

This Week in The Journal

● Cellular/Molecular

The Brain's Salt Sensor

Takeshi Y. Hiyama, Eiji Watanabe, Haruo Okado, and Masaharu Noda (see pages 9276–9281)

Maintenance of proper sodium and water balance, critical to survival, appears to involve both osmosensors and sodium sensors in the brain. A putative sodium sensor was identified recently as a member of a subfamily of voltage-gated sodium channels. This channel, Na_v , a product of the *SCN7A* gene, is expressed in a few areas in the CNS, particularly the subfornical organ, a specialized structure situated in the midline wall of the ventricles. Mice lacking Na_v continue to ingest salt even when serum sodium is increased by dehydration. Hiyama et al. extend their recent work to locate the sodium sensor. Unlike Na_v -deficient mice, normal mice increased their water intake and avoided salt when hypertonic saline was infused into the ventricles. Adenoviral-mediated expression of Na_v in Na_v knock-out mice only rescued salt-avoiding behavior when the expression included the subfornical organ. Thus the subfornical organ appears to be a prime locus for this salt sensor.

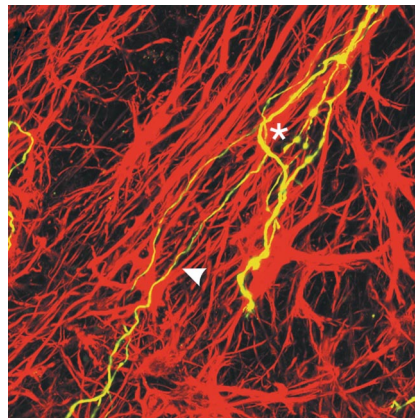
▲ Development/Plasticity/Repair

Using Fibronectin as Your Guide

Veronica J. Tom, Catherine M. Doller, Alfred T. Malouf, and Jerry Silver (see pages 9282–9290)

Astroglia provide a permissive environment for pioneering axons during development, whereas CNS myelin in the adult generally inhibits axonal regeneration. However, the adult environment can support neurite outgrowth of transplanted sensory neurons. This week, Tom et al. examine possible factors from adult astroglia that support such neurite regeneration. Using an *in situ* slice culture of adult (postnatal day 35) rat corpus callosum, they seeded slices with cortical or dorsal root ganglion (DRG) neurons from green fluorescent protein (GFP)-expressing

mice and then watched neurite outgrowth. The DRG neurons extended long axonal processes along the astrocyte-rich corpus callosum, but cortical neurons did not. Fibronectin was highly expressed in the corpus callosum and tightly associated with astrocytes, whereas laminin, another putative extracellular matrix growth-promoting factor, was detected only along blood vessels. Fibronectin function-blocking antibodies stunted neurite outgrowth. Because CNS neurons do not grow well on fibronectin, the authors speculate that fibronectin may actually inhibit CNS neuronal outgrowth while supporting the outgrowth of sensory neurons.



Regenerating GFP-positive neurites (green) generally followed host GFAP-positive astrocytic processes (red) and grew longitudinally (arrowhead). However, there were instances during which neurites wandered and jumped from one astrocytic process to another (asterisk). See the article by Tom et al. for details.

■ Behavioral/Systems/Cognitive

Remembering the Second Time Around

Sevil Duvarci and Karim Nader (see pages 9269–9275)

Protein synthesis is required for the formation of long-term memories. Interestingly, reactivation of such memories is followed by a period in which storage is once again dependent on protein synthesis. One prevailing idea is that memories must be reconsolidated. Alternatively, protein synthesis inhibition could be

equivalent to extinction, or memory retrieval could be blocked? This week Duvarci and Nader explore these possibilities by injecting anisomycin into the rat lateral amygdala immediately after retrieval of consolidated fear memories. Extinction requires new memory formation; thus the authors argue that facilitation of extinction cannot underlie anisomycin block of reactivated consolidated memory. In addition, extinction is context dependent, so a memory extinguished in one setting should resurface in another. However, when rats were tested in a neutral environment after blocking protein synthesis, the memories were still inaccessible. Two tests of retrieval deficiency also failed, suggesting that the reactivated memories do indeed require reconsolidation.

◆ Neurobiology of Disease

A Consequence of Prenatal Nicotine in the Rat

Robert A. Neff, Samuel J. Simmens, Cory Evans, and David Mendelowitz (see pages 9261–9268)

If any additional reasons were needed to avoid smoking during pregnancy, Neff et al. deliver them in this week's *Journal*. Sudden infant death syndrome (SIDS) has been linked to prenatal nicotine exposure and may result from an exaggerated response to hypoxia. Cardioinhibitory vagal neurons (CVNs) in the brainstem regulate the heart rate via the vagus nerve, and thus could be involved in such changes. These neurons are inhibited by GABAergic and glycinergic inputs that caused biphasic changes in activity during hypoxia. The frequency of IPSCs first increases and then decreases, thus speeding and then slowing respiration and heart rate to adjust metabolic demand. The authors recorded from fluorescent-labeled CVNs in rat brainstem slices. After exposure to prenatal nicotine, GABAergic inputs showed a marked decrease in activity. The authors suggest that the subsequent disinhibition of CVNs could cause excessive slowing of the heart rate and thus contribute to the pathophysiology of SIDS.

Editorial

Special Annual Meeting Issue

In this issue, the Program Committee and the *Journal* editors launch a new collaboration to bring a sampling of the Annual Meeting to a broader audience. We all have had the experience of not being able to get into the room for a well attended symposium or missing a talk because it occurred during a critical poster session. In this issue, the participants in two of the symposia and six of the mini-symposia for the 2004 Annual Meeting present mini-reviews of the topics covered by their presentations. This group was selected from an outstanding group of 18 symposia and 27 mini-symposia. Our intent was to include presentations from all of the major themes of the meeting. We hope that you will find these mini-reviews useful, and we thank the participants for their enthusiastic participation. Our choices also highlight mini-symposia, a new format for the 2004 Annual Meeting. Mini-symposia give younger scientists, including more women and members of underrepresented minorities, an opportunity to present their work in focused sessions aimed beyond the specialist, thus enhancing their exposure and impact at the meeting.

We hope that those of you considering symposia or mini-symposia for next year will take this opportunity as an added

