

“NEURALINK” Implantation of Artificial Intelligence in Humanbeings

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Abstract-- Intelligence exhibited by machines is known as artificial intelligence. We are all aware of the advantages of AI and how it has proved to be helpful in fields like agriculture, medical diagnosis, electronic training, robotic control and remote sensing. At the same time we may also have to analyze the negative side of artificial intelligence. Artificial Intelligence exceeding humans in reasoning and intelligence can replace humans and take away their jobs. This paper discusses about Elon Musk’s Neuralink which is centered on creating artificially intelligent devices like brain chips that can be implanted in human brain with purpose of helping humans merge with software and to keep pace with the advancements in artificial intelligence with the help of the Neural Lace Technology. This paper has attempted to give the basic idea of Neural Lace and how this can be helpful in overcoming brain disorders like chronic pain disorder permanently and help the patients get rid of the side effects of the medication of chronic pain disorder that has got several side effects.

Keywords-- artificial intelligence, brain chips, chronic pain disorder and neural lace

I. INTRODUCTION

Elon Musk’s Neuralink is centered on creating devices that can be implanted in human brain with the purpose of helping humans merge with software and to keep pace with the advancements in artificial intelligence. Neuralink is looking to develop something called “neural lace technology,” which involves implanting electrodes into human brains that allow for the uploading and downloading of thoughts to a computer. The WSJ report discusses how this technology could improve human cognitive function. Neural lace wants to explore how to alleviate the symptoms of chronic medical conditions, like depression, epilepsy and even Parkinson’s. Musk brought up the potential benefits of neural lace technology, something that is surgically connected to a human brain and allows users to interact with a computer without the need for input methods like keyboards or track pads. We think the development of full artificial intelligence could spell the end of human race and transform humans into super humans.

II. PROPOSED SYSTEMS:

A. DEEP BRAIN SIMULATION(DBS)

Deep brain stimulation (DBS) is a surgery to implant a device that sends electrical signals to brain areas responsible for body movement. Electrodes are placed deep in the brain and are connected to a stimulator device.

B. DARPA PROGRAM:

The DARPA program calls for the technology to be bidirectional; the implants must be able to not only record signals, but also to transmit computer-generated signals to the neurons. This feature would allow for neural prosthetics that provide blind people with visual information or deaf people with auditory information.

III. AN ATTEMPT TO CURE CHRONIC PAIN DISORDER:

A. CHRONIC PAIN DISORDER:

Chronic pain syndrome (CPS) is a common problem that presents a major challenge to health-care providers because of its complex natural history, nuclear etiology and poor response to therapy. CPS is a poorly defined condition. Some authors suggest that any pain that persists longer than the reasonably expected healing time for the involved tissues should be considered chronic pain. CPS is a constellation of syndromes that usually do not respond to the medical model of care.¹² This condition is managed best with a multidisciplinary approach, requiring good integration and knowledge of multiple organ systems.

B. MEDICATION FOR CHRONIC PAIN DISORDER AND THEIR SIDE EFFECTS:

- Acetaminophen (Tylenol)

This medicine may cause:

- Nausea.

- Rash.
- Liver damage (with high doses).
- Non-steroidal anti-inflammatory drugs (such as Aspirin, Ibuprofen, etc.) These may cause:
 - Stomach upset, heartburn, and nausea. Taking the medicine with food may help prevent these problems.
 - Stomach ulcers and kidney problems (with long-term use).
 - Allergic reaction (rare). Increased risk of heart attack and stroke.

C. HOW CAN WE OVERCOME THE SIDE EFFECTS:

Artificial intelligence and the basic concepts of neural lace (brain installation devices) can be made to overcome the chronic pain. Once the patient is relieved from the pain he need not take medicines for the chronic pain disorder which causes the above side effects.

