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Talk about seeing things! Scientists use a light beam to implant an artificial image into a mouse's mind

- **Scientists used optogenetics - a way of using light to control tissue**
- **During the experiment, a laser beamed light through a mouse's skull, while a second laser captured the activity of individual cells**
- **Results showed that fake images can be artificially implanted in the mind**
- **This could be help treat conditions such as epilepsy in humans**

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Implanting images into someone's mind sounds more like something that would happen in films such as Inception and Total Recall.

But scientists have managed to use beams of light to create an image of something completely unknown in a mouse’s brain.

The findings suggest that the brain may be more easily moulded than previously thought, and could have a major impact on neuroscience and medicine.

The thought of artificially implanting an image inside the mind might sound like a technique used by a hypnotist. But scientists have managed to use beams of light to create an image of something completely unknown in a mouse's brain

WHAT IS OPTOGENETICS?

The researchers were able to control and observe the brain of a living mouse using optogenetics.

This is a technique which involves the use of light to control cells in living tissue.

Before optogenetics, scientists had to open the skull and implant electrodes into living tissue to stimulate neurons with electricity and measure their response.

Even a mouse brain of 100 million neurons, nearly a thousandth the size of ours, was too dense to get a close look at groups of neurons.

Optogenetics allowed researchers to get inside the brain non-invasively and control it far more precisely.

The research comes from Columbia University, where scientists used a technique that has previously been shown to restore sight and hearing in blind and deaf mice.

Dr Luis Carrillo-Reid, who worked on the study, said: 'We think that these methods to read and write activity into the living brain will have a major impact in neuroscience and medicine.'

The researchers were able to control and observe the brain of a living mouse using optogenetic tools - a technique which involves the use of light to control cells in living tissue.

They injected the mouse with a virus containing light-sensitive proteins engineered to reach specific brain cells.

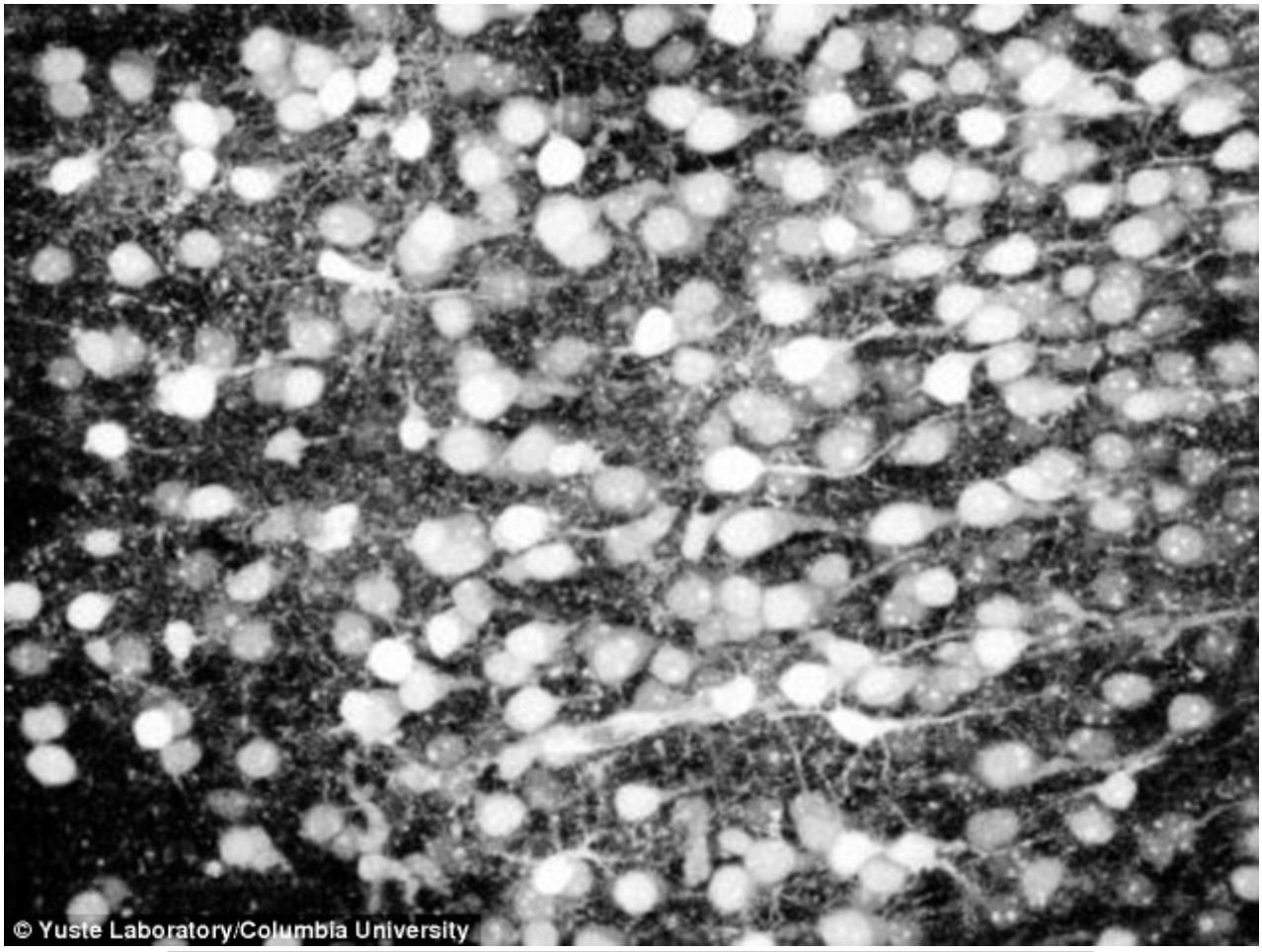
Once inside a cell, the proteins allowed researchers to remotely activate the neuron with light, as if switching on a TV.

