

Neuromodulation of Vagal Stimulation

A safe and robust method for selective stimulation of vagal afferent and efferent pathways by pairing electrical stimulation with kilohertz electrical stimulation nerve block

Georgia Tech inventors have developed a safe and robust method for selective stimulation of vagal afferent and efferent pathways by pairing electrical stimulation with kilohertz electrical stimulation nerve block. The approach has been evaluated for systemic inflammation in response to bacterial lipopolysaccharide induced endotoxemia in a rodent model. The researchers quantified both nerve activation and inhibition through electrophysiological recordings of peripheral nerve activity along with biochemical changes. The results demonstrated in the animal model indicate that afferent, but not efferent activation of the cervical vagus nerve synchronously activates the greater splanchnic nerve (and resulting elevation of pro-inflammatory cytokines) in a dose-dependent manner. In addition, efferent cervical vagus nerve activation enabled by complete afferent kilohertz electrical stimulation nerve block enhances the anti-inflammatory benefits and incomplete afferent kilohertz electrical stimulation nerve block exacerbates systemic inflammation.

Summary Bullets

- Enhances anti-inflammatory effects of vagus nerve stimulation
- Pairs electrical stimulation with kilohertz electrical stimulation nerve block to achieve directional stimulation
- Quick, reliable anti-inflammatory clinical effects

Solution Advantages

- Enhances anti-inflammatory effects of vagus nerve stimulation
- Pairs electrical stimulation with kilohertz electrical stimulation nerve block to achieve directional stimulation
- Quick, reliable anti-inflammatory clinical effects
- Standard protocol for investigating neuromodulation of systemic inflammation

Potential Commercial Applications

- Clinical strategy for achieving directional (afferent or efferent) peripheral nerve stimulation
- Utilized in any peripheral nerve for development of neuromodulation technologies

Background and More Information

Afferent cervical vagus nerve activation amplifies systemic inflammatory processes, resulting in an elevation of pro-inflammatory cytokines. In contrast, efferent activation of the cervical vagus nerve dampens systemic inflammatory processes, potentially moderating a wide-range of inflammatory pathological conditions. Unfortunately, current clinical approaches to cervical vagus nerve activation results in activation of both the afferent and efferent pathways. Precise and optimal control of neural circuits requires the ability to stimulate with directional specificity, which can be achieved in experimental conditions by nerve transection. However, transections are not viable clinically.

Inventors

- Yogi Patel
PhD student - Georgia Tech Department of Biomedical Engineering
- Dr. Robert Butera
Vice President for Research Development and Operations - Georgia Tech
- Dr. Ravi Bellamkonda
Professor- Department of Biomedical Engineering at Duke University
- Tarun Saxena
Pilot Program Manager- CTSI Accelerator at Duke University

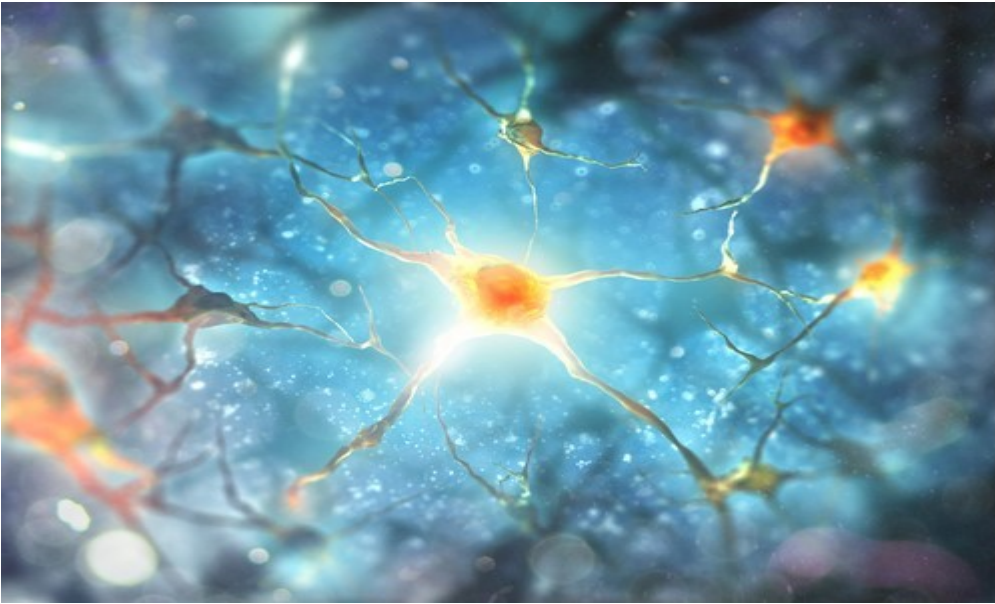
IP Status

:

Publications

[SYSTEMS, METHODS, AND DEVICES FOR NEUROMODULATION- Patent Application, -](#)

Images



Visit the Technology here:
[Neuromodulation of Vagal Stimulation](https://s3.sandbox.research.gatech.edu//print/pdf/node/3750)

<https://s3.sandbox.research.gatech.edu//print/pdf/node/3750>