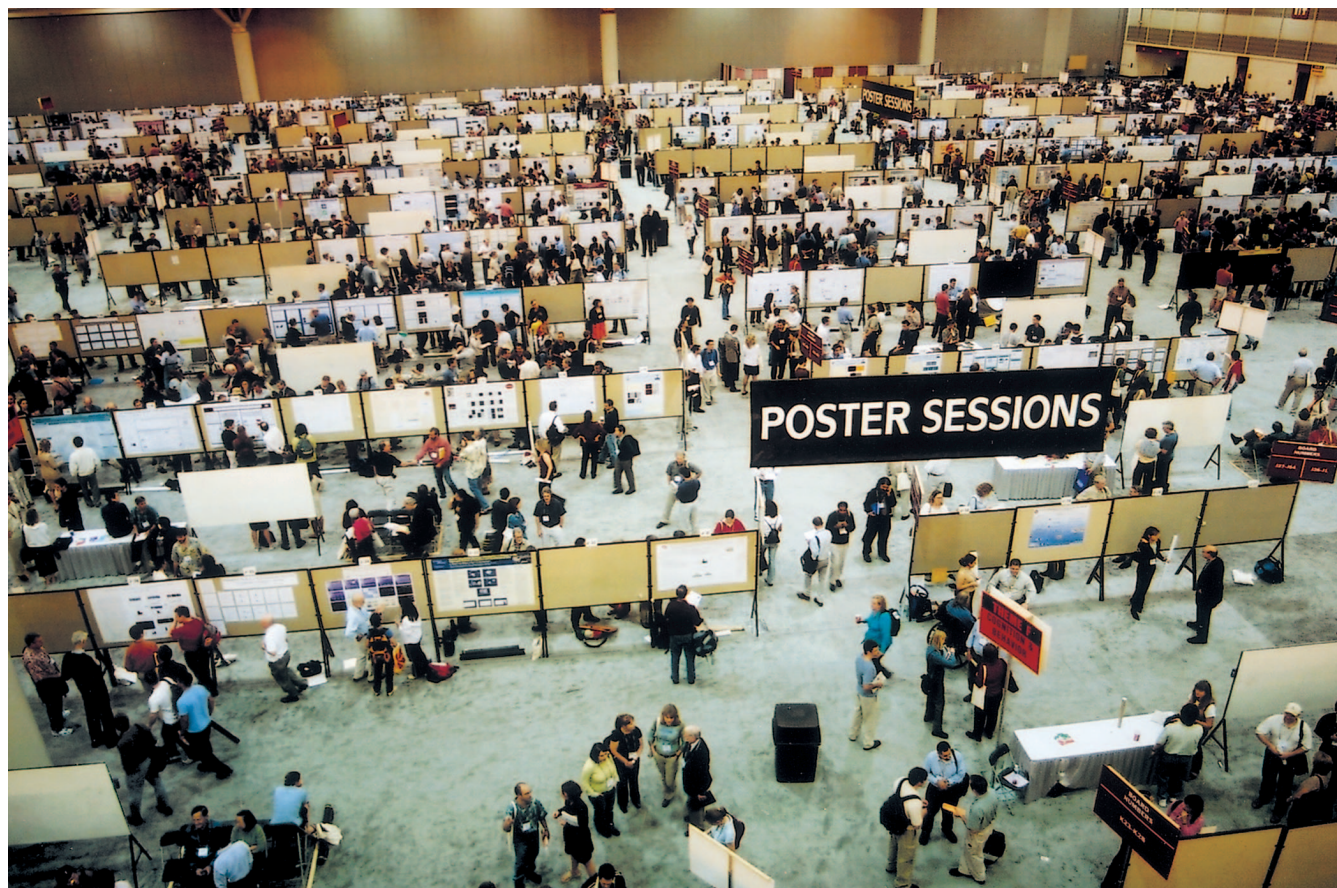
incentive to bring your ideas to an even larger audience. Although we are not able to publish mini-reviews for all of the symposia and mini-symposia, the Program Committee and *Journal* editors will work together to ensure that those chosen will represent the diversity of topics that characterize the Society for Neuroscience Annual Meeting.

We encourage feedback from participants and readers on this initiative and how it might be improved in future years. For information on proposals for future symposia or mini-symposia, please contact Julie Orlando-Castro at program@sfn.org. The deadline for submission of proposals for the 2005 Annual Meeting is Friday, January 7.

Have a great meeting.

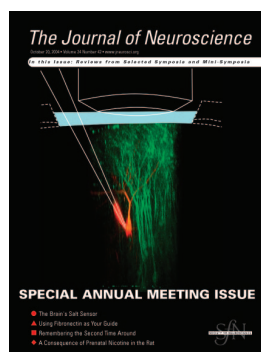
Leslie P. Tolbert, Society for Neuroscience Program Committee Chair

Gary Westbrook, Editor-in-Chief, *The Journal of Neuroscience*



The Journal of Neuroscience

October 20, 2004 • Volume 24 Number 42 www.jneurosci.org



Cover picture: An *in vivo* two-photon targeted patch recording from a lentivirus-infected pyramidal neuron in the rat barrel cortex. The overlay of two imaging channels (red and green) shows a whole-cell recording from a green fluorescent protein (GFP)-labeled neuron (orange color) with a patch pipette filled with the fluorescent dye Alexa 594 (red tip in the schematic). The drawing illustrates the objective of a two-photon laser-scanning microscope above a small craniotomy. The patch pipette was guided under visual control onto the infected GFP-expressing neuron. For details, see the article by Brecht in this issue (pages 9223–9227).

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The Beat Goes On: Spontaneous Firing in Mammalian Neuronal Microcircuits

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Molecules and Mechanisms of Mechanotransduction

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The Journal of Neuroscience, October 20, 2004 • 24(42):9220–9222

Novel Approaches to Monitor and Manipulate Single Neurons *In Vivo*

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The Journal of Neuroscience, October 20, 2004 • 24(42):9223–9227

Autism and Abnormal Development of Brain Connectivity

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The Journal of Neuroscience, October 20, 2004 • 24(42):9228–9231

Divide and Die: Cell Cycle Events as Triggers of Nerve Cell Death

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The Journal of Neuroscience, October 20, 2004 • 24(42):9232–9239

Neuronal Oscillations in the Basal Ganglia and Movement Disorders: Evidence from Whole Animal and Human Recordings

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The Journal of Neuroscience, October 20, 2004 • 24(42):9240–9243

Cell Adhesion Molecules in Synapse Formation

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Neuronal transmission relies on signals transmitted through a vast array of excitatory and inhibitory neuronal synaptic connections. How do axons communicate with dendrites to build synapses, and what molecules regulate this interaction? There is a wealth of evidence suggesting that cell adhesion molecules (CAMs) provide much of the information required for synapse formation. This review highlights the molecular mechanisms used by CAMs to regulate presynaptic and postsynaptic differentiation.

The Journal of Neuroscience, October 20, 2004 • 24(42):9244–9249

Mechanisms and Roles of Axon–Schwann Cell Interactions

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The Journal of Neuroscience, October 20, 2004 • 24(42):9250–9260

CELLULAR/MOLECULAR

The Subfornical Organ is the Primary Locus of Sodium-Level Sensing by Na_x Sodium Channels for the Control of Salt-Intake Behavior

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Dehydration causes an increase in the sodium (Na) concentration and osmolarity of body fluid. For Na homeostasis of the body, controls of Na and water intake and excretion are of prime importance. However, the system for sensing the Na level within the brain that is responsible for the control of Na- and water-intake behavior remains to be elucidated. We reported previously that the Na_x channel is preferentially expressed in the circumventricular organs (CVOs) in the brain and that Na_x knock-out mice ingest saline in excess under dehydrated conditions. Subsequently, we demonstrated that Na_x is a Na-level-sensitive Na channel. Here we show that the subfornical organ (SFO) is the principal site for the control of salt-intake behavior, where the Na_x channel is the Na-level sensor. Infusion of a hypertonic Na solution into the cerebral ventricle induced extensive water intake and aversion to saline in wild-type animals but not in the knock-out mice. Importantly, the aversion to salt was not induced by the infusion of a hyperosmotic mannitol solution with physiological Na concentration in either genotype of mice. When Na_x cDNA was introduced into the brain of the knock-out mice with an adenoviral expression vector, only animals that received a transduction of the Na_x gene into the SFO among the CVOs recovered salt-avoiding behavior under

dehydrated conditions. These results clearly show that the SFO is the center of the control of salt-intake behavior in the brain, where the Na-level-sensitive Na_x channel is involved in sensing the physiological increase in the Na level of body fluids.

The Journal of Neuroscience, October 20, 2004 • 24(42):9261–9268

Persistent Accumulation of Calcium/Calmodulin-Dependent Protein Kinase II in Dendritic Spines after Induction of NMDA Receptor-Dependent Chemical Long-Term Potentiation

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Calcium/calmodulin-dependent protein kinase II (CaMKII) is a leading candidate for a synaptic memory molecule because it is persistently activated after long-term potentiation (LTP) induction and because mutations that block this persistent activity prevent LTP and learning. Previous work showed that synaptic stimulation causes a rapidly reversible translocation of CaMKII to the synaptic region. We have now measured green fluorescent protein (GFP)–CaMKII α translocation into synaptic spines during NMDA receptor-dependent chemical LTP (cLTP) and find that under these conditions, translocation is persistent. Using red fluorescent protein as a cell morphology marker, we found that there are two components of the persistent accumulation. cLTP produces a persistent increase in spine volume, and some of the increase in GFP–CaMKII α is secondary to this volume change. In addition, cLTP results in a dramatic increase in the bound fraction of GFP–CaMKII α in spines. To further study the bound pool, immunogold electron microscopy was used to measure CaMKII α in the postsynaptic density (PSD), an important regulator of synaptic function. cLTP produced a persistent increase in the PSD-associated pool of CaMKII α . These results are consistent with the hypothesis that CaMKII α accumulation at synapses is a memory trace of past synaptic activity.

