

Blood-brain barrier opening

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In certain cases, it may be desirable to temporarily open the [blood-brain barrier](#) to allow for the delivery of therapeutic agents or the removal of toxic substances from the brain. This process is known as blood-brain barrier opening or BBB opening.

There are several methods that can be used to open the blood-brain barrier:

Focused Ultrasound: Focused ultrasound is a non-invasive technique that uses ultrasound waves to disrupt the tight junctions between the cells of the blood-brain barrier temporarily. This allows for increased permeability and facilitates the delivery of drugs or other therapeutic agents into the brain.

Osmotic Disruption: By administering substances with high osmolarity, such as mannitol, it is possible to create an osmotic gradient that draws water out of the brain cells and temporarily opens the tight junctions of the blood-brain barrier. This method is often used in combination with other techniques to enhance drug delivery.

Pharmacological Agents: Certain pharmacological agents, such as bradykinin agonists or vasoactive substances, can be used to induce blood-brain barrier opening. These agents act by affecting the endothelial cells that form the barrier, causing increased permeability.

Nanoparticles: Specially designed nanoparticles can be used to transport drugs across the blood-brain barrier. These nanoparticles can be engineered to interact with the endothelial cells of the barrier, either by receptor-mediated transcytosis or by opening tight junctions temporarily.

It is important to note that blood-brain barrier opening is a delicate process that requires careful control and monitoring to ensure the safety and effectiveness of the procedure. Additionally, BBB opening is currently primarily used in research and experimental settings, and its clinical applications are still being explored.

Focused ultrasound-mediated blood-brain barrier opening

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Last update: **2024/06/07 02:54**

