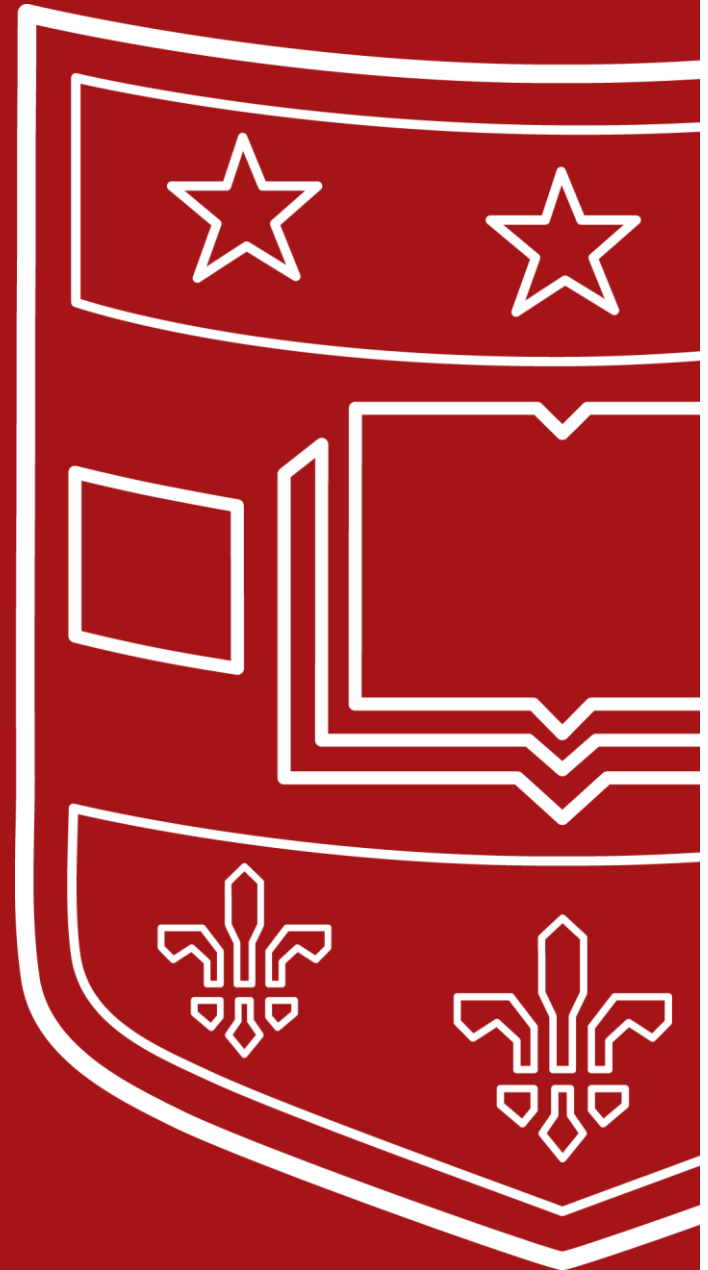


SimpEL

**Implantable, Bone-Anchored
Sympathetic Nerve Stimulator**

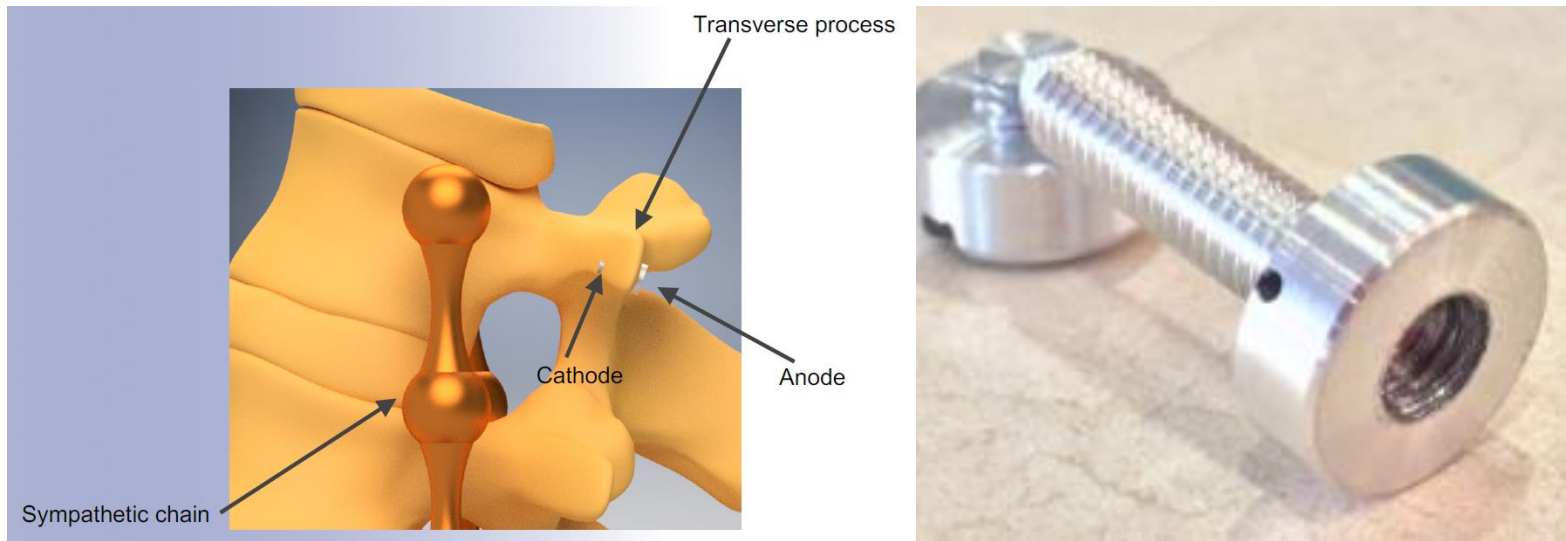
Dr. Eric Leuthardt

Professor of Neurological Surgery, Neuroscience, Biomedical
Engineering, and Mechanical Engineering & Materials Science
Director of Center for Innovation in Neuroscience & Technology





The SIMPEL device is a screw electrode that is anchored in the bone (prevents migration) and creates an electric field (non-contacting) to stimulate or inhibit the sympathetic nervous system to treat a plurality of diseases.



