

## **Description of Additional Supplementary Files**

**Supplementary Movie 1.** Volumetric image of a rat brain *in vivo*, showing detailed angiographic structures from the cortex to the Circle of Willis. Scale bars: 2 mm.

**Supplementary Movie 2.** Volumetric images of the rat brain: (I) intrinsic functional connectivity across spatially separated brain regions; (II) cortical hemodynamics in response to electrical stimulation to the front limbs.

**Supplementary Movie 3.** Volumetric image of the right human breast (cup 36C) *in vivo*, revealing blood vessels as deep as 4 cm. The image was acquired within a single breath hold of 10 seconds. Scale bars: 5 mm.

**Supplementary Movie 4.** Volumetric image of the left human breast *in vivo*. Scale bars: 5 mm.