conferenceseries.com

5th Global Summit on BRAIN DISORDERS AND THERAPEUTICS

August 05-06, 2024 | Paris, France

# MR - Guided focused ultrasound for refractory epilepsy: Where are we now?

**Annalisa Militi**
*IRCCS Centro Neurolesi Bonino Pulejo, Italy*

By outlining the current knowledge obtained from both preclinical and clinical studies and discussing the technical opportunities of this therapy for particular epileptic phenotypes, in this perspective review, we explore the various mechanisms and potential applications (thermoablation, blood-brain barrier opening for drug delivery, neuromodulation) of high- and low-intensity ultrasound, highlighting possible novel strategies to treat drug-resistant epileptic patients who are not eligible or do not accept currently established surgical approaches. Taken together, the available studies support a possible role for lesional treatment over the anterior thalamus with high-intensity ultrasound and neuromodulation of the hippocampus via low-intensity ultrasound in refractory epilepsy. However, more studies, likely conceiving epilepsy as a network disorder and bridging together different scales and modalities, are required to make ultrasound delivery strategies meaningful, effective, and safe.

Epilepsy despite advances in treatment, almost 20 to 30% of patients are resistant to the medications. With the advancement of technology and the ongoing search for better, less invasive neurosurgical techniques, magnetic-resonance-guided focused ultrasound (MRgFUS) has been proposed as an efficient and minimally invasive therapeutic ablation of tissue to disconnect aberrant networks and/or as an adjuvant therapy to modify brain networks in neurological patients- the development of MRI proton resonance frequency shift thermometry, which is used to track the release of energy in the targeted region and surrounding tissues, as well as the ability to precisely control the delivery of acoustic energy, has improved the accuracy and safety of MRgFUS brain ablation. However, the anatomical intricacy of the medial temporal structures should be taken into consideration before considering MRgFUS to treat mild temporal lobe epilepsy.Indeed, it is difficult to effectively ablate the target while protecting the delicate skull-base structures, significant blood arteries in the sylvian fissure, the cranial nerves, and the brainstem. MRgFUS could become an alternative method to target the area of mesial temporal (epileptic focus) dysfunction and produce a functional outcome comparable to that of resection of mesial temporal structures (the amygdala and the hippocampus).

## Biography

Annalisa Militi is a medical doctor of radiology. She has been working since 2019 on a project about MRg FUS in movement disorder and neuropathic pain. She spoke during National Congress of Radiology (SIRM -Italian Society of Medical Radiology; Rome 2022), about preliminary results of MRgFUS - three years of experience of a single center: IRCCS Bonino Pulejo Messina.