Problem

~1/3 of the US population suffers from one of the 6 diseases listed below

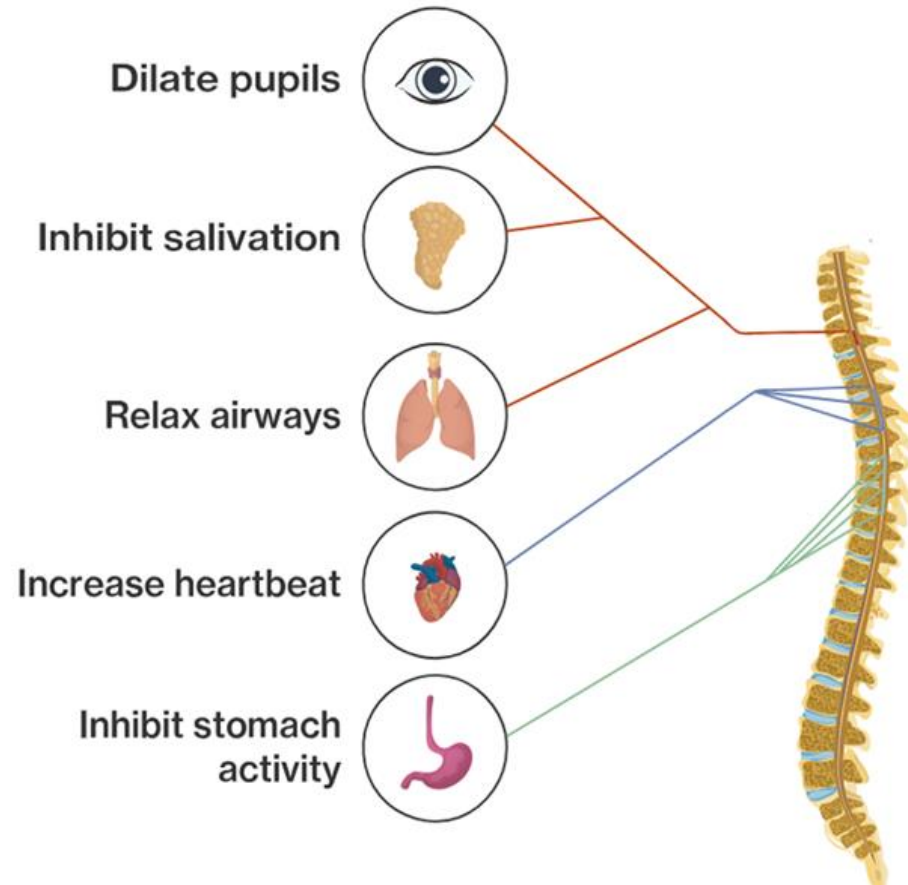


There are a multitude of diseases where medical treatment is not fully effective such as the ones seen below.

- Life-threatening asthma
- Severe irritable bowel syndrome
- Excessive sweating
- Resistant hypertension
- Chronic pain
- Hyperactive bladder

Direct contact with the nerve can damage the nerve tissue.

SYMPATHETIC NERVES ("fight-or-flight")



30%-40% incident rate of complications with lead migration being reported as high as 68%

