NEWS

Pathways to plasticity

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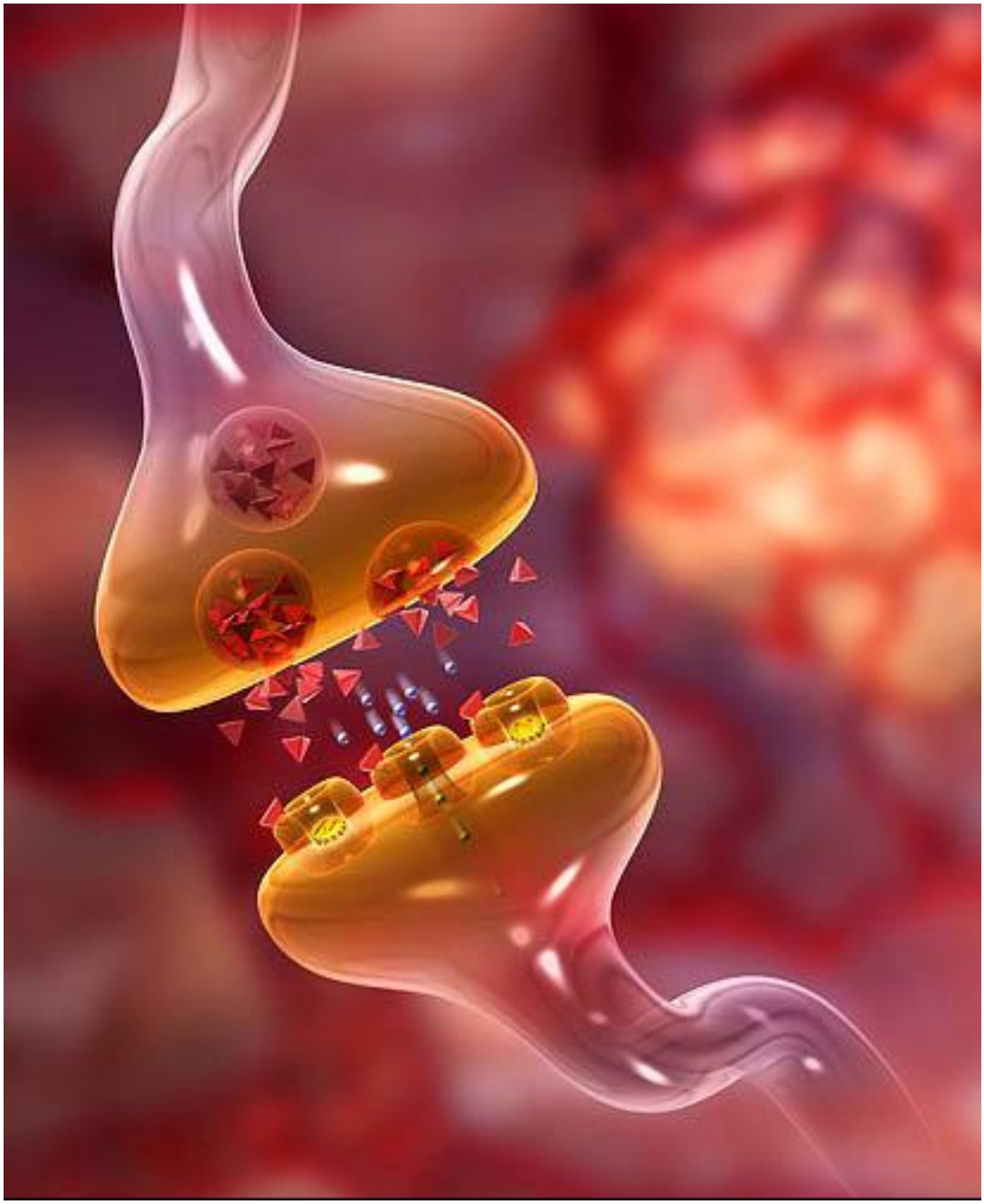

