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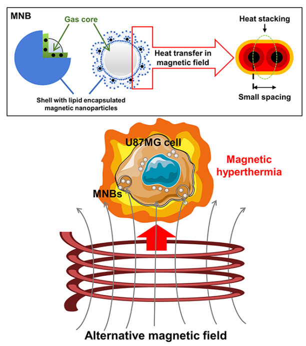
A specific design of magnetic nanobubbles has shown promise in treating glioblastoma through hyperthermia.



Glioblastoma is an aggressive form of cancer that occurs in the brain and spinal cord and claims some 10,000 lives every year in the United States alone. In recent years, researchers have tested killing cancer cells by heating them to temperatures exceeding 47 degrees Celsius using electromagnetic, microwave, radiofrequency, laser and ultrasound energy induced hyperthermia.

Several studies have shown magnetic nanoparticles can induce magnetic hyperthermia, but their low heating efficiency limits their therapeutic efficacy. To increase the heating efficiency, Li et al. developed a novel structure of a magnetic nanobubble, MNB, surrounded by a shell of phospholipid-encapsulated magnetic nanoparticles.

Using a temperature-regulated repeated compression self-assembly approach, MNBs with a specific geometrical orientation of magnetic nanoparticles were fabricated. The researchers optimized properties, like magnetic heating concentration and electric current parameters, to boost the hyperthermia effect.

The team then studied the optimized MNBs' interaction with U87MG glioma cells. The specific geometric orientation created by the gas-liquid surface assembly of the nanoparticles significantly enhanced the heat generation efficiency. Under an alternating magnetic field, the nanobubbles showed improved performance compared to previous designs.

"Our results show the MNBs have excellent hyperthermia effects and have high biocompatibility," said author Fang Yang. "The significantly enhanced intracellular magnetothermal effect of MNBs for glioblastoma cells makes it a promising new candidate for tumor magnetic hyperthermia treatments."

The researchers plan to continue studying MNBs for magnetic hyperthermia treatments. They aim to optimize synthesis parameters and formulation of MNBs, test MNBs with ultrasound imaging effects, and test *in vivo* experiments.

Source: "Fine-tuned magnetic nanobubbles for magnetic hyperthermia treatment of glioma cells," by Bin Li, Yuexia Han, Yang Liu, and Fang Yang, *Biointerphases* (2022). The article can be accessed at https://doi.org/10.1116/6.0002110.

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