Solution



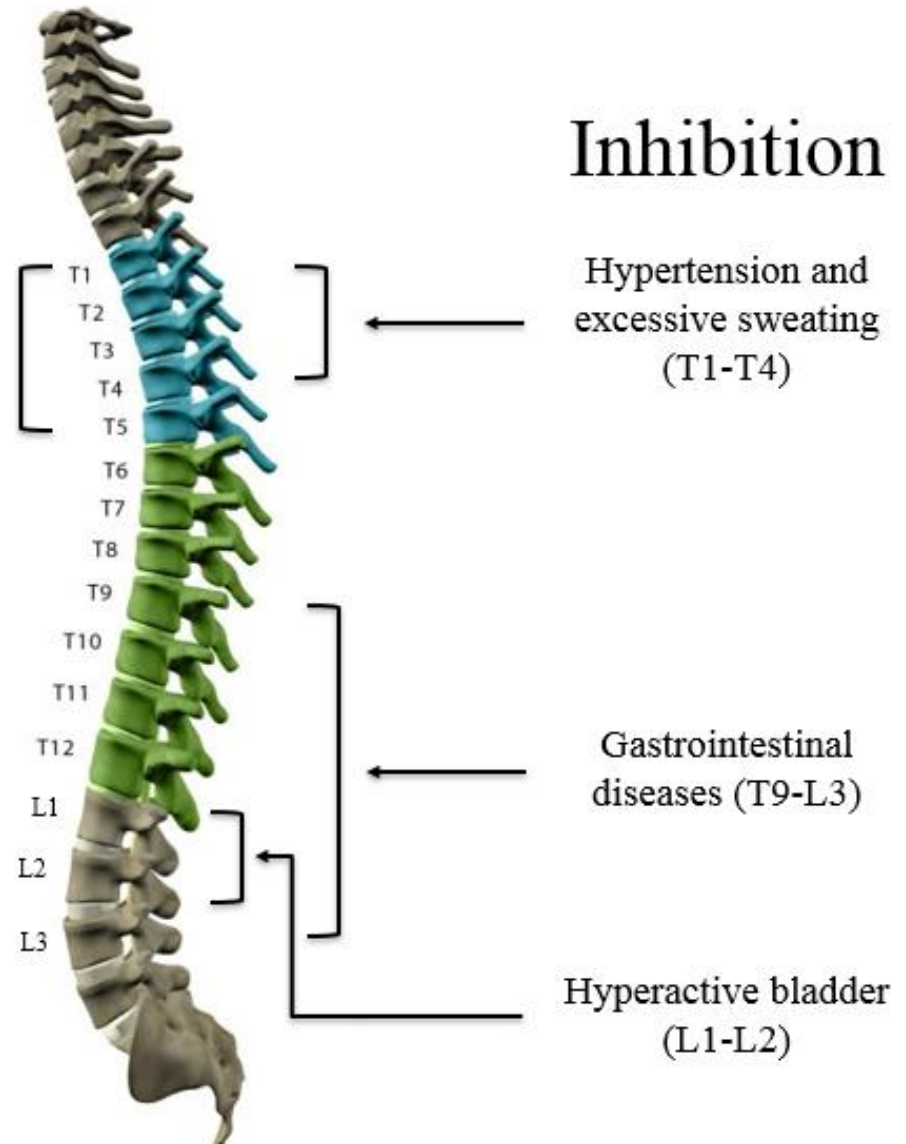
Excitation

Asthma (T1-T5)

