

Invasive surgeries may be replaced with ultrasound therapy

Phyllis is having brain surgery. But she is wide awake. There are no scalpels and no blood, sliced flesh or bone in sight. Instead, the surgeon carefully places a cap on top of Phyllis's head and flicks a switch. Deep inside her brain, a tiny region of tissue heats up and begins to burn, while surrounding brain cells are left unscathed. Later that day, Phyllis is able to go home, free from the neurological disorder that for the past 30 years has made her right hand tremble violently whenever she tried to use it.

She has a form of ultrasound to thank for her remarkable recovery. Just as the sun's rays can be focused by a magnifying glass to burn a piece of paper, high-intensity ultrasound waves can be concentrated to burn human tissue. The waves are harmless until they converge at the focal point, so a surgeon can operate deep inside the body without harming the surrounding tissue.

This high-intensity focused ultrasound (HIFU) requires no cuts to be made, and many operations don't even need an anaesthetic, so the patient can be in and out of hospital within a day. "When you're dealing with a lot of very sick people, that's a huge advantage," says [Gail ter Haar](#), who studies ultrasound at the Institute of Cancer Research in London.

After promising trials treating prostate cancer, it is now looking as if HIFU could become a medical Swiss army knife for all kinds of procedures. And even in parts of the body where the focused waves can't burn away tissue directly, they can still boost the uptake of drugs in specific organs. The method has even been used to prevent severe illness in fetuses in the womb.

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