The Journal of Neuroscience, October 20, 2004 • 24(42):9324–9331

Action Potential Backpropagation and Multiglomerular Signaling in the Rat Vomeronasal System

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In the accessory olfactory bulb (AOB), sensory neurons expressing a given vomeronasal receptor (VR) gene send divergent projections to many glomeruli, and second-order neurons (mitral cells) link to multiple glomeruli via branched primary dendrites. We used calcium imaging and paired soma–dendritic patch-clamp recording to track backpropagated action potentials (APs) in rat AOB primary dendrites. In cells loaded with 150 μM Calcium Orange, somatic spikes elicited fluorescence transients over the entire primary dendritic tree, and the relative fluorescence increment $\Delta F/F_0$ increased along all branches from soma to glomeruli. Backpropagation was reliant on Na^+ channels: in 1 μM TTX, somatic AP commands evoked dendritic Ca^{2+} transients that declined steeply with distance. In paired soma–dendritic whole-cell recordings, backpropagated APs were unattenuated up to ~ 200 μm from the soma, whereas subthreshold voltage transients decayed markedly. Computational modeling indicated that the large distal Ca^{2+} transients are consistent with active, not passive, backpropagation. Genetic tracing in the AOB has suggested homotypic connectivity with individual mitral cell dendritic arbors projecting only to glomeruli targeted by sensory neurons expressing the same VR gene. Non-decremental, non-dichotomous backpropagation in AOB primary dendrites ensures fast, reliable communication between mitral cells and their homotypic glomeruli, binding them into functional modules in accordance with their VR-coded inputs.

The Journal of Neuroscience, October 20, 2004 • 24(42):9341–9352

A Functional Role of Postsynaptic Density-95–Guanylate Kinase-Associated Protein Complex in Regulating Shank Assembly and Stability to Synapses

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Postsynaptic density (PSD) proteins include scaffold, cytoskeletal, and signaling proteins that structurally and functionally interact with glutamate receptors and other postsynaptic membrane proteins. The molecular mechanisms regulating the assembly of PSD proteins and their associations with synapses are still widely unknown. We investigated the molecular mechanisms of Shank1 targeting and synapse assembly by looking at the function of guanylate kinase-associated protein (GKAP) and PSD-95 interactions. Shank1 when it is not associated to GKAP, which binds to the Shank PSD-95-Discs Large-zona occludens-1 domain, forms filamentous and fusiform structures in which the Src homology 3 domain specifically interacts with the ankyrin repeat domain, thus allowing its multimerization via a novel form of intermolecular interaction. Surprisingly, in both COS-7 cells and hippocampal neurons, GKAP forms insoluble aggregates with Shank that colocalize with heat shock protein 70 and neurofilaments, two markers of the aggresomes in which misfolded proteins accumulate. However, the two proteins are organized in clusters in COS cells and synaptic clusters in neurons when both are overexpressed and associated with wild-type PSD-95, but not with palmitoylation-deficient PSD-95. Synaptic activity in neurons induces the formation of Shank and GKAP intracellular aggregation and degradation. Similarly, the overexpression of a GKAP mutant that is incapable of binding PSD-95 induces Shank aggregation

and degradation in neurons. Our data suggest a possible functional and structural role of the PSD-95–GKAP complex in Shank and PSD protein assembly and stability to synapses.

The Journal of Neuroscience, October 20, 2004 • 24(42):9391–9404

Rapid, Activity-Induced Increase in Tissue Plasminogen Activator Is Mediated by Metabotropic Glutamate Receptor-Dependent mRNA Translation

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Long-term synaptic plasticity is both protein synthesis-dependent and synapse-specific. Therefore, the identity of the newly synthesized proteins, their localization, and mechanism of regulation are critical to our understanding of this process. Tissue plasminogen activator (tPA) is a secreted protease required for some forms of long-term synaptic plasticity. Here, we show tPA activity is rapidly increased in hippocampal neurons after glutamate stimulation. This increase in tPA activity corresponds to an increase in tPA protein synthesis that results from the translational activation of mRNA present at the time of stimulation. Furthermore, the mRNA encoding tPA is present in dendrites and is rapidly polyadenylated after glutamate stimulation. Both the polyadenylation of tPA mRNA and the subsequent increase in tPA protein is dependent on metabotropic glutamate receptor (mGluR) activation. A similar mGluR-dependent increase in tPA activity was detected after stimulation of a synaptic fraction isolated from the hippocampus, suggesting tPA synthesis is occurring in the synaptodendritic region. Finally, we demonstrate that tPA mRNA is bound by the mRNA-binding protein CPEB (cytoplasmic polyadenylation element binding protein-1), a protein known to regulate mRNA translation via polyadenylation. These results indicate that neurons are capable of synthesizing a secreted protein in the synaptic region, that mGluR activation induces mRNA polyadenylation and translation of specific mRNA, and suggest a model for synaptic plasticity whereby translational regulation of an immediate early gene precedes the increase in gene transcription.

The Journal of Neuroscience, October 20, 2004 • 24(42):9425–9433

Metaplastic Facilitation and Ultrastructural Changes in Synaptic Properties Are Associated with Long-Term Modulation of the Lamprey Locomotor Network

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The neuropeptide substance P evokes a long-term protein synthesis-dependent increase in the cycle frequency of locomotor network activity in the lamprey. Although cellular and synaptic mechanisms that could induce this effect have been identified, nothing is known of the underlying maintenance mechanisms. These mechanisms have been examined here.

Substance P potentiates low-frequency-evoked EPSPs from excitatory network interneurons. It also converts the depression of the EPSP during spike trains into facilitation, an example of metaplasticity. The metaplasticity was associated with a reduction of the transmitter release probability but an increase in the number of release sites. Although the potentiation of low-frequency-evoked EPSPs recovered within 1 hr, the metaplastic facilitation had not recovered 3–4 hr after substance P application. The metaplasticity thus extended into the protein synthesis-dependent maintenance phase of the network modulation, making it the only identified cellular or synaptic effect of substance P to last this long. It also had the same induction and maintenance features as the network burst frequency modulation, further suggesting that the two effects were related.

Long-term changes in synaptic properties are often associated with changes in synaptic organization. We have thus also examined the effects of substance P on synaptic ultrastructure up to 5 hr after substance P application. Substance P had several significant effects. These included an increase in the number of docked vesicles and a reduction of the synaptic gap.

Substance P thus has long-term effects on synaptic organization and function. The relevance of these effects to the long-term locomotor network modulation is discussed.

The Journal of Neuroscience, October 20, 2004 • 24(42):9458–9468

DEVELOPMENT/PLASTICITY/REPAIR

Astrocyte-Associated Fibronectin Is Critical for Axonal Regeneration in Adult White Matter

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Although it has been suggested that astroglia guide pioneering axons during development, the cellular and molecular substrates that direct axon regeneration in adult white matter have not been elucidated. We show that although adult cortical neurons were only able to elaborate very short, highly branched, dendritic-like processes when seeded onto organotypic slice cultures of postnatal day 35 (P35) rat brain containing the corpus callosum, adult dorsal root ganglion (DRG) neurons were able to regenerate lengthy axons within the reactive glial environment of this degenerating white matter tract. The callosum in both P35 slices and adult rat brain was rich in fibronectin, but not laminin. Furthermore, the fibronectin was intimately associated with the intratract astrocytes. Blockade of fibronectin function *in situ* with an anti-fibronectin antibody dramatically decreased outgrowth of DRG neurites, suggesting that fibronectin plays an important role in axon regeneration in mature white matter. The critical interaction between regrowing axons and astroglial-associated fibronectin in white matter may be an additional factor to consider when trying to understand regeneration failure and devising strategies to promote regeneration.

