This Week in The Journal

● Cellular/Molecular

Making Fly Synapses with and without Glutamate Receptors

Andreas Schmid, Gang Qin, Carolin Wichmann, Robert J. Kittel, Sara Mertel, Wernher Fouquet, Manuela Schmidt, Manfred Heckmann, and Stephan J. Sigrist

(see pages 11267–11277)

A small army of structural proteins is needed to cluster and anchor postsynaptic receptors, ion channels, and other molecules to the right spots at synapses. This week, Schmid et al. report that non-NMDA glutamate receptors are key players in this process at the *Drosophila* neuromuscular junction. The authors genetically manipulated flies so that they produced a few or no postsynaptic glutamate receptors. Whereas the mutant animals formed neuromuscular junctions with fairly normal presynaptic active zones, the postsynaptic density never achieved normal size or an appropriate disposition of postsynaptic molecules. The organization of the postsynaptic structure did not appear to depend on glutamate binding or ion flux, because larvae whose synaptic activity was blocked formed normal-sized synapses. The results argue for a structural role of glutamate receptors in the protein–protein interactions that lead to maturation and assembly of the fly neuromuscular junction.

▲ Development/Plasticity/Repair

Sensory Input and Olfactory Bulb Circuits

Carolyn A. Marks, Kai Cheng, Diana M. Cummings, and Leonardo Belluscio

(see pages 11257–11266)

Noses come in all shapes and sizes, but the internal wiring is remarkably consistent across species. Axons of neurons expressing the same odorant receptor typically converge onto a pair of glomeruli on the surface of each olfactory bulb. Glomerular pairs, sharing the same functional properties, are then linked through a set of reciprocal intrabulbar projections to form a spatially conserved map. This week, Marks et al. sought to determine how this intrabulbar map develops. They injected dye into small areas of the olfactory bulb of mice and examined the resulting projections. Whereas in adults, the size of the tracer injection was nearly identical to that of its corresponding projection, in 1-week-old mice, the projections targeted a much broader area. The projection areas gradually refined to adult precision during the first 7 weeks of life. Interestingly, the initial formation of the intrabulbar map did not seem to require odorant-induced activity, but its refinement clearly did.

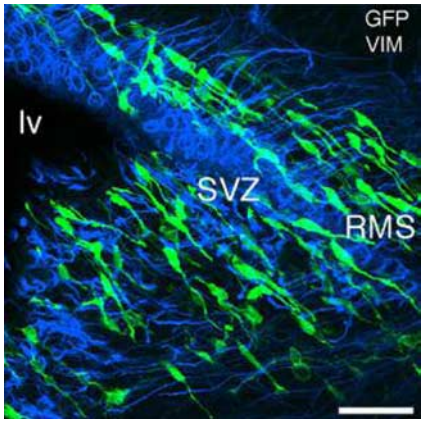
■ Behavioral/Systems/Cognitive

The Site of Perceived Pain Control

Katja Wiech, Raffael Kalisch, Nikolaus Weiskopf, Burkhard Pleger, Klaas Enno Stephan, and Raymond J. Dolan

(see pages 11501–11509)

Pain seems more bearable when you think you can control it. This week, Wiech et al. report that we can mostly thank the right anterolateral prefrontal cortex for the analgesic effect of perceived control. The authors sought out the involved brain regions by measuring responses to painful electrical pulses with functional magnetic resonance imaging. The participants either thought that they could stop the painful stimuli at will or that another person or a computer held control. Participants were also asked to rate the intensity of the pain they experienced and their anxiety about it. As expected, for the same stimuli, self-controlled pain always seemed less intense and produced less anxiety than externally controlled hurt. This analgesic effect was linked to the activation of neurons in the right dorsolateral and bilateral anterolateral prefrontal cortex, as well as in the dorsal anterior cingulate cortex.



Mouse neurons in the subventricular zone (SVZ) and rostral migratory stream (RMS) surrounding the lateral ventricle (lv) were labeled by a retrovirus carrying a GFP gene. The retrovirus integrated its genome only in dividing cells shown in green. Vimentin staining (VIM; blue) labeled ependymal cells. See Ackman et al. for details.

◆ Neurobiology of Disease

Retroviral Fusion of Microglia with Neurons

James B. Ackman, Faez Siddiqi, Randall S. Walikonis, and Joseph J. LoTurco

(see pages 11413–11422)

There is clear agreement that neurogenesis occurs in some areas of the adult brain, specifically the subventricular zone and the dentate gyrus. However, the evidence for generation of new neurons in the neocortex is controversial. This week, Ackman et al. tried to settle the issue by combining two methods for assessing the generation of new neurons. The authors injected the cerebral cortex of postnatal rats with a green fluorescent protein (GFP)-tagged retrovirus that only integrates into the genome of dividing cells. The procedure resulted in GFP-labeled neurons and glia in the neocortex and hippocampus. But the GFP-positive neurons, unlike the glia, never incorporated the thymidine analog bromodeoxyuridine into their DNA, thereby failing the second test for cell division. A closer look revealed that the labeled neurons were not newborn cells, but rather were old neurons whose apical dendrites had fused to microglial cells, allowing delivery of the GFP. Seems that these old neurons were caught masquerading as youngsters.