ACS Chemical Neuroscience

In This Issue

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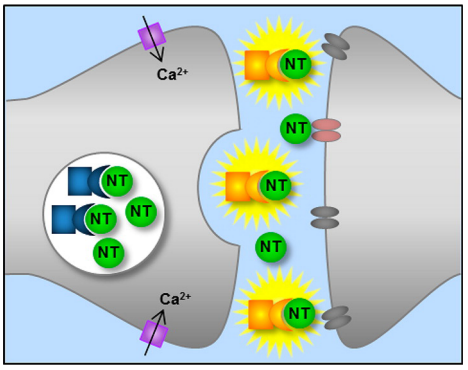
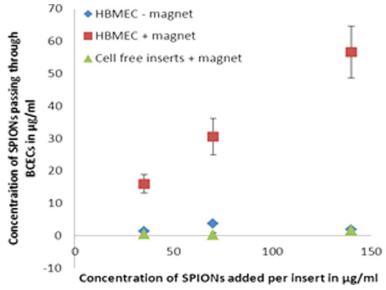
FLUORESCENT TOOL TO STUDY NEUROTRANSMITTER EXOCYTOSIS



Imaging neurotransmitter release is important to neuroscientists seeking to understand synaptic mechanisms underlying brain diseases. Currently available methodologies fail to directly image the neurotransmitters entering the synaptic cleft. To bridge this gap, Klockow et al. (DOI: 10.1021/cn400128s) describe an ingenious new method for detecting neurotransmitters during the conditions of exocytosis.

The authors report a fluorescent sensor which binds to neurotransmitters and exploits the pH change upon exocytosis as a fluorescence off–on switch. Exocytosis of the neurotransmitter-bound sensor triggers fluorescence. The sensor represents a novel logic-based strategy toward selective labeling and imaging of active neurotransmitters released into the synaptic cleft.

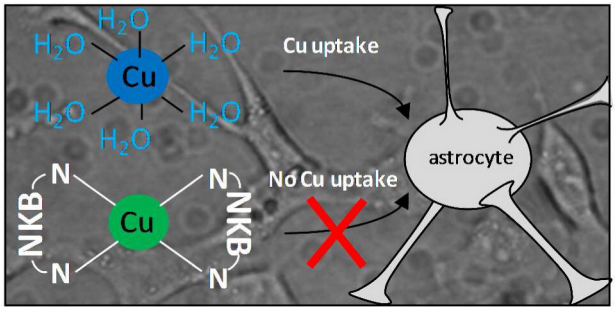
TRANSPORT BY MAGNETIC FORCE



For delivery into the brain, a drug must pass through the blood-brain barrier (BBB), a network of brain capillary endothelial cells (BCECs) further supported by astrocytes, pericytes, and neurons. Now, Thomsen et al. (DOI: 10.1021/cn400093z) report an innovative new way for drugs to traverse BCECs using magnetic force-induced superparamagnetic iron oxide nanoparticles (SPIONs).

SPIONs are highly magnetizable nanoparticles with a core of iron oxide particles composed of magnetite and maghemite. The protective coat of the nanoparticles allows for drug conjugation. Using an in vitro BBB model, the authors demonstrated that these SPIONs crossed into and through human BCECs and localized in a layer of astrocytes upon application of an external magnetic force.

NEUROKININ B CONTROLS COPPER UPTAKE INTO ASTROCYTES



A common feature of Alzheimer's disease and other amyloidogenic disorders is the dysregulation of metal ions such as copper, zinc, and iron. After neurons release copper, it is unclear how the metal is controlled in the synapse. Now, Russino et al. (DOI: 10.1021/cn4000988) describe a novel role for tachykinin peptide, neurokinin B (NKB), in synaptic copper homeostasis.

Using a variety of different experimental techniques, the authors show that NKB binds copper in a $[Cu(II)(NKB)_2]$ complex. NKB was also shown to protect astrocytes from toxicity due to copper-induced calcium level disruption inside the cell.

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