It delivers power at transfer efficiencies orders of magnitude higher than what is currently possible with conventional near-field and far-field techniques—and to an implant not much bigger than a grain of rice.

These exciting results derived from a sophisticated mathematical analysis that showed how to develop a transmitter capable of yielding the approximate current source density (which gives rise to the evanescent fields) needed to optimize wireless power transfer in biological tissue environments (see references in ref. 2). Experimental testing confirmed the model: more than 2 mW of power is transferred to a device implanted on a porcine heart surface at ~5 cm distance from the source[2]—enough to enable a whole host of new implantable devices on a scale previously impossible to power reliably.

The authors also altered the phase with which they drive the various input ports of their transmitter to change field interference patterns, effectively enabling mid-field beam steering—just as a phased antenna array allows directional communication with an airplane in far-field applications. This feature allows directional powering to an implanted device that is moving inside the body (for instance, because it's embedded in a muscle or moving through the gastrointestinal tract). It also facilitates patient compliance as the position of the external patch need not be so precise, because beam steering can compensate for misalignments.

Far-field powering will remain relevant for devices located at greater distances and uncertain orientation relative to the power source (for example, when the power supply is not worn by the patient). Near-field powering will be a better fit for devices with high power consumption and perhaps less-stringent size requirements, such as more sophisticated closed-loop neural prostheses. But for extreme miniaturization of devices implanted in deep tissue spaces, the work of Ho *et al.*[2] will make possible a wide range of new applications, such as measuring intravascular pressure and monitoring restenosis.

COMPETING FINANCIAL INTERESTS
The authors declare no competing financial interests.

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