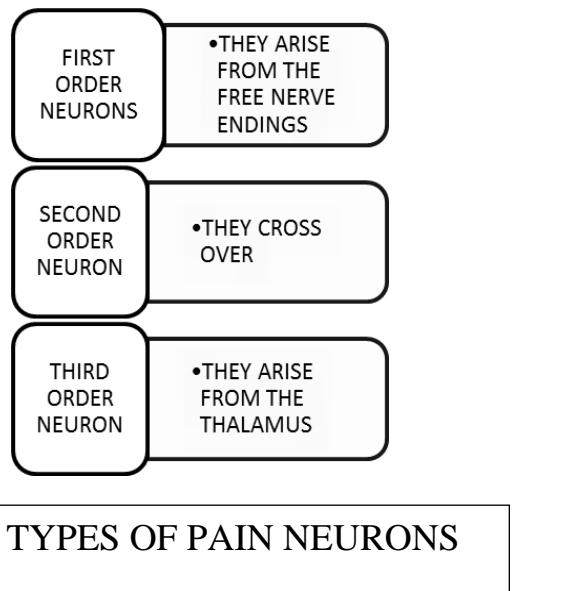
IV. THE MAIN IDEA:

Pain, temperature, fine touch and vibration can be sensed by the brain when the impulse reaches the brain through sensory pathway. If this pathway can be blocked then the impulse will not reach the brain and hence the patient won't feel the pain. This may avoid the intake of chronic pain disorder medication which may lead to side effects.

A. SPINOTHALMIC (PAIN) PATHWAY:

It consists of three types of neurons just like any other sensory pathway. They are:

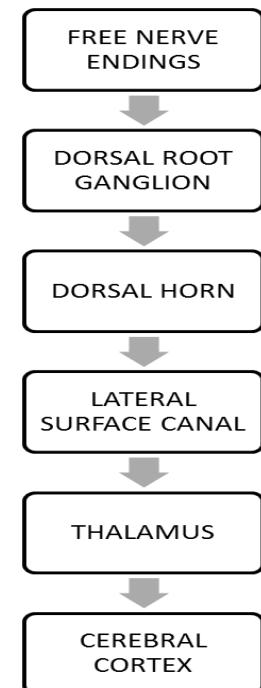
- first order neurons (they arise from the free nerve endings)
- second order neurons (cross over)
- third order neurons (they arise from thalamus)



B. JOURNEY OF THE IMPULSE TO THE BRAIN:

- Pain receptors recognize pain and convert it into an electro chemical signal called the impulse at the free nerve endings which is a part of the first order neurons.
- The free nerve endings carry the impulse into the spinal cord at the dorsal root ganglion (ganglion is a collection of axon of the nerves found outside the brain)
- From the dorsal root ganglion they move to the dorsal horn
- This is where the first order neurons end and the second order neuron begins
- The second order neurons will cross over
- (The brain has two parts-left brain and right brain.
- The left brain will coordinate the right side of the body and the right brain will coordinate the left side of the body. For example if you have a pain in the right leg then the impulse must reach the left brain, for this purpose crossover of second order neurons take place.)
- The second order neurons will move upwards through the lateral canal
- From the lateral canal it will move into the part of the brain called thalamus. Here the second order neurons will end and this will give rise to the third order neurons.
- The third order neurons will finally reach the brain cortex

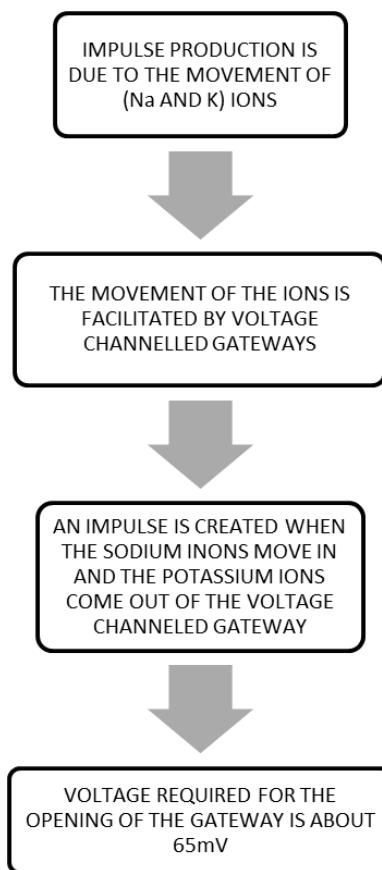
C. THE PAIN PATHWAY



A. HYPOTHESIS:

If the brain installation devices like the installation of brain chips as neural lace suggests can block any one area of the brain cortex that controls pain, then the pain impulse will not reach the brain and hence the patient will not be able to feel the pain. This leads to the ultimate cure of chronic pain disorder and therefore the patient can get rid of analgesics such as opioids and non-opioids and be free from its side effects

