ferrets that were reared in the dark from P16, some LGN neurons were found to respond to both increases and decreases in luminance. This implies that light is required for the normal segregation of the On and Off afferents.

The role of visual experience in the early sculpting of the visual system is still controversial, and this report is likely to add further fuel to the debate. There is little question that neuronal activity has a role, but the events that occur before eye opening were assumed to be driven by spontaneous activity, rather than stimulation of the nervous system by light. These new observations raise the possibility that some of the effects that were formerly attributed to spontaneous activity might actually result from visual experience.

Heather Wood

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neural activity and the development of brain circuits

blood–brain barrier is essentially impermeable to both gelsolin and GM1, these molecules probably act as peripheral sinks of Aβ.

The two papers converge on the idea that protein therapeutics might be a promising strategy to treat neurological disorders. Whether such a promise will be fulfilled in the clinical arena is still open to question.

Juan Carlos López

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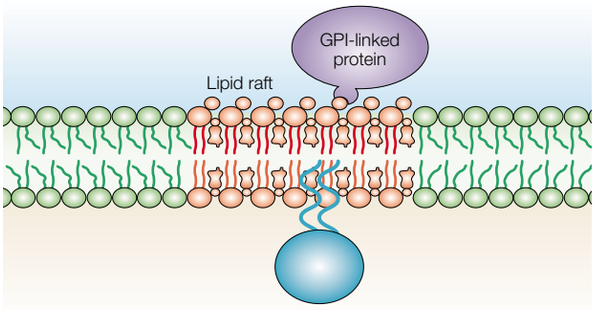

CELL BIOLOGY OF THE NEURON

Growth cones go rafting

New insights into the regulation of growth cone motility by cell adhesion molecules (CAMs) come from a study published in the *Journal of Cell Biology*. Nakai and Kamiguchi show that certain CAMs are localized to specialized microdomains within the cell membrane, known as lipid rafts, and that these rafts are important for growth cone migration.

Lipid rafts are regions of membrane into which cholesterol and sphingolipids are preferentially packaged. Specific proteins can attach to these areas, allowing regional concentration of signalling molecules. By separating out the lipid rafts, or detergent-resistant membranes (DRMs), from mouse cerebellar neurons, the authors found that two specific CAMS — L1 and N-cadherin (N-cad) — were expressed in DRMs (as well as elsewhere in the membrane). Another CAM, β1 integrin, was found only in non-DRM fractions of cell membrane.

Is this localization of L1 and N-cad to DRMs essential for their function in mediating growth cone motility? Nakai and Kamiguchi used various methods of disrupting DRMs in living neurons to show that such disruption prevented growth cones from moving on a substrate of L1 or N-cad (both CAMs show homophilic binding, so that growth on an L1 substrate, for example, is mediated by L1 in the growth cone). Growth cone motility on a laminin substrate, to which β1 integrin binds, was unaffected by DRM disruption.

To look at regional requirements for DRMs within the growth cone, the authors used a technique known as micro-scale chromophore-assisted laser inactivation (micro-CALI). A target molecule, in this case GM1 gangliosides (a marker for lipid rafts), is labelled with a dye-conjugated ligand. When a part of the cell is then irradiated with a laser, the labelled molecules and their immediate neighbours are selectively perturbed. Disruption of DRMs in growth cones by micro-CALI impaired growth cone motility mediated by L1 or N-cad, but not by β1 integrin. By irradiating just part of the growth cone, Nakai and Kamiguchi showed that DRMs were needed in the periphery of the growth cone, but not the central domain, for growth cone motility.

These results fit well with previous studies showing that these two domains within the growth cone probably have distinct functions in growth cone guidance, with the peripheral domain generating instructive signals and the central domain being responsible for more permissive signals. This elegant study constitutes one of the best proofs of a functional role for lipid rafts in neurons.

Rachel Jones

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LEARNING AND MEMORY

Family ties

Sheep are a good model to study social recognition memory — they form a strong family bond with their offspring shortly after parturition and strongly reject other newborn lambs. Olfactory cues are crucial for this form of memory, particularly during the early stages, but auditory and visual stimuli are also relevant later on. How is the different sensory information processed and integrated? A recent paper begins to address this issue by looking for transcriptional changes that might be associated with recognition memory in sheep.

The authors focused their efforts on brain-derived neurotrophic factor (BDNF), as this molecule seems to participate in plastic processes that might underlie memory formation. They looked for BDNF mRNA 4.5 hours post partum. At this time, an olfactory memory is already expressed, but the consolidation of the recognition memory is still ongoing. The authors saw that, in addition to structures of the olfactory processing system, BDNF mRNA was found in regions of the temporal, entorhinal, anterior cingulate and frontal cortices, as well as in the hippocampus and the diagonal band of Broca. As these structures have been implicated in attentional processes and visual recognition in some species, the authors speculate that the increase in BDNF mRNA levels reflects the reorganization of neural circuits in these regions at the time of memory formation. Although it is early to draw any definitive conclusions, these results point to several brain regions that we now need to probe in search of the mechanisms that underlie social recognition memory.

Juan Carlos López

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