



ONLINE SEMINAR BY PROF. ARAM MEGIGHIAN
(Dipartimento di Scienze Biomediche-DSB)
February 17th, 2022 - 3:00 p.m.

Zoom link: <https://bit.ly/3oCmGZc>

Title of the seminar: Oculomotor responses in humans and animals

Abstract: Gaze direction results from the orientation of eyes in the head and the orientation and position of the head in space. Consequently, gaze direction controls the retinal image.

Eye movements can be substantially subdivided in two classes. Eye movements which stabilize gaze when animals move their body and head (or only the head) with respect to the surrounding environment. The goal of this response is to stabilize the image on the retina despite the head movement (substantially they prevent retinal slip). Stabilization mechanisms have evolved to solve this problem. They maintain visual acuity during self-motion by stabilizing the retinal image of the world with rotations of the eyes that exactly compensate for head and body movements. The neural mechanisms for gaze stabilization are highly conserved across vertebrates and invertebrates, reflecting the widespread need to stabilize visual inputs despite other sensory and motor differences between species.

The second class of eye movements are eye movements which redirect gaze. The goal of this response is to allow animals to inspect the visual field with the aim to actively select objects or features of particular interest. These last processes require cognitive mechanisms based on perception and selective attention, and on motor control based on both predictive and feedback mechanisms. An interesting point in this class of eye movements is the fact that gaze redirection at least theoretically implies to focus a limited part of the visual field on a region of the retina with a higher spatial resolution. Hence it was supposed that these mechanisms were only present in animals with a fovea. Today, on the contrary, these mechanisms were also found in animals in which a truly fovea was not present, opening interesting questions about the cognitive mechanisms regulating gaze redirection as well as the presence of high spatial resolution regions in the retina of afoveate animals.