B. IMPULSE PRODUCTION:

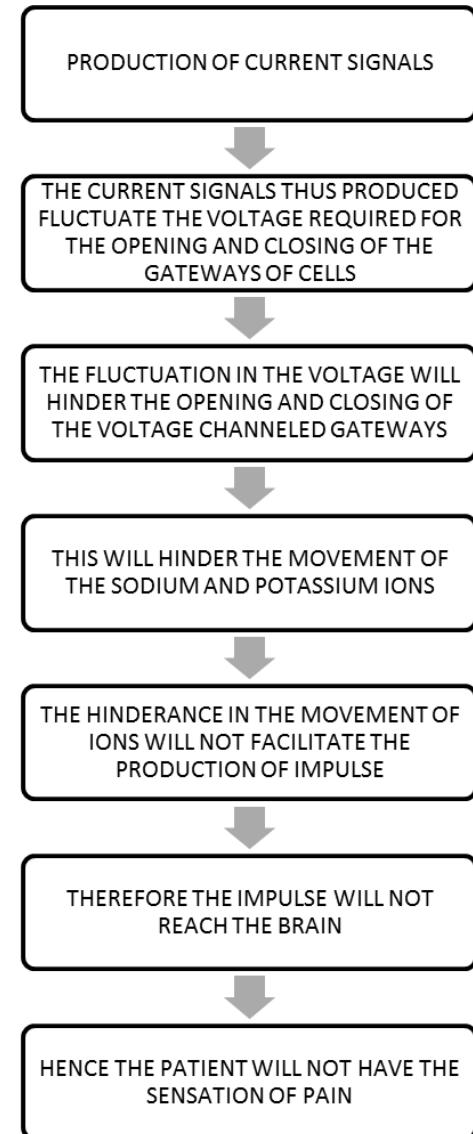


C. ALGORITHM: TO BLOCK THE SPINOthalMIC PATHWAY:

- In order to block the spinothalmic (pain) pathway, we must stop the impulse production
- Impulse is created due to the movement of ions
- Movement of these ions is facilitated by voltage channelled ion gateways
- Sodium ions must move in and potassium ions must come out through the gateway for production of impulse

- For the opening of the gateway a voltage of about 65mv is needed
- If the neural lace brain installation chip can modify this voltage, then the impulse production may be hindered
- Hence impulse won't reach the brain and the patient won't feel the pain
- This will avoid the unnecessary intake of the chronic pain disorder medication which leads to many side effects.

D. ROLE OF NEURALINK BRAIN CHIP IN STOPPING IMPULSE PRODUCTION



E. FUTURE ENHANCEMENTS:

- As pain and temperature shares the same pathway, the blockage of pain pathway can prevent the

sensation of temperature as well. Therefore, an artificial intelligent chip is required that is capable of learning, the one that can differentiate between the impulses of pain and temperature.

- Neural lace brain chips can be used to cure other brain disorders like Alzheimer's, Parkinson's, etc.
- The artificially intelligent brain installation devices can be injected into the brain in the form of a mesh, so that humans can directly get connected with the cloud and their computing devices.
- **Artificial intelligent brain chips will enhance the natural intelligence (biological intelligence) of humans with digital intelligence, so that humans can keep pace with the exponential growth of artificially intelligent devices like humanoid robots, killer robots, etc.**
- Elon Reeve Musk founder and CEO of Neuralink believes that with a technology of Neural Lace within a span of 8-10 years even healthy people can get their brains installed with artificially intelligent brain chips that can enhance their memory.

F. CONCLUSION:

Artificial intelligence and the technology are one side of life that always interest and surprises us with the new ideas, topics, innovative products etc..... Though AI is not a threat for humans right now it may become one any time in the near future. Hence the idea of installation of brain chips may sound weird right now but in the future this may become the way of life.

I strongly believe that this paper which is based on the technology of neural lace can definitely provide a permanent solution for the chronic pain disorder with the help of enhanced researches and experiments and relieve the patients from the unnecessary intake of medicines which will lead to many side effects. Henceforth I have decided to take this project as my final year project and contribute my findings to the medical field for patients suffering from chronic pain disorder and other brain related disorders.

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