Abstract

A classical receptive field of retinal ganglion cells has a center-surround antagonistic property. This characteristic can enhance retina's functions to detect object's edge. Previous studies have shown that some ganglion cells can segregate moving objects from moving background. In the rabbit retina, direction selective ganglion cells (DSGCs) are known for their ability to differentiate object's motion directions in the visual field. In this study, the goal is to investigate how the context of moving background affects the DSGC's response. Four major parameters of background contexts were used, including *spatial coverage, immediate surround extent, spatial scale, and motion coherence.* The results reveal that DSGCs' responses are strongly modulated by various motion background contexts. Specifically, three types of DSGCs can be grouped according to their tuning curves. Among them, two types of DSGCs showed a characteristic motion surround inhibition, but the other one exhibited some surround excitation under certain moving background conditions. I proposed that these excitatory surround DSGCs may be involved in a warning mechanism for detecting a moving object during self-motion, e.g., signaling the presence of a predator while running. The result indicates that the retina can do much more sophisticated tasks than we thought, including detection of direction selectivity under various background contexts.

Key words: direction selective ganglion cell, motion surround inhibition, motion surround excitation, motion background context