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In This Issue

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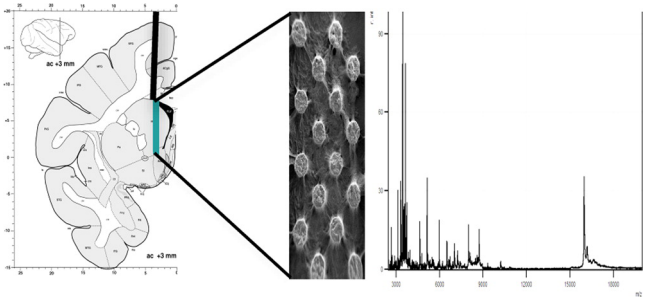
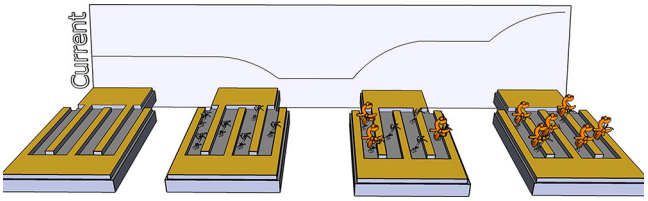
NEW TOOL FOR DEEP BRAIN MOLECULAR EXPLORATION



The molecular analysis of pathological brain regions is difficult due to the inaccessibility of cerebral tissue. Toward the better exploration of deep brain regions in vivo, Zaccaria et al. (DOI: 10.1021/cn300116g) report a microsilicon chip-based tool specifically adapted for brain tissue imprints in the striatum of monkeys.

Using the new tool, the authors were able capture striatal proteins implicated in dopaminergic regulation in a spatio-temporally controlled manner. Importantly, the authors show that this method for obtaining repeated cerebral imprints is safe, as behavioral and histological observations were unaltered. Owing to safety of the tool, it is likely that similar approaches can be used for molecular monitoring of deeper regions of the brain in animal models for relevant neurodegenerative disorders such as Parkinson's disease.

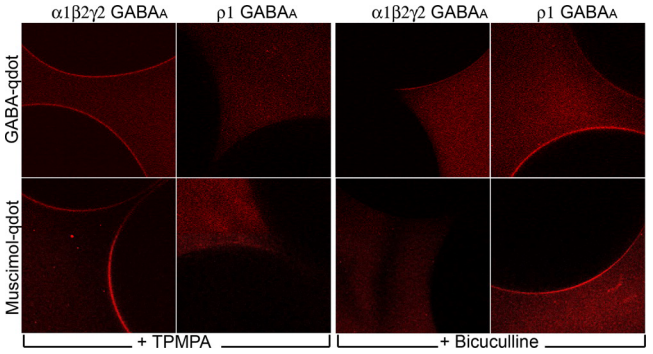
A SENSOR FOR FATIGUE AND COGNITIVE PERFORMANCE



Biomarker analysis offers significant insight into specific conditions and states of neurophysiology, such as stress, fatigue, vigilance, and emotion. However, there is a lack of sensor technologies to assess biomarkers in real-time. Now, Hagen et al. (DOI: 10.1021/cn300159e) describe the development of an innovative new biomarker detection platform for Orexin A, a neuropeptide linked to fatigue and cognitive performance.

The authors' approach involved the use of a field effect transistor integrated with a biorecognition element which selectively binds Orexin A and signals the presence of this neuropeptide in biofluids at physiologically relevant concentrations. This new sensor provides a refreshing new platform for developing low-cost, real-time analysis for neuro-biomarkers in general.

NOVEL LABELING AGENTS FOR $GABA_A$ RECEPTORS



$GABA_A$ receptors are a class of membrane ion channels activated by binding neurotransmitter γ-aminobutyric acid (GABA). Fluorescent labeling of the $GABA_A$ receptors could provide insight into their function in the central nervous system. Now, Gussin et al. (DOI: 10.1021/cn300144v) report the development of fluorescent probes for monitoring $GABA_A$ receptors.

The authors developed highly fluorescent CdSe/ZnS core–shell quantum dots conjugated to $GABA_A$ receptors agonists, muscimol and GABA, for binding to two types of $GABA_A$ receptors ($\rho 1$ and $\alpha 1\beta 2\gamma 2$) in a manner that preserves their differing pharmacological properties. The binding of both quantum dots preserves the receptors' respective sensitivities to the subtype-specific antagonists TPMPA and bicuculline. Thus, these results encourage the use of quantum-dots-conjugated neurotransmitter analogues as labeling agents at native $GABA_A$ receptors.

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