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PHARMA HIGHLIGHTS

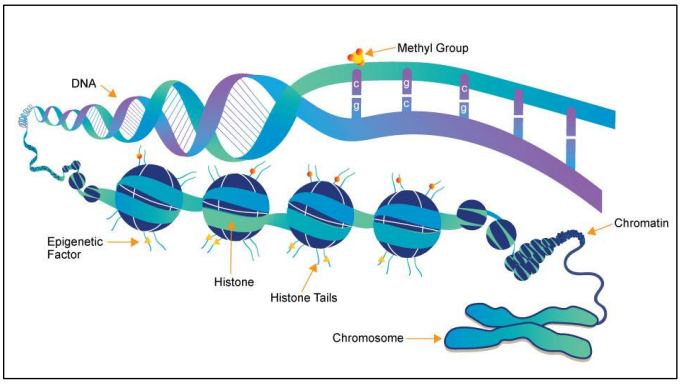
ISSUE 92 | MAY 2022

Epigenetic treatment in mice improves spinal cord regeneration after injury

Physical therapy can help patients regain some mobility, but the results are severely limited for severe cases because spinal neurons do not naturally regenerate after injury. At the moment, there are no effective treatments for spinal cord injury. However, in a study led by Simone DiGiovanni at Imperial College London in the United Kingdom, the team found that weekly treatments with an epigenetic activator can help the regrowth of sensory and motor neurons in the spinal cord when given to mice 12 weeks after severe injury. The study was published on September 20 in the open access journal PLOS Biology. Axon renewal in neurons is induced by genetic programming, which has previously been successfully activated by researchers using a tiny chemical called TTK21. The co-activator protein family CBP/p300 is activated by TTK21, altering the epigenetic status of genes. In a mouse model of severe spinal cord injury, they evaluated the TTK21 therapy. The mice were housed in an environment that was rich in opportunities for physical activity, which is recommended for patients who are human. When compared to the control treatment, researchers discovered many benefits following TTK21 treatment. More neuron sprouting in the spinal cord was the most obvious result.

Additionally, they discovered that sensory axon growth accelerated and motor axon retraction stopped above the site of injury. These alterations were probably brought on by the observed rise in regeneration-related gene expression. The next stage will be to increase the effectiveness of these effects and to cause the regenerated axons to connect to the rest of the nervous system, allowing animals to resume their natural mobility.

This research demonstrates that systemically delivering TTK21 once per week after chronic spinal cord injury (SCI) in mice can encourage neuronal regrowth and an increase in synapses, which are essential for neuronal transmission. This is significant because neuronal repair and regrowth are unsuccessful in chronic spinal cord injury, a condition for which there is no known cure. In an effort to reduce impairment in SCI patients, we are currently investigating the possibility of combining this medication with techniques that span the spinal cord gap, such as biomaterials.



Written by: Shafiqul Islam (Teaching Assistant)

Bioelectronic face masks that have the potential to detect viral exposure

From the inception of the COVID-19 pandemic, people from all over the world were instructed to wear face masks. Masks such as N95, KN95, and surgical and cloth masks have been used to slow the spread of the virus. They notably prevent the spreading of viruses through oral droplets. As face masks have been used to keep the viral transmission in control, and a primary part of patient management, researchers from Tongji University, Shanghai had other plans. They prepared face masks that have the potential to detect viral particles in the air, providing information that someone might have been contacted with viral particle. The mask is attached with ion-gated transistors.

Newsletter Editorial Board: Namara Mariam Chowdhury, Kazi Fatema Rahman and Farzana Islam

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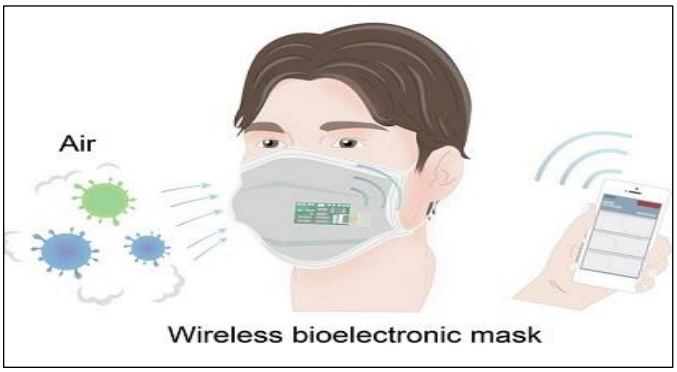
These transistors are loaded with aptamer which works like antibodies that can bind with the viral particle, and give signals. Researchers used respiratory infectious viral samples like H1N1, H5N1, and SARS-CoV-2. Their bioelectronic face masks were able to detect viral particles from liquid samples as low as 0.3 µL. Similarly, the mask was able to measure viral particles from gaseous media even at a low concentration of 0.1 fg/mL. Through wireless internet connection, the signal results can be found through smartphones. The response can be obtained within 10 minutes of contact. This technology will help to detect and provide early signs of any possible outbreak. Also, it will enhance personal protection.



Written by: Ashfaq Ahmed (Teaching Assistant)

Health Benefits of Cannabis

Hempseeds, the edible fruits of the Cannabis sativa L. plant, were initially considered a by-product of the hemp technical fibre industry. Nowadays, following the restorationing of the cultivation of C. sativa L. plants there is a growing interest for the hempseeds production due to their high nutritional value and functional features. Seeds of industrial hemp (Cannabis sativa L.) contain a large amount of protein (26.3%), dietary fiber (27.5%), and fatty acids (33.2%), including linoleic, α-linolenic, and some amount of γ-linolenic acid. An increased contribution of plant-based food is one of the ways to prevent obesity and associated metabolic disorders, which is partly due to the relatively low caloric value of such food. However, food from plants is also a good source of bioactive compounds that can directly bring benefits to the cardiovascular system, a good example of which are polyunsaturated fatty acids (PUFAs) with α-linolenic acid and linoleic acid as their main representatives in nature. Besides their nutritional importance, these PUFAs, especially from the n-3 family, can improve lipid metabolism and the inhibition of lipid synthesis in the body. PUFAs are also believed to prevent lipid accumulation in the arteries and decrease the development of hypertension. However, the consumption of PUFAs can also bring some negative consequences to the body, which especially applies to the fatty acids of the n-6 family that can be metabolized to pro-inflammatory eicosanoids. An interesting source of fatty acids is the seeds of industrial hemp (*Cannabis sativa* L.), as they contain a large amount of PUFAs, including linoleic and α-linolenic acids (approx. 53% and 18% of total fatty acids) and some small amount of other fatty acids that are uncommon in vegetable oils, such as γ-linolenic acid. The oil from hemp seeds is characterized as having an optimal ratio of n-3 to n-6 PUFAs (1:3), so important for the adequate functioning of the cardiovascular system; however, hemp oil contains trace amounts of trans fatty acids, which are generally thought to raise the risk of atherosclerosis by inhibiting the synthesis of other PUFAs in arterial cells. Nevertheless, Al-Khalifa et al. demonstrated that hearts from rats fed with hemp seeds exhibited significantly better postischemic recovery of maximal contractile function and relaxation during reperfusion compared to the control group. The authors concluded that this was due to PUFAs from hemp seeds.

Written by: Nasrin Ahmed Tahrim (Teaching Assistant)

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