

Neuro Shield Band - Suparba Sudha Biswas.pdf

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Neuro-Shield Band: An Innovative Idea in
Eliminating Risks and Hazards of
Anesthesia

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Neuro-Shield Band: An Innovative Idea in Eliminating Risks and Hazards of Anesthesia

RESEARCH QUESTIONS:

1. How does anesthesia harm people?
2. What are the obstacles preventing 100% good recovery after anesthesia?
3. What's the plan to eliminate complications of anesthesia?
4. Are the plan and strategy suitable enough for real life problems and resources?
5. Will it be better for the environment?
6. Will it be more efficient?

INTRODUCTION:

- It isn't guaranteed that we will always stay healthy in our lives even with medications. Sometimes we need surgery to eliminate diseases, reduce burden of it and even to save lives. Surgery requires anesthesia which may be general, local or others. Difficult and big surgeries need general anesthesia. General anesthesia presents with numerous disadvantages, including allergic reactions, nerve damage, vomiting, breathing problems and even cardiovascular and respiratory collapse ^[1]. General anesthesia also needs certain conditions to be fulfilled with elderly patients and patients with multiple systemic diseases. The treatment of these patients depend on their body's fitness, and if fails to meet these conditions, most of the time the patient is left without treatment and passes away while others go to bigger hospitals to manage it. But in a low economic country, that isn't always possible and that's why I thought of Neuro-Shield Band. Because why loose a loved one over excessive rules of anesthesia when you could promote awake surgery instead? Neuro-Shield Band will comprehensively cover all of the side effects, it will be less pricey, biodegradable and sustainable. Its simple mechanism diminishes the complexity of anesthesia eliminating unnecessary deaths and risks.

EXISTING LITERATURE:

- ***Existing Anesthesia Facilities:*** Anesthesia in the body easily helps to diminish the activity in the brain responsible for consciousness. In the spinal cord, anesthesia blocks the pain from reaching the brain. It also blocks signals in the sensory and motor nerves leading to muscle relaxation. The respiratory and Cardiovascular system help in spreading anesthetic agents throughout the body. Inhalation

anesthetics are inhaled through the nose and travels into the blood stream through the lungs making it more efficient. There are different types of anesthesia such as general, regional, spinal, local, epidural anesthesia, etc.^[2]. The type of anesthesia that is going to be used depends on the type of surgery.

- **General Anesthesia Hazards:** This type of anesthesia is the most used in hospitals as it is considered “safe” during surgery. The use of general anesthesia often causes patients to lose track of the cardiac rhythm. This causes the most deaths in anesthesia besides some other reasons. Another physical disadvantage is included as general anesthesia requires certain body conditions to be met; elderly people who need the surgery are often turned away^[3]. Though nausea, sore throat and headaches are common but breathing problems, allergic reactions, dental and eye injury may happen severely. The patient may experience consciousness mid procedure which is unpleasant for the patient^[1].
- **Microchip uses in biotechnology:** Microchips are now being used regularly in patients. Elderlies with Alzheimer’s have chips integrated into their brains or spinal cord to keep an eye on the brain activity without human supervision^[4]. Other microrobots like “E-dura” are implanted on the spinal cord to stimulate nerve signals while bots like “Neural dust” study and monitor the muscle, brain and nerve activity through sensors^[5].
- **Biodegradable and biocompatible materials in human body:** Prosthetics are mostly made with silicon or Gallium Nitrate [Ga(NO₃)₃] for application on the skin^[6]. Materials that stay for a long time inside the body are made with metals and materials that don’t alert the body, harm or cause infections. Material like Gallium Nitrate, Polymide and Niobium cause almost no reactions and are non-toxic in the body^[6].

METHODOLOGY

- **Study Design:** This is a theoretical innovation (radical innovation)
- **Theoretical Framework:** It will be based on neuroscience and biotechnology innovation sustainably.
- **Proposed Working Principle:** It latches onto a nerve and penetrates the lipid covering to absorb the electric impulses in the chip so it doesn’t reach the brain resulting in surgery without anesthesia^[7].

- **Design Description: Neuro-Shield Band (NS Band)**

Part of the microrobot	Material
• Chip	• Gallium Nitrate— $\text{Ga}(\text{NO}_3)_3$
• Chip Covering	• Polyimide—PI
• Penetrating Legs	• Niobium—Nb

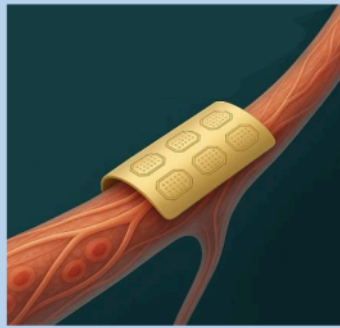


Fig: Proposed design of the NS band

- **How it will work? [THEORY]**

IDENTIFICATION: The nerve that supplies the designated area will be identified first. Specially the spinal nerves and other superficial nerve (ulnar nerve, radial nerve etc). The device will be inserted into the body by injecting into the specific spot.

IMPLANTATION: The NS band can be implanted near the targeted nerve using a special syringe.

APPLICATION:

- Neuro-Shield band will consist of 5-6 microrobots together.
- Once near the targeted nerve, it will guide itself to it and latch on.
- Simultaneously, they will penetrate the lipid covering to collect electric impulses cruising through the nerve and send it to the chip to collect which is covered by a protective layer.
- The device can be made in multiple batches consisting of 30 minutes to 3 hours of its working time and biodegradation.

BIODEGRATION: Consequently, this device being small helps in biodegrading. It will auto-biodegrade by melting itself onto the nerve which now has penetrations in it, this will cover the micro wounds and increase the speed of natural healing inside the body ^[8].

FUTURE RISKS: Risks like improper implantation, malfunction of the band and failed mechanism may take place.

FUTURE WORK: It will be used world-wide for eliminating risks of anesthesia and significantly less disposed plastic syringes in landfills. It will not only save money but also promote natural healing inside the body with non-toxic materials. If it's successful the surgeries will be more orderly and the chips would be more improved.

CONCLUSION:

- Although this paper states about the innovation, it has no real-life application yet^[9]. However, it thoroughly addresses its' challenges and obstacles enough to be real and ready to eliminate the complications of anesthesia. Altogether anesthesia is a complex set of rule books, even though it's the way to go option it has its own flaws, so to give people a better, healthier and risk-free life "Neuro-Shield Band" deserves more research, attention and real-life applications

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