

Investigation of the bioeffects of blood-brain barrier disruption by focused ultrasound: A multifaceted imaging approach

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Investigation of the bioeffects of blood-brain barrier disruption by focused ultrasound: A multifaceted imaging approach

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The project/programme is most relevant to:

Alzheimer's disease & other dementias

Keywords

Research Abstract

Drug delivery to the brain is limited by the presence of a specialized structure known as the blood-brain barrier (BBB). A recent technology known as focused ultrasound has been shown to

successfully open the BBB and allow access of drugs to the brain from the bloodstream. Focused ultrasound uses sound energy to open a localized region of the BBB which is then able to repair itself after a few hours. Focused ultrasound has successfully been used to increase the entry of various drugs into the brain to treat disorders such as Alzheimer's disease. However, prior to using this technology in clinical setting, it is important to fully understand the implications of focused ultrasound on the brain. We propose using several imaging techniques including magnetic resonance imaging (MRI) and live-imaging microscopy to observe the brain during BBB opening. Using this approach, we will define the parameters at which BBB opening initially occurs, address the effects of ultrasound on the individual blood vessels and brain cells and gain a better understanding of the overall safety of the procedure. We will also perform experiments in a mouse model of Alzheimer's disease to better understand how ultrasound impacts the diseased brain. Together, the proposed experiments will give insight into the effects of BBB opening by focused ultrasound in the normal brain and in the presence of neuropathology. These experiments are necessary to guide the design of future clinical trials testing this promising technology.

Lay Summary

Further information available at:

Types:

Investments > €500k

Member States:

Canada

Diseases:

Alzheimer's disease & other dementias

Years:

2016

Database Categories:

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