**Supplemental Figure 1. Effect of the registration technique on the distribution of differences in image intensity.** We computed the pixel by pixel differences in intensity between the SHG images acquired at low and elevated IOP (green) and between IOP transformed to elevated IOP and elevated IOP (pink). The figure shows a binned Bland-Altman violin plot, illustrating the distribution of the differences in intensity between images, binned to demonstrate the effects in various ranges of initial intensity. Registration was initialized by registering the images centers of mass. Large differences between images before registration are noticed in the wide distributions for the high intensity bin. Registration reduced the differences substantially, having larger effects in the increasing image intensity regions, where more information about the structure is assumed. The small Gaussian distributions after registration represent a measure of the artifacts that our technique has to overcome, including noise.