**BACKGROUND**

- Urinary incontinence (UI) is a prevalent condition among women affecting between 20 – 50% of adult women [1]. Aging, muscle weakness, degenerative diseases, and nerve damage are the primary causes of the condition.
- Currently, there are several UI treatment options, including medications, physical therapy, and surgery. Neuromodulation is beginning to be looked at to treat many ailments, including UI, as current methods have been shown to have their implications and varied outcomes [2].
- Neuromodulation involves the use of electrical stimulation, in this case, to modify the behavior of the bladder, and it has become a widely applied treatment to restore functions in damaged nerve regions throughout the body.
- Current electrodes used for the electrical stimulation of the bladder are unable to withstand the forces exerted by the bladder’s filling and contraction, which can limit their effectiveness.

**OBJECTIVE**

- This project aims to design a flexible and elastomeric electrode made of polydimethylsiloxane (PDMS) and platinized graphene that improves the effectiveness of neuromodulation of the bladder, potentially providing a new treatment alternative for urinary incontinence (Underactive Bladder).

**RESULTS**

- The electrode went under a design stage aimed at being able to anchor itself onto the bladder and withstand the forces for chronic implantation.
- An elastomeric electrode using PDMS and platinized graphene was successfully designed and fabricated. The fabrication process included the use of an FDM printer while still being able to achieve desired electrical characteristics and induce bladder contractions in vivo. There are many more opportunities for future development in our device like wireless power supply, using higher printing resolution, or testing other forms of anchoring.

**METHODS & MATERIALS**

- The PDMS was fabricated using a ratio of 9:1 silicone elastomer base to curing agent which was then placed and fabricated. The fabrication process included the use of an FDM printer and fabricated. The fabrication process included the use of an FDM printer while still being able to achieve desired electrical characteristics and induce bladder contractions in vivo. There are many more opportunities for future development in our device like wireless power supply, using higher printing resolution, or testing other forms of anchoring.

**CONCLUSIONS**

- An elastomeric electrode using PDMS and platinized graphene was successfully designed and fabricated. The fabrication process included the use of an FDM printer while still being able to achieve desired electrical characteristics and induce bladder contractions in vivo. There are many more opportunities for future development in our device like wireless power supply, using higher printing resolution, or testing other forms of anchoring.

- Nonetheless, this novel electrode could have a profound impact on the quality of life for those suffering from various forms of UI as it holds great potential for a chronic method of treatment through neuromodulation.

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