3.4 Dynamic imaging of drosophila larva

In live imaging experiments, we used 3rd instar larvae of the standard laboratory wild-type Drosophila melanogaster (Canton-S strain). Flies were raised on cornmeal agar media with a 12h light/dark cycle at 25˚C and 50% relative humidity. All experimental protocols were approved by the Stanford Institutional Review Board (Protocol #48409), and all methods were carried out in accordance with relevant guidelines and regulations. **Visualization 1** shows dynamic imaging of heartbeat, digestive system, and muscle motion.

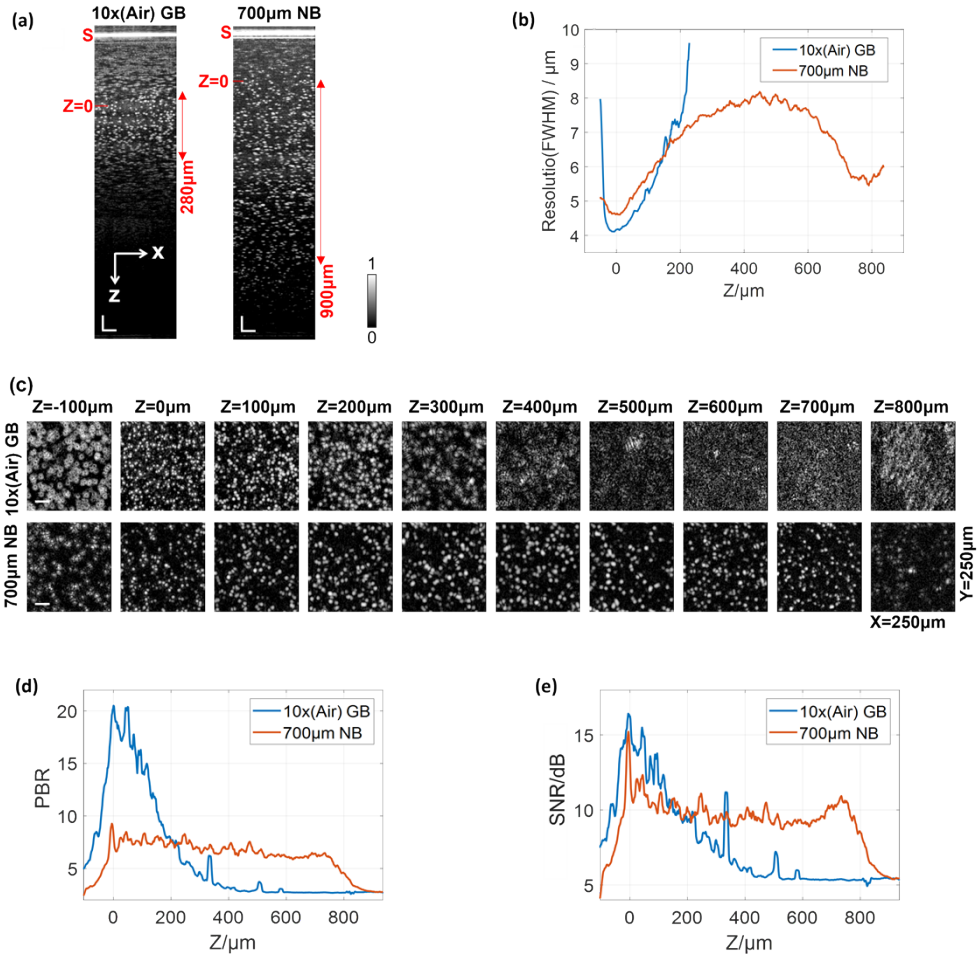

Fig.S17 The images of 0.8μm microbeads captured by the OCT with Gaussian beam (10x dry objective, LSM02-BB, Thorlabs) and 700μm×8μm NB. The beam profiles are given in Supplementary Fig.9. 700μm×8μm NB here and 600μm×7.5μm NB in Supplementary Fig.9 were generated by the same diffractive optical element. The size changes because the ultrasound gel used to contain the microbeads has a refractive index about 1.33, which is larger than that of air (=1). (a) The B-scan images. The depth range where the beads are clearly imaged is 280μm for Gaussian beam and 880μm for 700μm NB. S, the sample surface. Scale bar, 50μm. (b) The resolution profiles. 700μm×8μm NB has a resolution varying between 4.5μm (at the ends of the beam) and 8μm (in the middle). The resolution of the Gaussian beam is down to 4μm but increases rapidly to 9.6μm at 230μm depth, and the

beads become indistinguishable in the depths deeper than 230μm due to its resolution loss. (c) XY images. In Gaussian imaging, the beads located between $z = 0$ and $z = 200\mu m$ can produce complete circular profiles. For 700μm NB, the range is from $z = 0$ to $z = 700\mu m$. (d) The peak-to-background ratios (PBRs) along depth and (e) the signal-to-noise ratios (SNR) in the 3D bead images. In the depth range from 200μm to 800μm, the NB outperforms the focused Gaussian beam. PBR = (peak intensity − average background intensity) ÷ average background intensity, SNR = (peak intensity − average background intensity) ÷ standard deviation of background intensity. Scale bar, 50μm.