Research Highlight

Ex Vivo Imaging of the Murine Optic Nerve Head

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Mice are attractive model organisms in vision research due to the enormous array of genetic tools that are available in this species.[1] On the other hand, the small size of the murine eye makes its manipulation challenging, and the search for ever-improved experimental approaches to vision research in mice is ongoing. In some cases, it is beneficial to use explanted whole eyes or retinas to gain more precise control over experimental conditions. Such preparations have been used, for example, to directly assess outflow facility[2] or the remodeling of ganglion cell dendrites.[3] In the present volume of *IOVS*, Nguyen and colleagues[4] present an innovative refinement of the ex vivo preparation of whole murine eyes. In their approach, the whole globe is extracted and the optic nerve is transected in the unmyelinated portion, which is then mounted on the stage of a multiphoton microscope. This leaves the cornea accessible for manipulation—in this case elevation of the intraocular pressure by direct cannulation of the eye. The authors combined this approach with a mouse strain that expresses a fluorescent marker in optic nerve astrocytes, making the cells directly visible in multiphoton imaging. In the present paper, this method was applied to measure astrocyte process reorientation and the deformation of the peripapillary sclera. However, a variety of other uses for this technique are possible. As the tissue remains viable for several hours, cell motility of microglia or individual astrocytes could be assessed, as could cell physiological events, such as calcium signaling, or the influence of genetic mutations on scleral stiffness or astrocyte process reorientation. Especially in conjunction with the wide variety of transgenic mouse strains, this is a highly useful method for future studies on the biomechanics of the nerve head.

References

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Investigative Ophthalmology & Visual Science

DOI: 10.1167/iovs.17-21422

iovs.arvojournals.org | ISSN: 1552-5783