Processing of Visual Motion Information in the Ventral Visual Pathway

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Classically, visual motion processing is associated with the dorsal visual pathway including areas MT (V5) and MST. However, neurons selective for direction of motion are also found in many ventral areas. In area V4, a typical ventral area known for processing color and form information, about 13% of the neurons are direction selective. The functional contribution of these neurons to visual perception is unknown. To study the potential role V4 may play in visual motion processing, we investigate the functional architecture and single-cell receptive field properties of the V4 direction neurons in anesthetized monkeys.

With intrinsic signal optical imaging, we found that V4 contains functional domains preferring different motion directions. These domains are about 0.36 mm in size and are clustered to form different patches inside V4. Single-cell recordings targeting these domains showed that neurons inside the domains are mostly direction selective and tend to form columnar organization. Their receptive fields tend to exhibit features that are different from those found in area MT. These findings suggest that motion information in V4 is processed in a way that is different from those in the dorsal areas and may contribute to object feature detection.