Medical Xpress

Scientists demonstrate use of ultrasound to alter inflammatory and metabolic response

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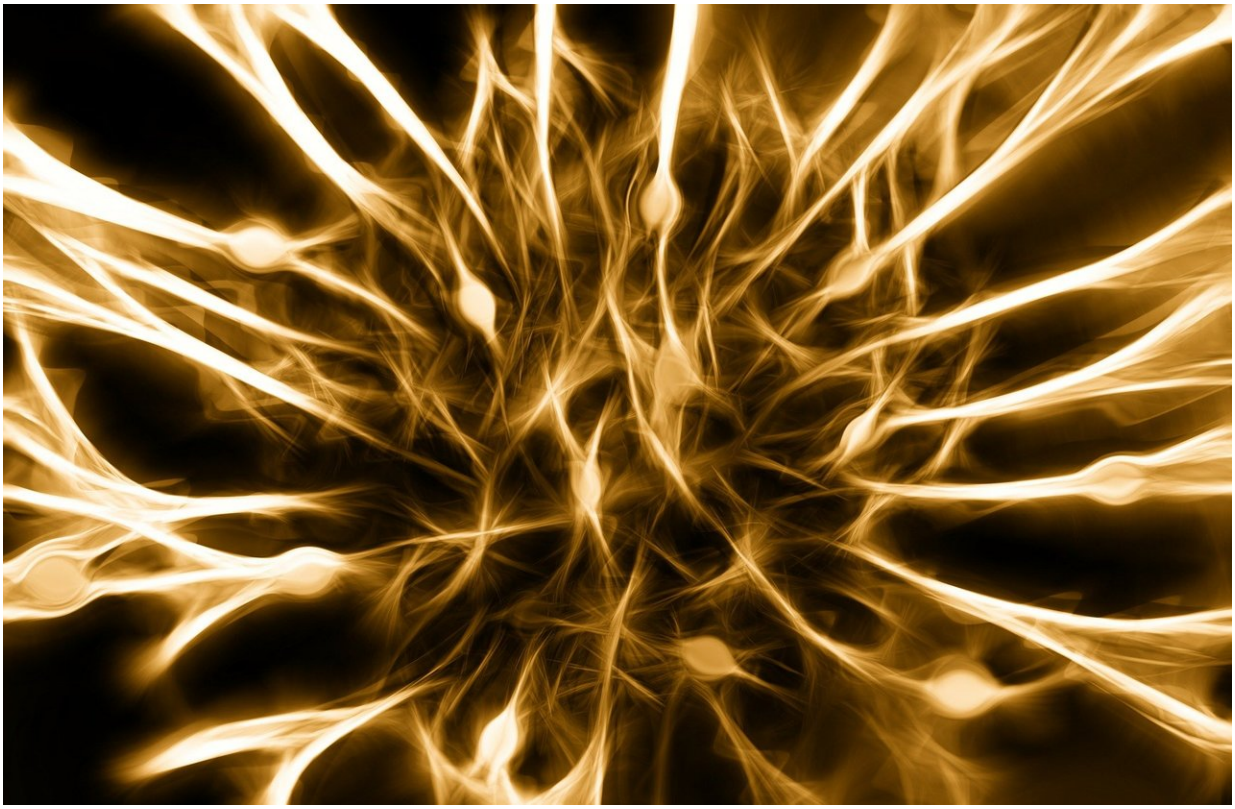

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GE Research and Feinstein Institute for Medical Research bioelectronic medicine teams have demonstrated potentially breakthrough non-invasive methods to regulate dysfunction in the body's metabolic or inflammatory control systems using ultrasound. The findings were

reported in this week's edition of *Nature Communications*. This article follows a medical first from The Feinstein Institute and GE Research to read what nerves are saying about inflammation in the body.

Bioelectronic medicine combines neuroscience, molecular biology and bioengineering to tap into the nervous system to treat disease and injury without the use of pharmaceuticals. Published bioelectronic medicine research has shown implanted devices stimulated nerves for therapeutic outcome. This most recent paper discusses the use of a non-invasive ultrasound technique to stimulate nerve features directly within target organs in a very precise manner.

"We have found that using ultrasound in very specific and targeted ways, we can reduce inflammatory markers and alter metabolism," said Chris Puleo, a GE biomedical engineer and co-author of the *Nature Communications* article. "In our studies, we show that applying ultrasound to a specific target in the spleen altered inflammatory markers that can cause arthritis, IBD and other ailments. And when targeting a specific part of the liver, we were able to modulate blood glucose levels."

"Major advances in understanding the immune system launched the new field of bioelectronic medicine, using devices targeting nerves to replace drugs. Non-invasive bioelectronic treatments have been limited until now," said Kevin J. Tracey, MD, president and CEO of the Feinstein Institute and co-author on the paper. "The potential for ultrasound devices to target specific reflex neural pathways to block inflammation represents a major contribution to the field."

"What's exciting is that we have demonstrated the use of ultrasound as a potential non-invasive alternative to current therapies that could lead to revolutionary new ways to treat various illnesses," said Victoria Cotero, a GE biologist and co-author of the manuscript.

Looking forward, more preclinical studies will be required to understand the full potential and effects of these new stimulation methods using ultrasound. In addition, human trials will be needed to further develop and validate these methods for potential future medical applications.

More information: Noninvasive ultrasound stimulation of the spleen to treat inflammatory arthritis, *Nature Communications* (2019). DOI: 10.1038/s41467-019-08721-0 , www.nature.com/articles/s41467-019-08721-0

Noninvasive sub-organ ultrasound stimulation for targeted neuromodulation, *Nature Communications* (2019). DOI: 10.1038/s41467-019-08750-9 , www.nature.com/articles/s41467-019-08750-9

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