption of Vitamin C can harm the human body. According to the ‘Dietary Reference Intakes: Estimated Average Requirements,’ published by the United States National Academy of Sciences, the recommended dietary allowance of Vitamin C for an adult male is 90 mg per day. Vitamin C can leave the body through the urine system when there is an excessive amount of Vitamin C since it is water-soluble. However, when people consume too much Vitamin C, it may cause light symptoms like headache or diarrhea to severe issues such as heartburn or kidney stones.

For many people, Vitamin C may be a familiar nutrient, but not many of them know what effects Vitamin C has on the human body. Know exactly how it affects your body and consume wisely.
ENZYMES CAN RESOLVE IT ALL

Yurim Lee

Lack of protease causes anxiety, feeble immune system, sloppy kidney function and cold hands and feet. Lack of disaccharidase causes diarrhea, constipation, insomnia and depression. People also gain weight easily if they intake foods without enzymes because too much cryptic enzymes, which humans form themselves, are used up as digestive enzymes when some of them need to be saved for metabolism. According to Karen L. DeFelice in Nutrition and Enzymes, insufficient amounts of enzymes just might be the cause of all of the health problems listed above which are common for modern people.

As one of nine major nutrients that organisms require to sustain their lives, enzymes break down foods so that bodies can absorb nutrients helping absorption, digestion and evacuation take place. There are two kinds of enzymes; one that humans produce on their own and another that they obtain from foods. Well, in the past, it was known that humans can produce cryptic enzymes infinitely, but now that the amount of enzymes human bodies can produce has been found out to be limited, people’s interest in effectively consuming enzymes has increased. Fortunately, according to Cookand, scientists have found out that people can increase the amount of enzymes they obtain from foods, though, by eating ‘rightly cooked’ foods at the ‘right time’.

People can increase the amount of enzymes they obtain from foods by cooking them right. According to Cookand, enzymes get denatured when cooked at high temperatures. In fact, most plant based enzymes become denatured at 48°C (water’s boiling point is at 100°C) and it is best to eat them raw. Second, the amount of enzymes one can obtain increases about ten times once the food gets grilled. Grilling fruits and vegetables as a whole, with their peels, would even add up this boost.

People can also consume enzymes effectively if they understand their biorhythm. According to Moon in Failing Diet, Lack of Enzymes Might be the Cause, in nutritional science, a day is divided in to three groups; four in the morning to noon, noon to eight in the night, and eight to four. Four to noon is when metabolic enzymes become active and people excrete bodily wastes. Since activation of digestive enzymes can interfere with or lessen the amount of metabolic enzymes, foods only, for instance, and vegetables, grilled and enemas water are recommended. Noon to eight is when digestive enzymes become active so enough nutrients including carbohydrates and proteins should be taken at this time. Eight until four, on the other hand, is when people should not eat. This is when cellular metabolic reactions take place with nutrients saved earlier and bodies repair themselves. To take enzymes efficiently, people have to supplement foods that contain enzymes and avoid foods that do not from four to noon.

Moon from Cookand states, now that a large part of people’s diets consist of foods without enzymes such as cookies and breads, poor digestion, bacterial infections due to poor digestion, leaky gut, colon problems and toxins might also all come from deficiency of enzymes. People can intake enzymes effectively from foods, though, by eating fruits and vegetables raw or grinded as a whole or both. Clear understanding of biorhythm also offers times to supplement enzymes and when not to intake foods. If one can obtain sufficient amounts of enzymes, one might be able to resolve some of the health problems he or she has.

HOW TO USE NSAID DRUGS SAFELY

SeoHyoun Moon

Have you benefitted from the effect of non-steroidal anti-Inflammatory drugs, otherwise known as NSAID drugs? You don’t think so? Well, maybe then you need a better explanation. One of the most popularly used forms of NSAID painkillers is Acetylic Salicylic Acid, otherwise known as Aspirin. Another popular form is known as Ibuprofen. They are also among the most popular over-the-counter drugs, which means that they can be bought without a prescription.

However, did you know that NSAID drugs had a fatal side effect? These anti-inflammatory drugs can cause gastrointestinal bleeding which can be fatal. Although individual possibility of experiencing these symptoms are very low, over 100,000 hospitalizations and 16,000 deaths are caused by NSAID drugs annually. You are more likely to experience these symptoms if you are “over 60 years, concurrent use of corticosteroids, previous GI bleeding or history of peptic ulcer disease, use of excessively high NSAID doses, and history of cardiovascular disease”.

Also, overdose of these drugs are a common symptom. There are nearly 175 million adults who take pain relievers, and over half of them admit that their doses exceed the recommended dose. People use various reasons to take more than written on the prescription, the most common reason being that they have developed immunity or that it doesn’t work quickly enough. On the contrary, there has been no case of developing immunity to NSAID, overdosing highly increases the possibility of kidney failure to up to 4 times.

To avoid these fatal symptoms, we need to understand how these popular painkillers work. As the name “anti-inflammatory” suggests, they cut off the effects of Cox-1 and Cox-2 enzymes. By blocking these enzymes, these drugs lessen pain and swelling. However, it cannot be said that it is good to be relieved of pain or fever because it is a factor in our immune system. By trying to suppress the uncomfortable symptoms such as fevers or cramps, we also end up suppressing our immune system, prolonging the illness.

