Targeted drug delivery with focused ultrasound induced blood-brain barrier opening

Technology #cu14035

Drug delivery through the blood-brain barrier is necessary for the targeted delivery of some therapeutic agents for neurodegenerative diseases, such as Alzheimer’s or Parkinson’s diseases. Focused ultrasound induced blood-brain barrier opening with gas microbubbles allows drugs that are typically restricted to the vasculature to cross the barrier and be delivered to targeted regions of the brain. The efficiency of the microbubbles is limited by their micron-sized diameters that constrain them to the intravascular space. This technology is an acoustically activated droplet that can mediate focused ultrasound induced blood-brain barrier opening. Acoustically activated droplets improve blood brain barrier molecular diffusion by generating microbubbles capable of diffusing through the leaky vasculature.

Acoustically activated droplets facilitate focused ultrasound induced blood-brain barrier opening

Acoustically activate droplets are a class of ultrasound contrast agents capable of forming microbubbles after exposure to acoustic pressures. The resulting microbubbles have similar oscillatory properties to traditional microbubbles and can be used for blood-brain barrier opening. After the original blood-brain barrier permeation, the remaining acoustically activated droplets are small enough to diffuse through the vasculature for extravascular activation for enhanced drug delivery. Improving drug delivery and extending the regions of the brain where drug delivery is possibly may enable the development of new targeted therapies for neurodegenerative diseases.

Blood brain barrier opening with acoustically activated nanodroplets was confirmed by the successful delivery of fluorescent material into the brain of a mouse.

Lead Inventor:

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**Applications:**

- Therapeutic preferential permeation of tissues such as the blood brain barrier
- Targeted drug delivery through the blood brain barrier
- Delivery of contrast agent to the extravascular space for imaging and therapeutic applications
- Drug delivery for Alzheimer’s disease
- Drug delivery for Parkinson’s disease

**Advantages:**

- Targeted delivery of therapeutic agents across the blood brain barrier
- Facilitates focused ultrasound induced blood brain barrier opening using an extravascular agent
- Can facilitate higher injection doses with reduced side effects

**Patent information:**

Patent Pending

Tech Ventures Reference: IR CU14035

**Related Publications:**


**Inventors**

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