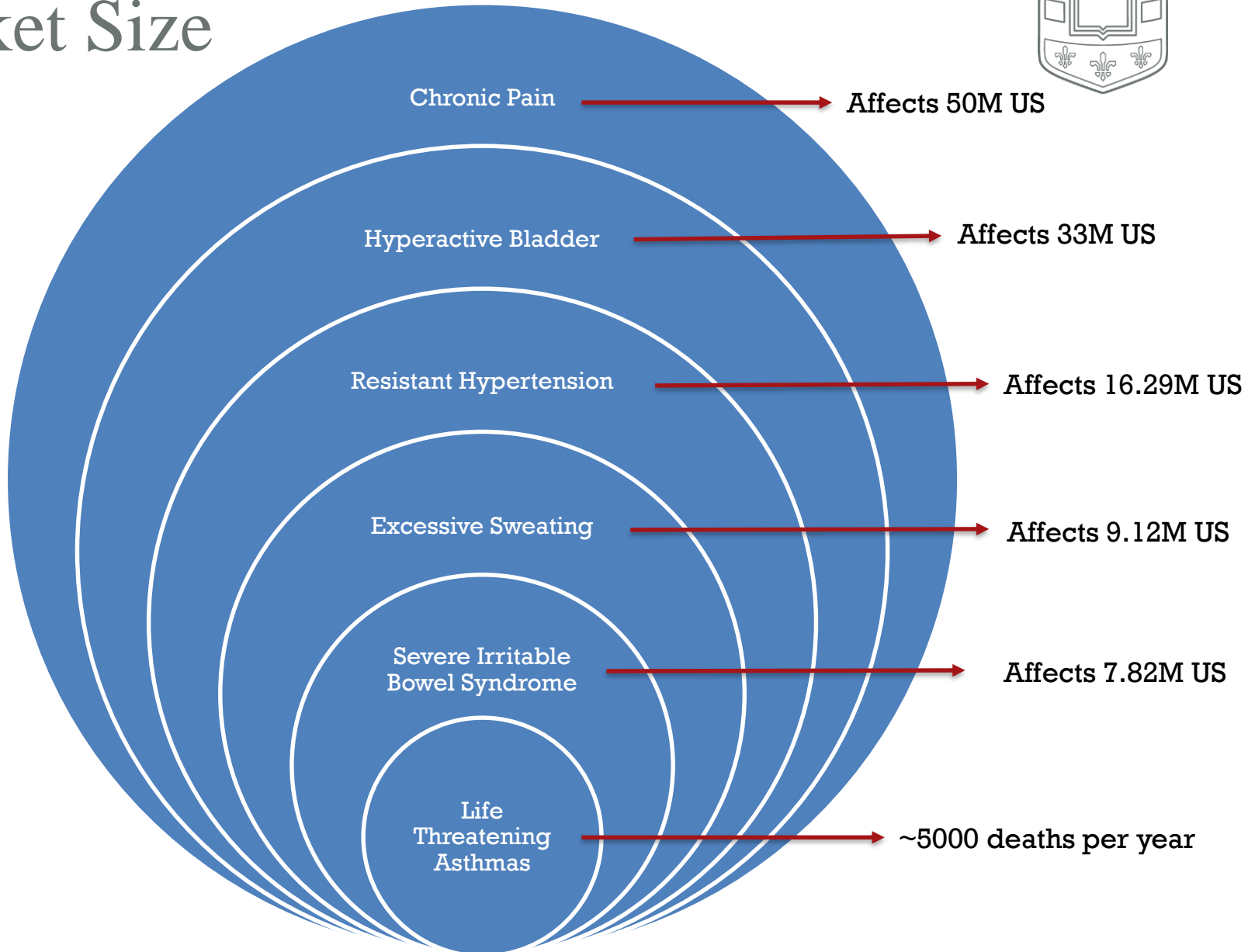
Inhibition

Hypertension and
excessive sweating
(T1-T4)

Using an implantable, bone-anchored screw to electrically stimulate or inhibit the sympathetic nervous system without contacting the nerve at different regions of the spine for the treatment of multiple diseases



Market Size



Current Technologies on the Market



Bone growth, tissue healing, and/or pain control

Bone growth stimulator

Pain relief

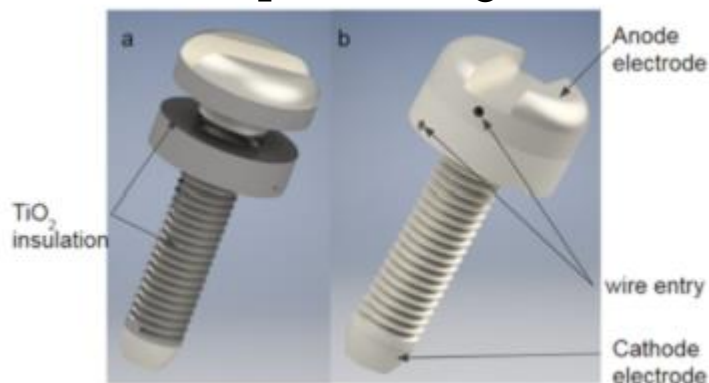
Therapy for neurodegenerative diseases (Parkinson's)

However there are no other company that is electrically stimulating the sympathetic nervous system for multiple disease states

