Wireless optogenetic devices sync neurons among mice

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Two new wireless devices can **synchronize neuronal activity** in multiple mice at once, enabling researchers to explore how brain-to-brain synchronization underlies social behaviors.

The devices, described in *Nature Neuroscience* in May, **make use of optogenetics**, a technique in which pulses of light activate or silence neurons engineered to express light-sensitive proteins called opsins. The **same technique** has been used to study the hormone **oxytocin's role in social behaviors** relevant to autism.

Traditional optogenetic devices rely on power from cables that can limit both the speed and distance of animals' movements, making it difficult to study the link between neuronal activity and social behaviors.

Researchers have developed wireless, battery-powered optogenetic devices that can be mounted on an animal's head, but these apparatuses are often bulky and distracting to the animals. "Mice tend to gnaw on the head-mounted devices, so we wanted fully subdermal implants," says **John Rogers**, director of the Querrey Simpson Institute for Bioelectronics at Northwestern University in Evanston, Illinois.

Rogers and his colleagues created a thin device, about 1.2 millimeters thick, that they can mount beneath the skin on a mouse's head. It has two micro-LED lights affixed to the ends of sharp probes that can be injected into the skull and controlled independently.

The team also made a larger, more powerful device that can be mounted on an animal's back; it has four micro-LEDs on the tips of metal coils that extend up the neck and into the skull. The larger device can stretch and bend to accommodate the wide range of a mouse's movements.

Both devices are powered wirelessly and can be controlled from a nearby computer in real time,

enabling researchers to modulate each light's optical intensity, pulse duration and frequency in up to 256 animals at once without impeding their movement.

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