The Journal of Neuroscience, October 20, 2004 • 24(42):9282–9290

Polysialylated Neural Cell Adhesion Molecule Promotes Remodeling and Formation of Hippocampal Synapses

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Expression of the neural cell adhesion molecule (NCAM) has been shown to promote long-term potentiation (LTP) and stabilization of synapses during early synaptogenesis. Here, we searched for the mechanisms of synaptogenic activity of NCAM, focusing on the role of polysialic acid (PSA), an unusual carbohydrate preferentially associated with NCAM. We show that enzymatic removal of PSA with endoneuraminidase-N (endo-N) abolished preferential formation of synapses on NCAM-expressing cells in heterogenotypic cocultures of wild-type and NCAM-deficient hippocampal neurons. Transfection of NCAM-deficient neurons with either of three major NCAM isoforms (different in intracellular domains but identical in extracellular domains and carrying PSA) stimulated preferential synapse formation on NCAM isoform-expressing neurons. Enzymatic removal of heparan sulfates from cultured neurons and a mutation in the heparin-binding domain of NCAM diminished synaptogenic activity of neuronally expressed PSA-NCAM, suggesting that interaction of NCAM with heparan sulfate proteoglycans mediates this activity. PSA-NCAM-driven synaptogenesis was also blocked by antagonists to fibroblast growth factor receptor and NMDA subtype of glutamate receptors but not by blockers of non-NMDA glutamate receptors and voltage-dependent Na⁺ channels. Enzymatic removal of PSA and heparan sulfates also blocked the increase in the number of perforated spine synapses associated with NMDA receptor-dependent LTP in the CA1 region of organotypic hippocampal cultures. Thus, neuronal PSA-NCAM in complex with heparan sulfate proteoglycans promotes synaptogenesis and activity-dependent remodeling of synapses.

The Journal of Neuroscience, October 20, 2004 • 24(42):9372–9382

Induction of a Parafacial Rhythm Generator by Rhombomere 3 in the Chick Embryo

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Observations of knock-out mice suggest that breathing at birth requires correct development of a specific hindbrain territory corresponding to rhombomeres (r) 3 and 4. Focusing on this territory, we examined the development of a neuronal rhythm generator in the chick embryo. We show that rhythmic activity in r4 is inducible after developmental stage 10 through interaction with r3. Although the nature of this interaction remains obscure, we find that the expression of *Krox20*, a segmentation gene responsible for specifying r3 and r5, is sufficient to endow other rhombomeres with the capacity to induce rhythmic activity in r4. Induction is robust, because it can be reproduced with r2 and r6 instead of r4 and with any hindbrain territory that normally expresses *Krox20* (r3, r5) or can be forced to do so (r1, r4). Interestingly, the interaction between r4 and r3/r5 that results in rhythm production can only take place through the anterior border of r4, revealing a heretofore unsuspected polarity in individual rhombomeres. The r4 rhythm generator appears to be homologous to a murine respiratory parafacial neuronal system developing in r4 under the control of *Krox20* and *Hoxa1*. These results identify a late role for *Krox20* at the onset of neurogenesis.

The Journal of Neuroscience, October 20, 2004 • 24(42):9383–9390

Pronounced Cell Death in the Absence of NMDA Receptors in the Developing Somatosensory Thalamus

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Genetic deletion of NMDA glutamate receptors disrupts development of whisker-related neuronal patterns in the somatosensory system. Independent studies have shown that NMDA receptor antagonists increase cell death among developing neurons. Here, we report that a dramatic feature of the developing somatosensory system in newborn NMDA receptor 1 (NMDAR1) knock-out mice is increased cell death in the ventrobasal nucleus (VB) of the thalamus. Sections were subject to terminal deoxynucleotidyl transferase dUTP nick end labeling staining for apoptotic DNA fragmentation, thionine staining for pyknotic nuclei, silver staining for degenerating cells, and immunostaining for caspase-3. All four methods demonstrated that deletion of NMDAR1 causes a large (on the order of threefold to fivefold) increase in cell death in the VB. The NMDA receptor antagonists dizocilpine maleate (MK-801) and phencyclidine also increase cell death in this structure. The onset of increased cell death in the VB in the absence of NMDA receptor function is approximately the time of birth, overlaps with naturally occurring cell death and synaptogenesis, and displays some anatomical specificity. For example, there was no increase in cell death in the hippocampus or neocortex of NMDAR1 knock-out mice at any of the time points examined: embryonic day 15.5 (E15.5), E17.5, and postnatal day 0. We also report a significant reduction in the size of the VB that is evident starting at E17.5. The results indicate that NMDA receptors play a major role in cell survival during naturally occurring cell death in the VB and demonstrate that cell death is a consideration in NMDA receptor knock-out studies.

The Journal of Neuroscience, October 20, 2004 • 24(42):9441–9450

Characterization of Fear Memory Reconsolidation

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Reactivation of consolidated memories returns them to a protein synthesis-dependent state. One interpretation of these findings is that the memory reconsolidates after use. Two alternative interpretations are that protein synthesis inhibition facilitates extinction and that postreactivation protein synthesis inhibition leads to an inability to retrieve the consolidated memory. First, using two different approaches, we report that reconsolidation cannot be reduced down to facilitated extinction. We show that the reconsolidation deficit does not show renewal after a contextual shift, whereas an extinguished auditory fear memory does under the same conditions and the deficit occurs regardless of whether the memory is reactivated with an extinction [conditioned stimulus (CS) alone] or a reinforced trial (CS–unconditioned stimulus). To address the issue of whether postreactivation anisomycin leads to an inability to retrieve the consolidated memory, we used two traditional assays for retrieval deficits. First, we demonstrate that the amnesia induced by blockade of reconsolidation does not show any spontaneous recovery. Second, we show that application of reminder shock does not result in the reinstatement of the memory. These findings support the idea that reactivation of consolidated memories initiates a second time-dependent memory formation process.

The Journal of Neuroscience, October 20, 2004 • 24(42):9269–9275

Dynamic Sound Localization during Rapid Eye–Head Gaze Shifts

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Human sound localization relies on implicit head-centered acoustic cues. However, to create a stable and accurate representation of sounds despite intervening head movements, the acoustic input should be continuously combined with feedback signals about changes in head orientation. Alternatively, the auditory target coordinates could be updated in advance by using either the preprogrammed gaze–motor command or the sensory target coordinates to which the intervening gaze shift is made (“predictive remapping”). So far, previous experiments cannot dissociate these alternatives. Here, we study whether the auditory system compensates for ongoing saccadic eye and head movements in two dimensions that occur during target presentation. In this case, the system has to deal with dynamic changes of the acoustic cues as well as with rapid changes in relative eye and head orientation that cannot be preprogrammed by the audiomotor system. We performed visual–auditory double-step experiments in two dimensions in which a brief sound burst was presented while subjects made a saccadic eye–head gaze shift toward a previously flashed visual target. Our results show that localization responses under these dynamic conditions remain accurate. Multiple linear regression analysis revealed that the intervening eye and head movements are fully accounted for. Moreover, elevation response components were more accurate for longer-duration sounds (50 msec) than for extremely brief sounds (3 msec), for all localization conditions. Taken together, these results cannot be explained by a predictive remapping scheme. Rather, we conclude that the human auditory system adequately processes dynamically varying acoustic cues that result from self-initiated rapid head movements to construct a stable representation of the target in world coordinates. This signal is subsequently used to program accurate eye and head localization responses.