Prototype

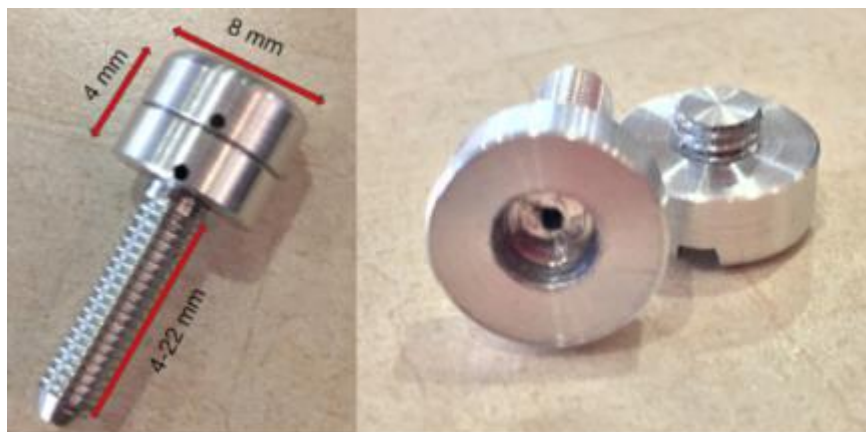


Concept Drawings



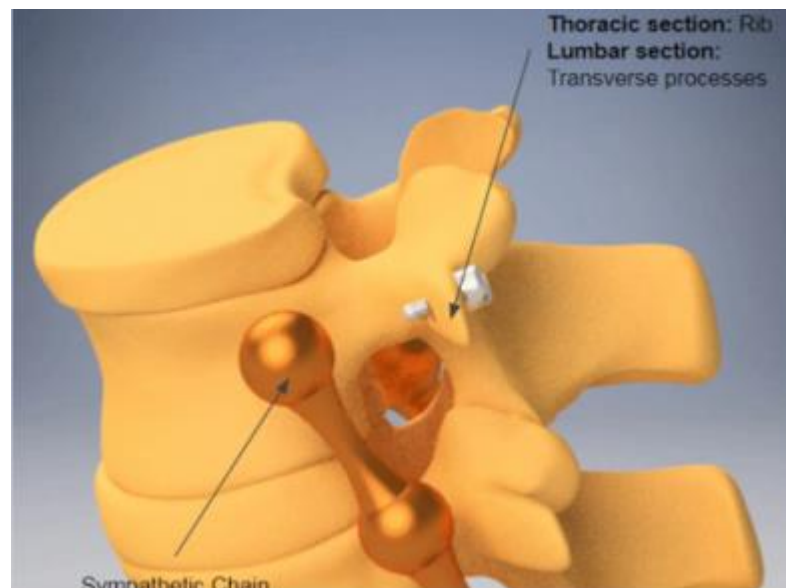
Current Prototype

Length of Screw ranges from 4mm to 22mm



Surgical Procedure

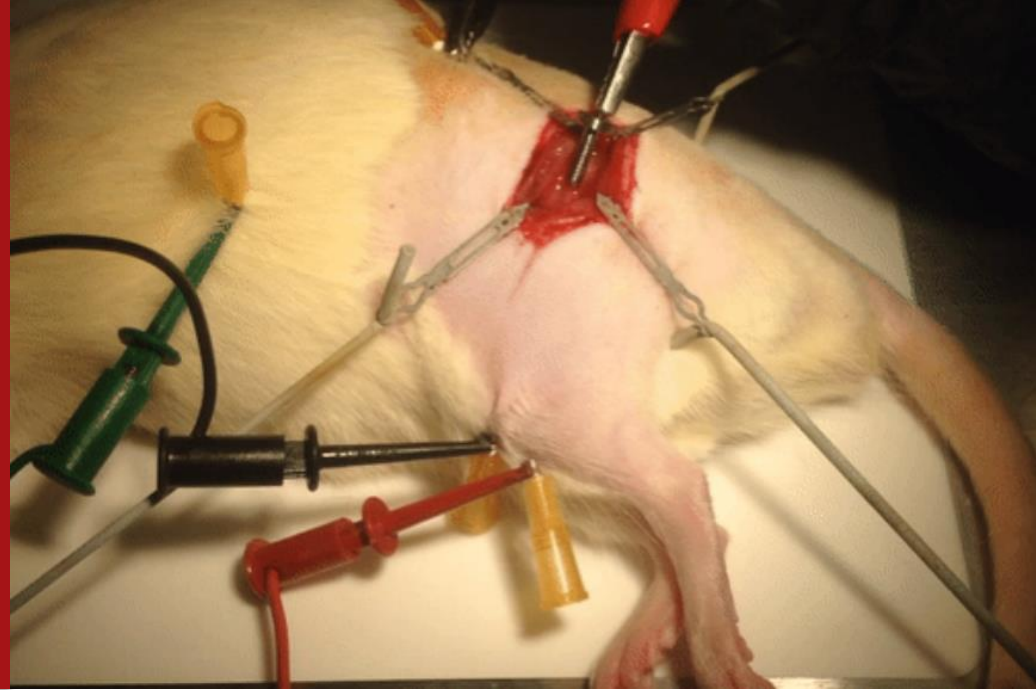
Can be implanted at Transverse Processes, the ribs, or in some cases both.