During the experiment, the mouse was allowed to freely run on a treadmill while its head was held still under a microscope.

The researchers used a laser to beam light through its skull, with a second laser used to capture the activity of individual cells.

The results, which are published in the journal **Science**, showed that the neural networks can be artificially implanted and replayed.

Dr Rafael Yuste, who also worked on the study said: ‘If you told me a year ago we could stimulate 20 neurons in a mouse brain of 100 million neurons and alter their behaviour, I'd say no way.



Scientists were able to record the firing of individual neurons (pictured) and their pulses of electricity

‘It's like reconfiguring three grains of sand at the beach.’

The researchers think that the network of activated neurons they artificially created may have implanted an image completely unfamiliar to the mouse.

The team is now planning follow up studies verify the results.

Dr Daniel Javitt, a psychiatry professor at Columbia University Medical Centre who was not involved in the study, says the work could potentially be used to restore normal connection patterns in the brains of people with epilepsy and other brain disorders.

However, optogenetic techniques are not yet applicable for the human brain.

In a study last year, conscious memories were implanted into the minds of mice while the sleep. The technique could one day be used to change human memories, such in in films like Total Recall and Inception (a still from the film is shown)

This isn't the first time scientists have managed to implant false memories into a mouse's brain.

In March last year scientists from the Industrial Physics and Chemistry Higher Educational Institution in Paris, France, used this replay process to create new memories in the brains of mice, while they slept.

The team, led by Karim Benchenane, focused on place cells - which are neurons that fire in response to thinking about.

They monitored the activity of these cells when the mice explored an ‘arena’ using electrodes, isolating the cell that fired in a certain arena location.

While the mice slept, they monitored the creature’s brain activity and when the specific place cell fired, an electrode stimulated the brain areas linked to reward.

When the mice woke up, they immediately scurried to the location that was linked to the rewarding feeling, showing that a new pleasant memory of the place had been formed by the scientists.

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