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## **Supplementary Information**

### **Cerebral tissue pO<sub>2</sub> response to treadmill exercise in awake mice**

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**Supplementary Video 1.** Improvement of animal's running skills on the treadmill during the training sessions (2 sessions per day). The length of the time that mice were restrained and the maximum running speed were gradually increased each day.

**Supplementary Video 2.** After training, animals were able to run very well on the treadmill under imaging setups.

**Supplementary Videos 3-6.** Representative space-time images from two-photon longitudinal and perpendicular line scans of capillaries at the exercise level 3 (L3), showing minimal capillary movement and reliable measurements.