The Journal of Neuroscience, October 20, 2004 • 24(42):9291–9302

Spontaneous Withdrawal from the Triazolobenzodiazepine Alprazolam Increases Cortical Corticotropin-Releasing Factor mRNA Expression

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Corticotropin-releasing factor (CRF) is the major physiologic regulator of the hypothalamic–pituitary–adrenal (HPA) axis and plays a key role in coordinating the mammalian stress response. Substantial data implicates hyperactivity of CRF neuronal systems in the pathophysiology of depression and anxiety disorders. Enhanced CRF expression, release, and function have also been demonstrated during acute withdrawal from several drugs of abuse.

Previous studies revealed that chronic administration of the anxiolytic alprazolam reduced indices of CRF and CRF₁ receptor function. Conversely, measures of urocortin I and CRF₂ receptor function were increased. To further scrutinize these findings, we sought to determine whether CRF neuronal systems are activated during spontaneous withdrawal from the triazolobenzodiazepine alprazolam in dependent rats and to characterize the time course, extent, and regional specificity of the patterns of activation. After 14 d of alprazolam administration (90 mg · kg^{−1} · d^{−1}), spontaneous withdrawal produced activation of the HPA axis, as well as suppression of food intake and weight loss that peaked 24–48 hr after withdrawal. Remarkably, CRF mRNA expression in the cerebral cortex was markedly (>300%) increased over the same time period. Other indices of CRF–CRF₁ and urocortin I–CRF_{2A} function, altered by chronic alprazolam treatment as previously described, returned to pretreatment levels over 96 hr. The physiologic significance of this dramatic induction of cortical CRF mRNA expression, as well as whether this occurs during withdrawal from other drugs of abuse is yet to be determined. The marked increase in CRFergic neurotransmission is hypothesized to play a major role in benzodiazepine withdrawal.

The Journal of Neuroscience, October 20, 2004 • 24(42):9303–9312

The Effects on Place Cells of Local Scopolamine Dialysis Are Mimicked by a Mixture of Two Specific Muscarinic Antagonists

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Using a dialysis probe near CA1 hippocampal recording electrodes, we infused nonspecific (scopolamine) and specific (methoctramine, pirenzepine) antagonists of muscarinic cholinergic transmission to determine their effects on the positional firing properties of place cells. Both low (0.5 mM) and high (2.0 or 3.0 mM) scopolamine significantly decreased in-field firing rate, increased the ratio of out-of-field to in-field rate, and reduced the smoothness of rate maps, while tending to increase out-of-field rate. Thus, local nonspecific muscarinic blockade mimicked the effects seen with intracerebroventricular application, suggesting that blockade of receptors local to the recorded cells plays an essential role. Unexpectedly, dialysis of scopolamine reduced locomotor activity, again duplicating the effects of intracerebroventricular administration. Most effects of methoctramine (1.0 mM), which blocks presynaptic m_2 and m_4 receptors, were initially strong but then diminished over hours. Methoctramine produced a significant increase only in out/in ratio and out-of-field rate, whereas it tended to increase in-field rate and monotonically decrease smoothness. Pirenzepine (3.0 mM), which blocks postsynaptic m_1 receptors, produced a significant increase only in out/in ratio, whereas it tended to increase out-of-field rate and decrease in-field rate; all these effects were monotonic with respect to time. A mixture of methoctramine plus pirenzepine recapitulated the place-cell effects of scopolamine, although neither the mixture nor its separate components affected behavior. We conclude that the effects of scopolamine on place cells likely result from a combination of blockade of postsynaptic m_1 receptors, leading to reduced excitability, with blockade of presynaptic m_2 and m_4 receptors, leading to increased out-of-field firing.

The Journal of Neuroscience, October 20, 2004 • 24(42):9313–9323

Cranial Afferent Glutamate Heterosynaptically Modulates GABA Release onto Second-Order Neurons via Distinctly Segregated Metabotropic Glutamate Receptors

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The balance between excitation and inhibition dictates central integration. Glutamatergic and GABAergic neurotransmission dominate this process. Cranial primary afferents enter the brainstem to release glutamate (Glu) onto second-order neurons within the caudal nucleus tractus solitarius (NTS) to initiate autonomic reflexes. The simplest pathways for these reflexes contain as few as two central neurons, but display robust frequency-dependent behavior. Within NTS, multiple metabotropic Glu receptors (mGluRs) are present, but their roles are poorly understood. Using synaptically discriminated second-order NTS neurons in brainstem slices and mechanically dissociated NTS neurons with intact boutons, we show that Glu differentially controls GABA release via distinct presynaptic mGluRs. In second-order NTS neurons recorded in slices, activation of primary afferents at frequencies as low as 10 shocks per second released sufficient Glu to alter rates of spontaneous IPSCs (sIPSCs). In both approaches, group I mGluRs increased GABA release in some neurons, but, on different neurons, group II and group III mGluRs decreased the sIPSC rate. mGluR actions were remarkably rapid, with onset and reversal beginning within 100 msec. In all cases, mGluR actions were exclusively presynaptic, and mGluRs did not alter postsynaptic properties in second-order neurons in either slices or isolated neurons. Tests with capsaicin and $\alpha\beta$ -methylene ATP suggest that myelinated and unmyelinated afferent pathways engage both mGluR–GABA mechanisms. Afferent Glu spillover provides heterosynaptic cross talk with GABAergic inhibition in NTS. This process may critically shape the dynamic character and use dependence for cranial afferent transmission at the first stage of autonomic reflexes.

The Journal of Neuroscience, October 20, 2004 • 24(42):9332–9340

Localizing P300 Generators in Visual Target and Distractor Processing: A Combined Event-Related Potential and Functional Magnetic Resonance Imaging Study

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Constraints from functional magnetic resonance imaging (fMRI) were used to identify the sources of the visual P300 event-related potential (ERP). Healthy subjects performed a visual three-stimulus oddball paradigm with a difficult discrimination task while fMRI and high-density ERP data were acquired in separate sessions. This paradigm allowed us to differentiate the P3b component of the P300, which has been implicated in the detection of rare events in general (target and distractor), from the P3a component, which is mainly evoked by distractor events. The fMRI-constrained source model explained >99% of the variance of the scalp ERP for both components. The P3b was mainly produced by parietal and inferior temporal areas, whereas frontal areas and the insula contributed mainly to the P3a. This source model reveals that both higher visual and supramodal association areas contribute to the visual P3b and that the P3a has a strong frontal contribution, which is compatible with its more anterior distribution on the scalp. The results point to the involvement of distinct attentional subsystems in target and distractor processing.

The Journal of Neuroscience, October 20, 2004 • 24(42):9353–9360

Neurotrophin-3 Reverses Chronic Mechanical Hyperalgesia Induced by Intramuscular Acid Injection

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Injection of acid into the gastrocnemius muscle results in a persistent, mechanical hyperalgesia of the hindpaw (Sluka et al., 2001). Here, the ability of neurotrophins to alter the development of this secondary hyperalgesia was assessed using transgenic mice and exogenous neurotrophin administration. Acid-induced hyperalgesia was measured in wild-type and transgenic mice that overexpress neurotrophin-3 (NT-3) in muscle (*myo/NT-3* mice). Mechanical and thermal sensitivity of the hindpaws were assessed after injections of acidic saline, pH 4, into the right medial gastrocnemius. Wild-type mice exhibited mechanical but not thermal hyperalgesia in both paws 1 d after acid injection. In contrast, *myo/NT-3* mice developed a transient mechanical hyperalgesia in both paws that disappeared by 2–3 d. The reversal of hyperalgesia in *myo/NT-3* mice could be mimicked by intramuscular administration of exogenous NT-3 to acid-injected mice but not by other neurotrophins. The route of NT-3 administration appears critical, because intrathecal or intraperitoneal delivery were ineffective. The hyperalgesia could only be reversed by NT-3 treatment concurrent with acid injection and not after the emergence of hyperalgesia. The acid-induced hyperalgesia did not redevelop after the termination of NT-3 treatment, suggesting that NT-3 permanently reversed the hyperalgesia. Consistent with the behavioral data, paw palpation of acid-injected mice significantly increased Fos expression in the spinal cord of wild-type but not *myo/NT-3* or NT-3-injected mice. The attenuation of hyperalgesia suggests that NT-3 may be a modulator of muscle-derived pain, and NT-3 may suppress events that lead to secondary hyperalgesia triggered by insult to muscle afferents.