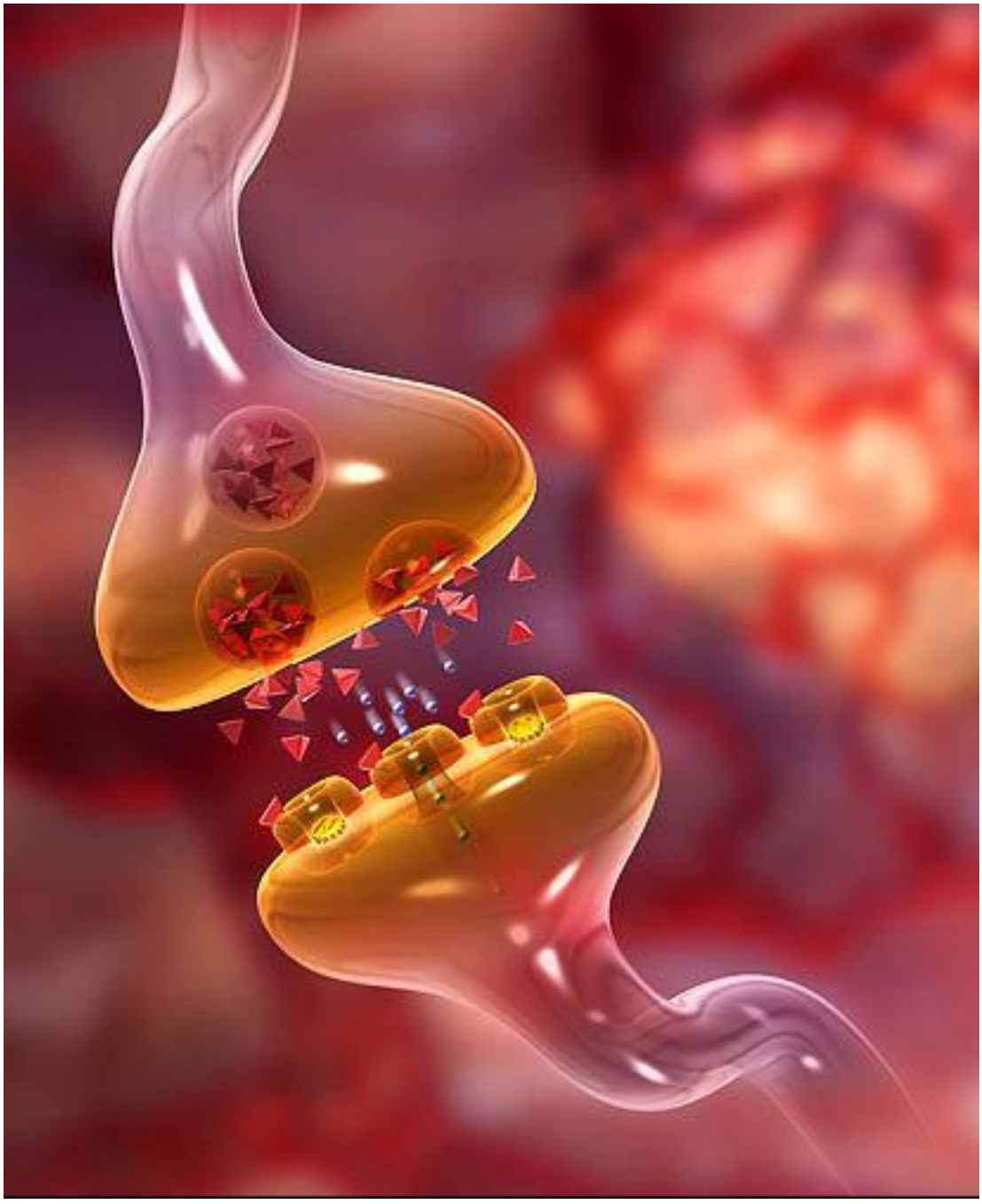

Diverse paths: Studying mechanisms of plasticity in inhibitory synapses has uncovered some surprises.

The molecular mechanisms underlying synaptic plasticity ? the ability of neurons to change the

strength of their connections ? can vary across different inhibitory neural circuits as much as they can vary across excitatory neural circuits, according to research presented this morning at the **Society for Neuroscience meeting**.

Uncovering these mechanisms could help develop therapies that improve deficits in learning, memory and other cognitive processes, reported **Julie Kauer**, professor of molecular pharmacology at Brown University.

“Having these distinct mechanisms of plasticity may make it possible to target one of these forms of plasticity without disrupting the entire brain,” Kauer said.

Most work on synaptic plasticity to date has focused on the effects of excitatory synapses on excitatory neurons. But a growing body of work focuses on how the firing of inhibitory neurons affects the firing of excitatory neurons and *vice versa*.

Using electrophysiology ? a technique in which electrodes are placed in the brains of live rodents ? researchers can stimulate one excitatory cell in the hippocampus, a brain area involved in learning and memory, and record any activity from neighboring neurons in the region.

In one example, they narrowed down a potential molecular pathway underlying the weakening of synaptic connections, a phenomenon called long-term depression or LTD. To their surprise, they saw that the usual molecular players in synaptic plasticity ? the cell-surface receptors NMDA and AMPA ? are not involved.

But blocking metabotropic glutamate receptors ? which are implicated in other forms of plasticity ? inhibits LTD, the researchers found.

The researchers also stumbled on to the finding that blocking TRPV1, an ion channel present in the brain and thought to be involved in anxiety, inhibits LTD. TRPV1 has not previously been found to be involved in synaptic plasticity.

Applying the same approaches in other brain areas might help study synaptic plasticity in mouse models of autism, notes **Lori McMahon**, an associate professor of physiology and biophysics at the University of Alabama at Birmingham.

“People are really starting to apply the lessons in the hippocampus to other brain areas like the amygdala,” she says.

For all reports from the Society for Neuroscience annual meeting, **click here**.