NCMLS SEMINAR

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12.00 h.
Colloquium Room 8th floor*

Contrast gain control and cortical TrkB signaling shape visual acuity

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During development, aging and in amblyopia, visual acuity is below the limitations set by the retina. Expression of brain-derived neurotrophic factor (BDNF) in the visual cortex is reduced in these situations. We have tested the hypothesis that TrkB/BDNF regulates cortical visual acuity in adult mice. We found that genetically interfering with TrkB/BDNF signaling in pyramidal cells in the mature visual cortex reduced synaptic strength and resulted in a loss of neural responses to high spatial frequency stimuli while responses to low spatial frequency stimuli were unaffected. This selective loss was not accompanied by a change in receptive field sizes or plasticity but exclusively by a reduction in apparent contrast. We demonstrate that a previously ignored dependence on spatial frequency in the Heeger normalization model explains this selective effect of contrast reduction on high resolution vision, and show that it involves gain control operating within the visual cortex.

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