Medical Xpress

Yale team finds neural thermostat keeps brain running efficiently

January 13 2010

Our energy-hungry brains operate reliably and efficiently while processing a flood of sensory information, thanks to a sort of neuronal thermostat that regulates activity in the visual cortex, Yale researchers have found.

The actions of inhibitory neurons allow the brain to save energy by suppressing non-essential visual stimuli and processing only key information, according to research published in the January 13 issue of the journal *Neuron*.

"It's called the iceberg phenomenon, where only the tip is sharply defined yet we are aware that there is a much larger portion underwater that we can not see," said David McCormick, the Dorys McConnell Duberg Professor of Neurobiology at Yale School of Medicine, researcher of the Kavli Institute of Neuroscience and co-senior author of the study. "These inhibitory neurons set the water level and control how much of the iceberg we see. We don't need to see the entire iceberg to know that it is there."

The brain uses the highest percentage of the body's energy, so scientists have long wondered how it can operate both efficiently and reliably when processing a deluge of sensory information. Most studies of vision have concentrated on activity of excitatory neurons that fire when presented with simple stimuli, such as bright or dark bars. The Yale team wanted to measure what happens outside of the classical field of vision when the brain has to deal with more complex scenes in real life.

By studying brains of animals watching movies of natural scenes, the Yale team found that inhibitory cells in the visual cortex control how the excitatory cells interact with each other.

"We found that these inhibitory cells take a lead role in making the visual cortex operate in a sparse and reliable manner," McCormick said.

Provided by Yale University