The Journal of Neuroscience, October 20, 2004 • 24(42):9405–9413

Time-Dependent Alterations in mRNA Expression of Brain Neuropeptides Regulating Energy Balance and Hypothalamo–Pituitary–Adrenal Activity after Withdrawal from Intermittent Morphine Treatment

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Chronic stressors alter brain function and may leave traces after their relief. We used intermittent morphine treatment to examine the relationships between stress-induced changes in energy balance and hypothalamo–pituitary–adrenal (HPA) activity and the recovery thereafter. We studied the effects of morphine injections on energy balance, hormones and fat stores, brain neuropeptide expression, and the ACTH and corticosterone responses to restraint 12 hr after the final injection and 8 d later during recovery. Weight gain, food intake, and caloric efficiency decreased at morphine onset, and these were maintained throughout the morphine injections. At 12 hr, fat stores, leptin, insulin, and testosterone concentrations were reduced. Subsequently, body weight gain and food intake increased and caloric efficiency was above control during the final days. By the eighth recovery day, fat stores and peripheral hormones were no longer depressed. At 12 hr, an over-response of CRF mRNA to restraint occurred in the hypothalamus, similar to the facilitated ACTH and corticosterone responses. On day 8, the hypothalamic CRF mRNA response to restraint was still facilitated, opposite to inhibited ACTH responses. Hypothalamic CRF mRNA correlated highly with mesenteric fat weight in morphine-treated rats. We conclude that there is a prolonged recovery from chronic stressors involving interrelated changes in energy balance and HPA activity. Nonetheless, 8 d after withdrawal from morphine, rats still display facilitated central stress responses, similar to the HPA symptoms described in posttraumatic stress disorder patients. Repeated partial withdrawal associated with intermittent morphine treatment, compounded by complete withdrawal associated with termination of the treatment, is likely required for these metabolic and HPA derangements.

The Journal of Neuroscience, October 20, 2004 • 24(42):9414–9424

Olfactory Sex Discrimination Persists, Whereas the Preference for Urinary Odorants from Estrous Females Disappears in Male Mice after Vomeronasal Organ Removal

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Based on observed changes in the social context for the display of ultrasonic vocalizations, scent marking, aggression, and mounting behavior by male mice with a null mutation of the transient receptor potential 2 ion channel, it was proposed recently that a primary function of the mouse vomeronasal organ (VNO)/accessory olfactory system is sex discrimination. We tested this hypothesis directly by studying the ability of male mice to discriminate between urinary odors of conspecifics of the two sexes and in different endocrine states using habituation–dishabituation tests. Male mice from which the VNO had been surgically removed (VNOx) resembled sham-operated controls (VNOi) in their ability to discriminate between volatile urinary odors from estrous females versus gonadally intact males, as well as between urinary odors from estrous versus ovariectomized females and from gonadally intact versus castrated males. When physical access to stimuli was permitted, VNOi control males strongly preferred to investigate volatile and nonvolatile urinary odorants from estrous females as opposed to intact males, whereas VNOx males showed no such preference. Mating performance in tests with estrous females was equivalent in VNOi and VNOx subjects. Both groups of males preferred to mount an estrous female instead of a castrated male. Our results suggest that the VNO is not required for sex discrimination but instead detects the nonvolatile components of opposite-sex urine that may be used to help prolong contact with individuals that produce these chemosignals.

The Journal of Neuroscience, October 20, 2004 • 24(42):9451–9457

Prenatal Nicotine Exposure Alters Central Cardiorespiratory Responses to Hypoxia in Rats: Implications for Sudden Infant Death Syndrome

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Maternal cigarette smoking and prenatal nicotine exposure are the highest risk factors for sudden infant death syndrome (SIDS). During hypoxia, respiratory frequency and heart rate transiently increase and subsequently decrease. These biphasic cardiorespiratory responses normally serve to prolong survival during hypoxia by reducing the metabolic demands of cardiac and respiratory muscles. However, exaggerated responses to hypoxia may be life threatening and have been implicated in SIDS. Heart rate is primarily determined by the activity of brainstem preganglionic cardioinhibitory vagal neurons (CVNs) in the nucleus ambiguus. We developed an *in vitro* rat brainstem slice preparation that maintains rhythmic inspiratory-related activity and contains fluorescently labeled CVNs. Synaptic inputs to CVNs were examined using patch-clamp electrophysiological techniques. Hypoxia evoked a biphasic change in the frequency of both GABAergic and glycinergic IPSCs in CVNs, comprised of an initial increase followed by a decrease in IPSC frequency. Prenatal exposure to nicotine changed the GABAergic response to hypoxia from a biphasic response to a precipitous decrease in spontaneous GABAergic IPSC frequency. This study establishes a likely neurochemical mechanism for the heart rate response to hypoxia and a link between prenatal nicotine exposure and an exaggerated bradycardia during hypoxia that may contribute to SIDS.

The Journal of Neuroscience, October 20, 2004 • 24(42):9361–9371

Biochemical, Ultrastructural, and Reversibility Studies on Huntingtin Filaments Isolated from Mouse and Human Brain

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Huntington's disease (HD) and eight additional inherited neurological disorders are caused by CAG triplet-repeat expansions leading to expanded polyglutamine sequences in their respective proteins. These triplet-CAG repeat disorders have in common the formation of aberrant intraneuronal proteinaceous inclusions containing the expanded polyglutamine sequences. These aggregates have been postulated to contribute to pathogenesis caused by conformational toxicity, sequestration of other polyglutamine-containing proteins, or by interfering with certain enzymatic activities. Testing these hypotheses has been hampered by the difficulty to isolate these aggregates from brain. Here we report that polyglutamine aggregates can be isolated from the brain of the Tet/HD94 conditional mouse model of HD, by following a method based on high salt buffer homogenization, nonionic detergent extraction, and gradient fractionation. We then verified that the method can be successfully applied to postmortem HD brains. Immunoelectron microscopy, both in human and mouse samples, revealed that the stable component of the inclusions are mutant huntingtin-containing and ubiquitin-containing fibrils. Atomic-force microscopy revealed that these fibrils have a “beads on a string” morphology. Thus, they resemble the *in vitro* assembled filaments made of recombinant mutant-huntingtin, as well as the A β and α -synuclein amyloid protofibrils. Finally, by shutting down transgene expression in the Tet/HD94 conditional mouse model of HD, we were able to demonstrate that these filaments, although stable *in vitro*, are susceptible to revert *in vivo*, thus demonstrating that the previously reported reversal of ubiquitin-immunoreactive inclusions does not simply reflect disassembling of the inclusions into their constituent fibrils and suggesting that any associated conformational or protein-sequestration toxicity is also likely to revert.

The Journal of Neuroscience, October 20, 2004 • 24(42):9276–9281

Early and Progressive Sensorimotor Anomalies in Mice Overexpressing Wild-Type Human α -Synuclein

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Accumulation of α -synuclein in brain is a hallmark of synucleinopathies, neurodegenerative diseases that include Parkinson's disease. Mice overexpressing α -synuclein under the Thy-1 promoter (ASO) show abnormal accumulation of α -synuclein in cortical and subcortical regions of the brain, including the substantia nigra. We examined the motor deficits in ASO mice with a battery of sensorimotor tests that are sensitive to alterations in the nigrostriatal dopaminergic system. Male wild-type and ASO mice were tested every 2 months for 8 months for motor performance and coordination on a challenging beam, inverted grid, and pole, sensorimotor deficits in an adhesive removal test, spontaneous activity in a cylinder, and gait. Fine motor skills were assessed by the ability to grasp cotton from a bin. ASO mice displayed significant impairments in motor performance and coordination and a reduction in spontaneous activity as early as 2 months of age. Motor performance and coordination impairments became progressively worse with age and sensorimotor deficits appeared at 6 months. Fine motor skills were altered at 4 months and worsened at 8 months. These

data indicate that overexpression of α -synuclein induced an early and progressive behavioral phenotype that can be detected in multiple tests of sensorimotor function. These behavioral deficits provide a useful way to assess novel drug therapy in genetic models of synucleinopathies.