At the risk of sounding clichéd, anti-inflammatory painkillers are a double-edged sword. Although they are already a part of life because they are highly helpful in managing everyday disturbances. On the other hand, they can cause permanent organ damage and internal bleeding, both of which can be fatal. So, before you gulp that Ibuprofen, think twice and stay safe!
RUNNING: HOW BENEFICIAL IS RUNNING TO YOUR HEALTH?

Justin Turner

Running is an intriguing activity. Just last year, over 540,000 people ran marathons within the United States. Over half of a million people decided to run 26 miles. Why would anyone put themselves through such a thing? The reasoning is, running is extremely beneficial to your health and your mentality. Those half-million people enjoyed what they were doing. Running can make you feel healthier, reduce stress, and create social interactions.

Some of the health benefits of running include the strengthening of bones and muscles, increasing energy, and extending your life. When you run, just like in all exercise, your muscle filaments tear. Your cells then rapidly work to regrow and as a result your muscles are stronger. Two of the main parts of your body to be affected are legs and knees. The filaments around your knees strengthen and can remove knee and joint pain. Also with each stride a person takes while running, their bone is stressed upon and the body reacts by rebuilding and strengthening bone cells. Along with strengthening bones and muscles, you will have an increase in energy. Running works out your cardiovascular system. The cardiovascular system is responsible for pumping blood and moving oxygen around your system. Oxygen is one of the key components in cellular respiration to produce energy in your cells. By improving your heart health through running, you increase oxygen movement and energy production. Runners find themselves rejuvenated and awake. Finally, exercising can increase your life by creating stronger cells and reducing stress on your body in the long run.

Besides helping you physically, running benefits your mental emotions and capabilities. When you run, you increase your production of endorphins, which are neurotransmitters. Neurotransmitters help make you feel good. Running also produces a calming rhythm to remove worry and forget your daily struggles. It can also help balance your sleep schedule, which results in a healthier and happier lifestyle. Finally, running gives more oxygen to the brain and causes higher awareness and more retention when learning.

Socially, running is a very popular activity. Many people run daily and know others who run. Running can, with no doubt, be hard to do at times, and running with someone enduring the pain grows a respect and a strong bond with that person. Also, instead of enduring pain, a group of people can jog lightly and chat. Nowadays, running events are held very frequently that are often filled with friendly people. Socially, running is a great activity to get involved in.

To conclude, running is a wonderful activity to get involved in to increase your health, relieve mental stress, and get to know people. Running is an activity that can be done through the young years, and through the old. It is an extremely beneficial form of exercise and is a great way to stay healthy.

REGENERATIVE KIDNEY

Chunzi Zhang

It is widely believed that the only viable ways of treating renal failure and renal insufficiency are transplantation, hemodialysis, and peritoneal dialysis, all of which may induce great pain in the patient and cost extremely large amounts of money. But now, a prospective, more advanced, and less costly treatment is already under progress and is very likely to become the primary method of treating kidney diseases and other chronic diseases caused by irreversible cell damage.

Most of chronic kidney diseases are caused by damage of podocytes --differentiated epithelial cells crucial for filtration. Unlike other epithelial cells that periodically renew themselves, these cells are thought to be non-regenerative because the kidney has a highly organized filter system and any replacement of cells can undermine the homeostatic balance. Any damage done would be permanent. Many scientists specialized in stem cells, telomerase, and cell aging have attempted to find signs of podocytes’ renewal. It is found that podocytes may dedifferentiate, and proliferate, in human immunodeficiency virus (HIV)-associated nephropathy, which is characterized by a rapid decline in renal function, emphasizing the importance of podocyte quiescence for glomerular function (Barisoni 1999). Together with other evidence, it reveals the potential regenerative ability of podocytes.

A study done by Marina Shkreli showed that podocytes can re-enter the cell cycle after TERT expression is silenced or when Wnt signaling is inhibited. (Shkreli 2009) A more stunning research conducted by Dr. Yuval Rinkevich at Stanford managed to show that in fact, kidney cells (renal tubule-restricted clonal segment-specific epithelial cells) can be replenished by local cell production from Wnt-responsive, fate-restricted, and clone-forming cells that may function as unipotent stem/progenitor cells. (Rinkevich 2014) These results are especially valuable for the patients who have been suffering from chronic kidney disease and cannot afford the prohibitive cost of regular dialysis treatment.

It is known that the ability that these cells possess to re-enter the generation process is related to Wnt pathways, which was found in numerous studies investigating kidney cell regeneration. Basically, these proteins are involved in a particular kind of cellular pathway that can be recognized by podocytes, and the activation of this pathway can trigger cellular reproduction. This finding offers a therapeutic target to stimulate the regenerative ability of the kidneys. If one day we can put this method to use, it may become the radical cure for chronic kidney disease.


The Missouri Academy Science Journal serves as the source of scientific intelligence of the students of the Missouri Academy and staff members of Northwest Missouri State University.