

## Quantitative analysis of visual plasticity in the adult LGN

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The developing visual system has been at the forefront of studies examining the rules that govern synaptic plasticity and the consequences that different forms of plasticity have on sensory processing. Past studies suggest that ON- and OFF-center retinal ganglion cells occasionally provide mismatched input to LGN neurons of the opposite response signature (e.g. OFF-center retinal input to an ON-center LGN neuron) [1]. This finding raises the possibility that manipulations to the primary source of retinal drive to the LGN could unmask or augment geniculate responses to the otherwise weak, mismatched inputs.

By blocking the ON-center pathway in the retina with intra-ocular injections of DL-2-amino-4-phosphonobutyrate (APB), we found that rapid visual plasticity could be induced in cat LGN cells [2]. As expected, APB blocked ON responses, but not OFF responses, in the retina. ON-center neurons in the LGN initially showed a similar effect. Surprisingly, however, many ON-center neurons rapidly began to display OFF-center responses. We interpret this switch in response signature as evidence of rapid synaptic plasticity, possibly involving weak mismatched inputs that are normally masked. Here, we performed a quantitative examination of LGN receptive field properties before and after application of APB in the retina. Response latency, center and surround subfield strength, and a transience index derived from impulse responses were quantified for individual neurons before and after application of APB. Spatial properties of the receptive fields, including size and location, were also assessed before and after APB application. Ongoing analysis is directed at determining the extent to which the rapid time-course of this plasticity depends on visual stimulation.

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### References

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