The Journal of Neuroscience, October 20, 2004 • 24(42):9434–9440

Neuroscience Faculty Positions

Medical College of Georgia



The Medical College of Georgia invites applications from outstanding investigators for tenure-track Assistant or Associate Professor positions in the Program in Developmental Neurobiology, Institute of Molecular Medicine and Genetics. Candidates should have a Ph.D. or M.D. degree and a demonstrated capacity to conduct creative and original research. Successful applicants will become members of the Program with joint appointment in a basic science or clinical department. They are expected to establish extramurally funded research programs in neural development or neural regeneration, which complement existing research focuses in neural stem cell biology, molecular mechanisms of synapse formation and function, regenerative neurobiology, glyco-neurobiology, neuronal differentiation/migration and neuroendocrinology. Outstanding core facilities are available on campus, which include: cell imaging with confocal and multiphoton microscopy, gene microarray analysis, proteomic analysis and mass spectrometry, transgenic mouse development, small animal behavior core, histopathology, and molecular biology. Generous start-up packages are available based on the experience of the applicant investigators. The Medical College of Georgia is a growing state supported academic medical center located in a historic city of 200,000 individuals with outstanding recreational and lifestyle opportunities. Interested applicants should forward a curriculum vitae, a statement of research interest and future plans, a list of three appropriate references to:

Darrell Brann, Ph.D., Developmental Neurobiology Program, Institute of Molecular Medicine and Genetics,
Medical College of Georgia, 1120 Fifteenth Street, CB-2803, Augusta, GA 30912-2620

The application materials can also be submitted electronically by e-mailing them to Dr. Brann (dbrann@mail.mcg.edu). Applications will be received through 12/1/04. ACH #47427 . PO# E000054392
EEO/AA/Equal Access employer.

THE DEPARTMENT OF PSYCHOLOGY UNIVERSITY OF PENNSYLVANIA

invites applications for a tenure-track assistant professorship in **Behavioral Neuroscience**. Applicants should have a PhD and postdoctoral experience in psychology, biology or neuroscience, and an active, high quality research program with potential for extramural funding, as well as a commitment to excellence in undergraduate and graduate teaching. Of special interest are candidates whose expertise and interests complement our existing strengths in homeostasis, motivated behaviors, and neuroendocrinology. Such areas include the neurobiology of stress, emotion, social behaviors and mental illness. Submit a CV, selected preprints and reprints, and a statement of research interests, and arrange for three letters of recommendation to be sent to:

Behavioral Neuroscience Search Committee
Department of Psychology
University of Pennsylvania
3720 Walnut Street
Philadelphia, PA 19104-6241

Screening of applicants will begin immediately and continue until the position is filled.

The University of Pennsylvania is an Equal Employment Opportunity/Affirmative Action Employer.

FACULTY POSITION – NEUROBIOLOGY

The Department of Neurobiology, University of Pittsburgh School of Medicine, is inviting applications for a full time tenure-track position, rank to be determined, to begin July 1, 2005. Preference will be given to applicants with research programs investigating mechanisms of signal transduction in cell-cell interactions, particularly related to development, synaptic transmission and plasticity in the nervous system. It is expected that the successful candidate will conduct a competitive research program in which molecular and cellular approaches are emphasized to complement current department strengths in developmental and systems neurobiology. The position requires a Ph.D. and/or M.D., with at least two years postdoctoral experience. Competitive salary support and start-up funds will be made available. Applicants should submit by December 31, 2004, a curriculum vita, a detailed description of future research goals, representative recent publications, and names and addresses of three references by email to recruit@neurobio.pitt.edu or by mail to:

Dr. Susan G. Amara, Chair, Dept. of Neurobiology
University of Pittsburgh School of Medicine
E1440 Biomedical Science Tower
Pittsburgh, PA, 15261
Phone: 412 383-8910

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**MBL**

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Funding Available for Summer Research in Neuroscience

**APPLICATION DEADLINE:
JANUARY 15, 2005**

The Marine Biological Laboratory is pleased to announce the availability of funding for the following summer research programs in Neuroscience in 2005. These programs will provide up to \$50,000/year/award with a possibility for renewal for 3 years. Scholars in these programs will benefit from the rich intellectual and interactive environment of the scientific community at the MBL.

**ALBERT AND ELLEN GRASS
FACULTY GRANTS PROGRAM**

Proposals must describe collaborative research in any area of neuroscience by teams of two or more investigators, with a minimum stay of six weeks at the Marine Biological Laboratory. Collaborative teams must consist of a minimum of two Assistant/Associate Professor-level neuroscientists. Collaborative units may be formed with senior investigators, but only the more junior neuroscientists will receive direct funding. Awards provide funds for research and laboratory rental, and cover the costs of housing and travel for the PIs.

**DART FOUNDATION SCHOLARS
PROGRAM IN LEARNING & MEMORY**

Proposals must be targeted to the study of learning and memory with a minimum stay of six weeks at the Marine Biological Laboratory. Applications are encouraged from junior- or senior-level neuroscientists holding a Ph.D., M.D. or equivalent degree. Awards provide funds for research and laboratory rental, and cover the costs of housing and travel.

For application and information, contact:

Sandra Kaufmann, Fellowships Coordinator, (508) 289-7441, skaufmann@mbi.edu

Applications are encouraged from women and members of underrepresented minorities.

The MBL is an Equal Opportunity/Affirmative Action Employer.

www.mbl.edu/fellowships

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Fax this form and forward all ad materials to: The Herlitz Company, Inc., Attn: Jnl. Neurosci. Classified Ad Manager, 1890 Palmer Ave., Ste. 202A, Larchmont, NY 10538 **Phone:** 914-833-1979 / **Fax:** 914-833-0929. Please **e-mail** the text of the ad to: info@herlitz.com

New Position at Caltech

Assistant Professor in Genetics of Neural Systems and Behavior

We invite applications for a tenure-track Assistant Professor appointment in the Division of Biology at the California Institute of Technology. We are seeking highly qualified candidates who are committed to a career in research and teaching. The applicant should conduct research at the interface of molecular biology and systems neuroscience aimed at understanding neural circuits and the control of behavior. We encourage applications from individuals working on vertebrate or invertebrate systems. The initial appointment term is four years, and appointment is contingent upon completion of all the requirements for a Ph.D.

The California Institute of Technology is an affirmative action/equal opportunity employer. Women, minorities, veterans and disabled persons are encouraged to apply. Applicants should submit a curriculum vita, list of publications, a brief statement of research interests and teaching experience, and arrange for three letters of recommendation to be sent to:

Chair of Genetics of Neural Systems
and Behavior Search
Division of Biology 216-76
California Institute of Technology
Pasadena, CA 91125

Molecular Neuroscience Faculty Positions

Smilow Center, NYU School of Medicine

Applications are invited for four tenure-track faculty positions at all career levels in Molecular Neuroscience at the New York University School of Medicine. We are undergoing a significant expansion of our faculty in association with the opening in the late 2005 of the Joan and Joel Smilow Research Center, a state-of-the-art research facility. MD and/or PhD scientists with an outstanding record of scientific achievement in in basic or translational cellular and molecular neuroscience research will be considered. Applicants should provide a curriculum vitae, a statement of current research interests, and the names and contact information for three references. To apply online and to learn more about the programs at the Joan and Joel Smilow Research Center, please visit our website at www.med.nyu.edu/smilowcenter. NYU School of Medicine is located on Manhattan's East Side in the midst of a thriving metropolis, home of one of the world's largest biomedical research communities.

