Supplementary Figures

Finite Element Modeling of Factors Influencing Optic Nerve Head Deformation due to Intracranial Pressure

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Supplemental Figure S1: Convergence history of the standard deviations in computed prelaminar neural tissue peak compressive strains. After each LHS iteration, the standard deviation of all simulations to that point was computed to create the above graph. It is clear that asymptotic convergence has been reached after 4 LHS iterations, corresponding to 300 LHS samples. We examined similar convergence histories for all outcome measures; all other graphs demonstrated more rapid convergence than the one shown here.
Supplemental Figure S2: Representative scatter plots of actual values produced by the LHS (dots) and their corresponding specified (population) distributions (solid lines). A) The material coefficient $c_1$ in the sclera, for which the specified distribution was uniform, versus intracranial pressure in the upright condition, for which the specified distribution was normal. B) Similar, except for scleral $c_1$ versus the Young’s modulus of the lamina cribrosa, where both specified distributions were uniform.
Supplementary Figure S3: Contour plots of the first (left) and third (right) principal strains and their respective eigenvector orientations. Note that the orientations are plotted as vectors due to limitations in the plotting software. Recalling that first principal strain represents tissue extension and third principal strain represents compression, it can be seen that radial compressive strains in the retrolaminar optic nerve increase with intracranial pressure. These elevated compressive strains cause an elongation of the optic nerve in the perpendicular (anterior-posterior) direction due to a phenomenon called Poisson’s effect.