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An Implantable Device to Regulate Urination through Deep Brain Stimulation

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ABSTRACT

Urinary Incontinence (UI) is a disease in which patients lose control of their bladder. It is particularly common in elderly women having a prevalence of as much as 30% to 50% [1]. Many of these patients are left without successful treatment. A recent study has shown a new option for treatment that consists of deep brain stimulation (DBS) at a site known as the periaqueductal gray (PAG) [2, 3]. To test the effectiveness of this treatment, chronic stimulation of the PAG should be used in animals to see if it can reliably prevent micturition in the long term. A device was created that incorporated a piezoresistive pressure sensor and two electrodes connected through an implantable circuit developed by other members of this lab. The pressure sensor was implanted in the bladder and the electrodes were implanted in the PAG. When the bladder pressure reached a level greater than **XX**mmHg, **XX**mA of current was sent between the electrodes. The threshold was set slightly lower than the actual voiding pressure to ensure effectiveness. Results showed that the circuit and pressure sensor used could accurately detect voiding in a rat's bladder. There was a steady increase in the voltage output and a sharp spike followed by a quick decrease during voiding. This shows that an implantable chronic device to regulate micturition is very feasible as long as the electrodes are placed in the correct location. The next step is to insert electrodes, stimulate, and look for changes in the bladder pressure readings.

KEYWORDS

Periaqueductal Gray (PAG), Deep Brain Stimulation (DBS), Urinary Incontinence (UI), Micturition

CITATIONS

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