We are an equal opportunity employer and provide a drug-free workplace.

CHAIR, DEPARTMENT OF NEUROLOGY

University of California, Davis Health System

The UC Davis School of Medicine is seeking to recruit a full-time academic faculty member to be chair of the Department of Neurology. We seek nationally recognized candidates who are actively involved in successful research within a neurology subspecialty area or neuroscience research field as evidenced by a sustained track record of extramurally funded research. The candidate should also have experience in managing a wide range of services and programs through experience as a research center director or chief of a neurology clinical service.

The search committee is seeking a confident leader with excellent interpersonal skills, a history of successful collaborations with colleagues in other disciplines, and demonstrated experience in mentoring junior faculty. The successful candidate also should have a well-developed vision for a successful academic department of neurology in today's challenging managed care environment and should be an accomplished administrator.

The UC Davis Department of Neurology has an established group of excellent clinicians, teachers, and researchers in a wide range of neurology and neuroscience subspecialty areas, both at the Davis and Sacramento campuses. The School of Medicine is committed to the further expansion of an already successful neuroscience enterprise that includes such programs as the Center for Neuroscience, directed by Distinguished Professor Edward G. Jones; the UC Davis Imaging Research Center, directed by Professor Cameron Carter; the Medical Investigation of Neurodevelopment Disorders (M.I.N.D.) Institute, directed by Professor Robert Hendren with Professor David Amaral as Research Director; the Alzheimer's Disease Center, directed by Professor Charles DeCarli; the UC Davis Center for Mind and Brain, directed by Professor George R. Mangun; and the UC Davis Genome Center, directed by Professor Richard Michelson.

Applicants should send a letter describing their administrative, clinical and research background and a curriculum vitae to:

Robert E. Hales, M.D., MBA, Chair, Neurology Chair Search Committee
via e-mail at rehales@ucdavis.edu or via mail to
Robert E. Hales, M.D., UC Davis Department of Psychiatry
2230 Stockton Blvd., Sacramento, Ca. 95817.

This position will be "open until filled but not later than March 31, 2005." Applications should be received by November 30, 2004 for full consideration.

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2005 Neuroscience Courses

Neural Systems & Behavior, June 11 - August 6
APPLICATION DEADLINE: February 1, 2005

Neurobiology, June 5 - August 6
APPLICATION DEADLINE: February 1, 2005

**Summer Program in Neuroscience, Ethics
& Survival (SPINES)**, June 18 - July 16
APPLICATION DEADLINE: February 1, 2005

Methods in Computational Neuroscience
July 31 - August 28
APPLICATION DEADLINE: March 7, 2005

Pathogenesis of Neuroimmunologic Diseases
August 4 - August 21
APPLICATION DEADLINE: March 14, 2005

Neural Development & Genetics of Zebrafish
August 14 - August 27
APPLICATION DEADLINE: March 18, 2005

Neuroinformatics, August 13 - August 28
APPLICATION DEADLINE: March 23, 2005

**Substantial financial assistance is available
for many of our programs!**

For additional information on these and other courses, contact:

Carol Hamel, Admissions Coordinator, (508) 289-7401, admissions@mbi.edu

Applications are encouraged from women and members of underrepresented minorities.
The MBL is an Equal Opportunity/Affirmative Action Employer.

www.mbl.edu/education

Neuroscience Faculty Positions

Medical College of Georgia



We are seeking four outstanding individuals to join an interdisciplinary group of investigators to study synaptic mechanisms of learning, memory or sleep. These are tenure track appointments at the Assistant, Associate or Full Professor level depending on experience. A variety of approaches from behavioral to molecular are welcome. This recruitment is part of the development of a new Synapses and Cognitive Neuroscience Program at the Medical College of Georgia (MCG).

Outstanding facilities are available for electron microscopy, multiphoton and other imaging, microarray technology, proteomics, transgenic animals, primate research, and clinical collaborations.

Candidates should have a Ph.D. or M.D. degree, postdoctoral experience, and a demonstrated capacity to perform creative and original research. The successful applicants will become members of the Program with joint appointments in a clinical or basic science department. They will develop vigorous extramurally funded research programs. We offer a generous start-up package and outstanding facilities in a growing academic medical center.

The MCG is located in a historic city of 200,000 people with excellent recreational and lifestyle opportunities. Please send letter of interest, curriculum vitae and statement of research plans, and arrange to have three letters of reference sent to:

Kristen M. Harris, PhD
Medical College of Georgia
1120 15th Street, CB-2740
Augusta, GA 30912
wpaschal@mail.mcg.edu

MCG is an EEO/AA/Equal Access employer and we invite applications from women and members of underrepresented racial minorities, and the handicapped (AC#48502-5). Review of applications will continue until the four positions are filled with start dates beginning in the Spring of 2005. For more information see www.mcg.edu and <http://synapses.mcg.edu>.

Editor/Writer

Society for Neuroscience, a scientific non-profit representing 34,000 members, seeks an Editor/Writer to be responsible for developing approximately five pages of editorial feature content per weekly issue of The Journal of Neuroscience (between 290 and 370 journal pages per year). Content development will require close collaboration with the Journal Editor-in-Chief in order to successfully carry out his vision of using new editorial features to enhance the unique strengths of the Journal. The Editor/Writer also will work closely with the Editor-in-Chief to identify topics and invite authors for Mini-Reviews.

The Editor/Writer will be responsible for writing the one-page "This Week in The Journal" feature under the supervision of the Editor-in-Chief, summaries with commentary on one article from each of the journal's four scientific sections (Cellular Molecular; Development/Plasticity/Repair; Behavioral Systems/Cognition; and Neurobiology of Disease).

New features will be developed by the Editor/Writer in consultation with the Editor-in-Chief and the Senior Director of Scientific Programs. These are intended as short articles with an educational component that is closely linked to current research, e.g., reviews of new methods and techniques, "journal club" discussions of recently published articles. Content may be written by the Editor/Writer or solicited from guest authors, who may include postdoctoral fellows or other junior scientists.

ESSENTIAL DUTIES AND RESPONSIBILITIES include the following. Other duties may be assigned as required.

- Develop strategies for creating new features that will enhance the mission of the Journal; and present proposals for features to Editor-in-Chief;
- Generate an annual publishing plan for review by Editor-in-Chief, Senior Director, and Managing Editor, that will ensure a steady flow of feature content resulting in approximately 5 pages per issue;
- Solicit contributions from junior scientists for "journal club" commentary on significant articles published in the Journal or elsewhere in the neurosciences literature;
- Solicit contributions from key educators for contributions that expand the educational mission of the Journal;
- Invite leading researchers to develop Mini-Reviews on topics approved by the Editor-in-Chief, and manage the submission and review of these papers through the system;
- Work with Editorial Services and Communications department to get media coverage of Journal research articles, and attend press conferences when appropriate;
- Coordinate manuscript processing, peer review administration and production schedule for features articles with Managing Editor and Production Coordinator;
- Provide weekly reports on the status of Feature articles in the pipeline to Managing Editor, Senior Director, and Editor-in-Chief;
- Adhere to production schedule by providing materials to the printer on time;
- Proofread all feature pages after printer has composed them but prior to going to press;
- Commission and manage work performed by freelance science writers or illustrators, as needed;
- Perform other duties as assigned.

Requirements:

Graduate degree (preferably a Ph.D.) in neuroscience or related discipline and at least two years' experience (five preferred) with STM publications required. Must have superior communication skills, including science writing/editing experience. Must have familiarity with Macintosh computers. Must be proficient in Adobe Acrobat, Adobe Photoshop, and Microsoft Office. Must be familiar with using databases and must be web savvy.

Send resume and cover letter to:

SfN/FE
11 Dupont Circle, NW, Suite 500
Washington, DC 20036
Fax: 202-234-9770
E-mail: jobs@sfn.org

EEO/AA