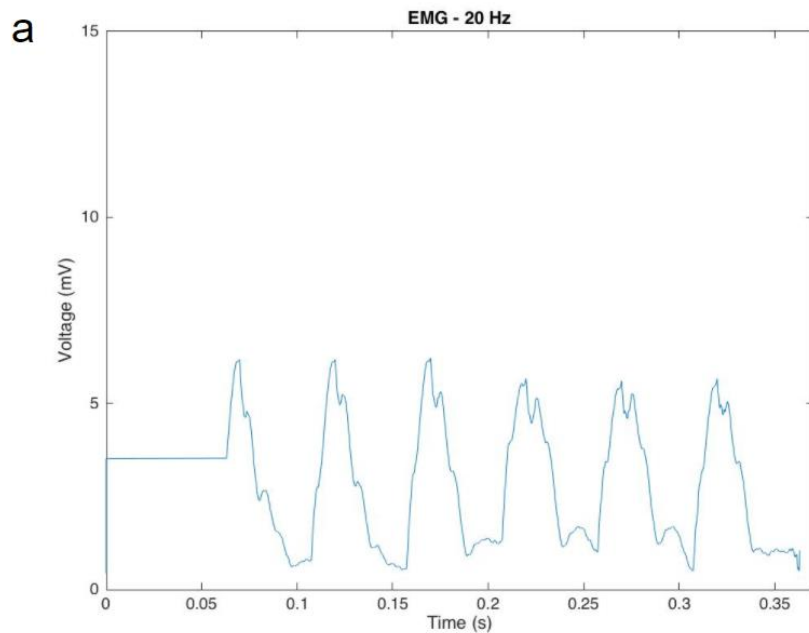
Sympathetic Stimulation/Inhibition Parameters	
Stimulation Frequency	2 – 100 Hz
Inhibition Frequency	100 – 200 Hz
Current	0.1 – 10 mA

Pre-Clinical Data

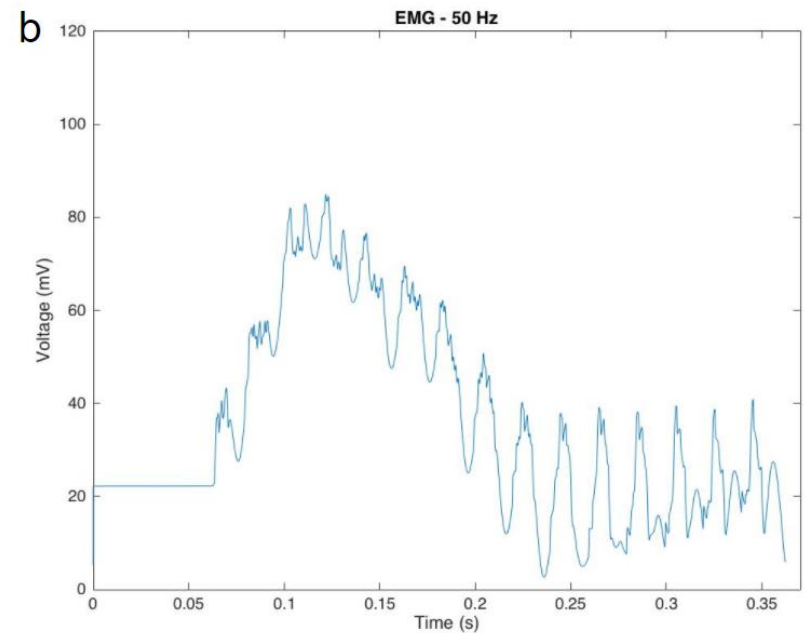
Using a rat model, in vivo prototype testing demonstrated stimulation of the rat's sciatic nerve with a nerve response consistent with the stimulation frequency applied.



Twitch contraction



Sustained muscular contraction





Conclusion

Adaptable to multiple disease states
with refractory conditions

Easy surgical implementation and
usage

Screw fixation prevents migration

No direct contact with nerve
potentially preventing nerve damage

Successful nerve stimulation in vivo

Patent: US application 16/415,311

Inventor bio



Eric C. Leuthardt, M.D.

- Professor of Neurological Surgery, Biomedical Engineering, Neuroscience, Mechanical Engineering and Materials Science at Washington University in St. Louis
- Director of the Center for Innovation in Neuroscience and Technology with a fellowship sponsored by Stryker Corporation.

Key Honors and Awards:

- Holder of 516 US Issued Patents and more than 1,120 pending applications
- Founder, consultant, or board member of 9 companies
- Innovation Award from the Academy of Science
- Winner of X Prize Visioneering Workshop

