This Week in The Journal

● Cellular/Molecular

A Choline Transporter and Autoimmune Hearing Loss

Thankam S. Nair, Kelley E. Kozma, Nickoleta L. Hoefling, Pavan K. Kommareddi, Yo Ueda, Tzy-Wen Gong, Margaret I. Lomax, Christopher D. Lansford, Steven A. Telian, Bulent Satar, H. Alexander Arts, Hussam K. El-Kashlan, Wayne E. Berryhill, Yehoash Raphael, and Thomas E. Carey
(see pages 1772-1779)

Antibodies to neural antigens cause several neurological diseases, myasthenia gravis with its acetylcholine receptor antibodies being perhaps the best known. Autoimmune damage is also suspected as a cause of rapidly progressive hearing loss. In this issue, Nair et al. track down the antigen underlying hearing loss that is caused by an antibody (KHRI-3) generated against the guinea pig organ of Corti. They isolated and sequenced the inner ear supporting cell antigen as choline transporter-like protein 2 (CTL2). Supporting cells bound KHRI-3 and anti-CTL2 with a punctate, "wine-glass" pattern. A similar pattern also can be seen in humans with autoimmune hearing loss. CTL2 is expressed in humans, although its function is not yet known. Because the antibody binds to carbohydrate moieties on the putative extracellular domain of CTL2, the authors speculate that the antibody blocks a possible transporter function.

▲ Development/Plasticity/Repair

Serotonin in the Marginal Zone

Skirmantas Janušonis, Vicko Gluncic, and Pasko Rakic
(see pages 1652-1659)

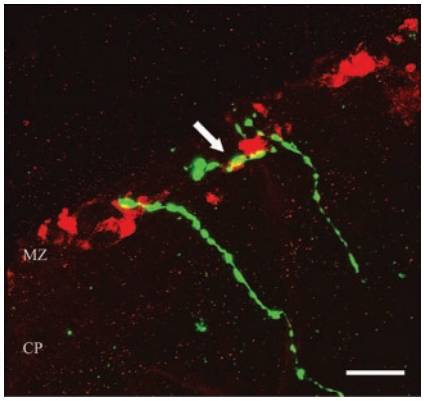
Neurotransmitters can play distinctive roles in early brain development and in disorders with cortical columnar abnormalities such as autism and schizophrenia. In this week's *Journal*, Janušonis et al. examine one of the early targets of cortical serotonergic projections, Cajal-Retzius (CR) cells in the marginal zone (MZ). CR cells secrete reelin, which is necessary for correct laminar and columnar development of the cerebral cortex. The authors report that serotonergic inputs form synaptic contacts with CR cells beginning on embryonic day 17. To disrupt serotonin input, they injected pregnant mice with 5-methoxytryptamine, a nonspecific serotonin receptor agonist. At birth, the progeny mice had reduced levels of reelin, and at postnatal day 7, they displayed poorly formed minicolumns in the presubicular cortex. The results provide an intriguing clue that may link early serotonin innervation with the role of Cajal-Retzius cells in the development of the cerebral cortex.

■ Behavioral/Systems/Cognitive

Basic Training in Visual Area V4

Tianming Yang and John Maunsell
(see pages 1617-1626)

Perceptual learning, the improvement in sensory performance after extensive training, has been related to changes in the properties of cortical neurons in the somatosensory and auditory cortex. However, neurons in the primary visual cortex (V1) show only modest changes in their properties after extensive training, despite improvements in visual abilities. This week, Yang and Maunsell investigate whether such plasticity occurs later in visual pathways. Neurons of V4, at the mid-level of visual processing, have defined receptive fields and respond to objects of specific orientation. After several months of training with a match-to-sample orientation task, monkeys improved their orientation discrimination. V4 neurons in the trained hemifield had stronger responses and narrower orientation tuning curves, consistent with a role for V4 in perceptual visual learning. The results suggest that there's some truth to the old adage, "You will only see it if you look for it," assuming you look again and again!



Confocal microphotograph of serotonergic fibers (green) contacting CR cells (red) in the MZ. See the article by Janušonis et al. for details.

♦ Neurobiology of Disease

Rheumatic Fever, Murine-Style

Kurt L. Hoffman, Mady Hornig, Kavitha Yaddanapudi, Omar Jabado, and W. Ian Lipkin
(see pages 1780-1791)

Many of us were dragged to the pediatrician at some point with a "strep throat" out of a concern for the dreaded rheumatic fever (RF), a delayed consequence of streptococcal infection. Thanks to the use of antibiotics, RF is now less common. When this presumed autoimmune disorder affects the brain, it can cause jerky involuntary (choreiform) movements, once called "St. Vitus' dance" (a name apparently derived from a major outbreak near Strasbourg in the 15th century). Infection with group A β-hemolytic streptococcus (GABHS) also can be associated with other neurological symptoms, such as obsessive–compulsive disorder and attention deficit/hyperactivity disorder. Now Hoffman et al. examine the possibility that antibodies raised against bacterial antigens may cross-react with brain proteins and contribute to the motor and behavioral symptoms. They created an animal model by immunizing mice with GABHS antibodies. A subset of the mice produced antibodies that were immunoreactive to selected brain regions, including deep cerebellar nuclei, and had IgG deposits in brain. These mice also showed disrupted rearing and ambulatory behavior. This animal model may be useful in further investigation of this neurological complication of a bacterial infection.