This Week in The Journal

● Cellular/Molecular

$GABA_A$ Responses on Mossy Fiber Boutons

Henrik Alle and Jörg R. P. Geiger

(see pages 942–950)

Ionotropic receptors are enjoying increased appreciation for their importance in axons and nerve terminals. In this week's *Journal*, Alle and Geiger investigated the role of presynaptic $GABA_A$ receptors using direct recording from mossy fiber boutons (MFBs) in rat hippocampal slices. Based on the single-channel conductance of currents evoked by exogenous GABA, the authors estimated that each MFB contained 20–200 receptors. The receptors were not tonically active, presumably because the receptors had a relatively low affinity for GABA, and ambient GABA was kept low by transporters. Upon extracellular high-frequency stimulation in CA3, however, the authors saw transient currents mediated by GABA spillover from cannabinoid (CB1) receptor-expressing interneurons. The authors' cell simulations indicate that GABA spillover can transiently depolarize MFBs and thus modulate evoked transmitter release.

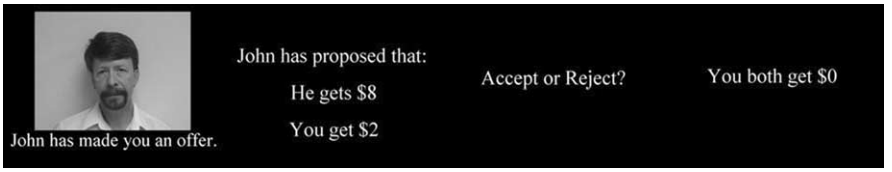
▲ Development/Plasticity/Repair

For these Synapses, only the Strong Survive

Tao Lu and Laurence O. Trussell

(see pages 808 – 817)

This week, Lu and Trussell looked at synapse formation and elimination in the giant synapses between the chick auditory nerve and the nucleus magnocellularis (NM). These synapses initially form around embryonic day 12 (E12) and then are pruned back, so that by E16, each NM cell receives input from a single axon with 2–3 endbulb terminals. This one-to-one mapping allowed the authors to follow development at single axon synapses. At E12, EPSCs on NM cells had both NMDA and AMPA receptor components, but by E19, AMPA receptors had taken over. When the authors simultaneously recorded from two neighboring NM neurons, synchronous EPSCs arose from a common axon. By E14, these pairs of synapses consisted of one strong, predominantly AMPA receptor-mediated EPSC and one much weaker, NMDA receptor-mediated EPSC. The authors suggest that the weaker synapses containing NMDA receptors are targeted for elimination.



A trial in the Ultimate Game in which the offer was rejected. See the article by Koenigs and Tranel for details.

■ Behavioral/Systems/Cognitive

Rejecting Unfair Offers in the Ultimate Game

Michael Koenigs and Daniel Tranel

(see pages 951–956)

Most of us feel a flash of anger at being treated unfairly, particularly when it comes to money. But can you make a rational decision that salvages the best available outcome? According to Koenigs and Tranel, the answer depends on the activity of your ventromedial prefrontal cortex (VMPC). The authors used the so-called Ultimate Game in which one player proposes a split of $10, which the responder can then accept or reject. Players receive their split with an accepted offer, a "rational" decision. However, neither player profits from a rejected offer, an "irrational" decision. Normal subjects and a brain-injured group accepted about 60% of "unfair" offers, splits of $3/$7, $2/$8, or $1/$9. Subjects with bilateral lesions of the VMPC, however, accepted only 31%, instead preferring irrational decisions that resulted in no financial gain.

♦ Neurobiology of Disease

The Nigrothalamic Pathway and Control of Absence Seizures

Jeanne Tamar Paz, Mario Chavez, Sandrine Saillet, Jean-Michel Deniau, and Stéphane Charpier

(see pages 929 –941)

Absence seizures are marked by synchronized cortical spike-and-wave discharges (SWDs). This electroencephalographic pattern reflects thalamocortical oscillations gone haywire. This week, Paz et al. used genetic absence epilepsy rats from Strasbourg (GAERS) as a model to explore the contributions of the nigrothalamic pathway to these seizures. The authors first recorded from neurons of the ventromedial nucleus of the thalamus (VM) in anesthetized rats *in vivo* and found that the cells displayed high-frequency burst firing during SWDs. Next, the authors locally injected a glutamate receptor antagonist to block neurotransmission in the substantia nigra pars reticulata, a basal ganglia output structure that sends GABAergic projections to the VM. The intranigral block eliminated SWDs and converted the firing pattern in VM neurons from burst firing to sustained arrhythmic firing. Cortical neuron activity also was reduced, pointing to the nigro-thalamo-cortical pathway as a control point for this variety of absence seizures.