Supporting Information

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Fig. S1. System compensation profile and cover glass induced aberration. (A) System compensation profile. (B) Phase difference between system compensation and Fig. 1F. (C) Phase difference between system compensation and Fig. 1G.



Fig. 52. The corresponding side views of Fig. 3 *E–J.* (*A–C*) Maximum intensity projection view of the dendrite acquired with full correction at 200, 300, and 400 μm depth, respectively. (*D–F*) Corresponding views acquired with only system correction.



Fig. S3. In vivo lymph node imaging at 80 μm depth. (*A–E*) One micron diameter fluorescence beads imaged with full correction at 78–82 μm depth, respectively. (*F–J*) The corresponding images acquired with system correction and the same excitation power. (*K*) Full correction phase profile. (*L*) System correction phase profile.



Fig. S4. Range of signal improvement with a single IMPACT measurement. (A–F) Comparison of the intensity of the dendrite in Fig. 3A with full correction and system correction from 135 to 410 μ m. (G) The image intensity of Fig. 2 B and C averaged along the vertical direction. A Gaussian curve with a FWHM of 7 μ m is plotted to show the envelope of the signal improvement. (H) The image intensity of Fig. 2 E and F averaged along the vertical direction. A Gaussian curve with a FWHM of 6 μ m is plotted to show the envelope of the signal improvement.



Fig. S5. Image displacement. (*A* and *B*) Images of a dendrite at 266 μm depth acquired with full correction phase profiles determined at 260 and 270 μm depth, respectively. (*C* and *D*) The image intensity averaged along the *y* axis and *x* axis of the two images, respectively. The peak intensities are normalized to one.



Fig. S6. Large field of view imaging. (A) One micron diameter beads under a 400 μ m thick fixed brain slice imaged with full correction. The image is stitched together using images C–G. (B) The same beads directly imaged without brain slice on top. (C–G) Beads under a 400 μ m thick brain slice imaged with full correction. (H–L) The corresponding images acquired with system correction. The image intensity is increased by a factor of 10 to be visible on the same scale as the full correction images. (M–Q) The corresponding full correction phase profiles.

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Movie S1. The image stack (33 images) used to produce Fig. 4B. The field of view is 27 μm. The axial spacing between the images is 0.4 μm. Movie S1 (MOV)

Movie S2. The image stack (33 images) used to produce Fig. 4C. The field of view is 27 μm. The axial spacing between the images is 0.4 μm.

Movie S2 (MOV)

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