

Description of Additional Supplementary Files

File Name: Supplementary Movie 1

Description: Thinned skull. Video of a thinned skull experiment, where the focus shifts in 2- μ m steps from the skull (notice the NG2-dsRed expression in osteoblasts) through the vasculature in the dura to the pial arterioles. Close-ups of the precapillary sphincters are shown in Supplementary Fig. 2.

File Name: Supplementary Movie 2

Description: Volume rendering of SMA staining. Z-stack and volume rendering of smooth muscle actin antibody and DAPI staining at a precapillary sphincter of an NG2-dsRed mouse brain after i.v. fluorescent-lectin injection.

File Name: Supplementary Movie 3

Description: 4D whisker pad stimulation. Hyperstack projection of precapillary sphincter dilation after whisker pad stimulation. At the end of the video, we show rotation around the x-axis of the baseline and stimulation peak.

File Name: Supplementary Movie 4

Description: RBC stalled at sphincter. Video of RBCs stalling at the precapillary sphincter in an in vivo experiment with a craniotomy (first video) and two pial arteriole precapillary sphincters of a thinned skull experiment (second video).

File Name: Supplementary Movie 5

Description: RBC deformation. Resonance frame-scan video of RBCs passing through a precapillary sphincter and taking up the parachute form. The RBCs move in the opposite direction of the resonance scan, which will flatten their shapes.

File Name: Supplementary Movie 6

Description: CSD. Video of the three phases of the CSD in a dsRed mouse with FITC-dextran in the vessel lumen.

File Name: Supplementary Movie 7

Description: Cardiac arrest. Hyperstack recording of two PA branches with precapillary sphincters in an NG2-dsRed mouse that collapse in rigor after cardiac arrest (first video). The second video shows SR101 staining of astrocytes in an FITC-loaded wild-type mouse in which the astrocytes swell while the vascular lumen collapses.