

SUPPLEMENTAL MOVIES

Movie S1. Bidirectional activation of calcium fluorescence along arteriolar endothelium. An ACh stimulus was delivered abluminally using microiontophoresis (500 nA, 500 ms) in the middle of the arteriole (diameter, ~ 30 μm). Calcium fluorescence increased to a similar extent in both directions along the arteriolar wall over a distance of several hundred microns.

Movie S2. Convected activation of calcium fluorescence along endothelium downstream from site of ACh microiontophoresis (500 nA, 500 ms). Similar to Movie S1, calcium fluorescence increased in the upstream direction over a limited region. In contrast, calcium fluorescence in the downstream direction increased rapidly and extended well beyond the field of view, indicating diffusion of ACh across the arteriolar wall and its convection in the flow stream.

Movie S3. With a microocclusion micropipette positioned across the arteriole upstream from the ACh stimulus (500 nA, 500 ms) to eliminate blood flow, the convected calcium fluorescence response downstream is abolished and the slower, bidirectional calcium response is similar to that shown in Movie S1. Removal of the microocclusion micropipette restored the downstream calcium fluorescence response (not shown).

Movie S4. Circulating fluorescent microbeads illustrate blood flow velocity similar to that observed for the velocity of the convected activation of calcium fluorescence along endothelium downstream from site of ACh microiontophoresis (500 nA, 500 ms; initiated just after Movie starts).

Movie S5. Pseudocolored recording illustrating the activation of the entire network of arteriolar endothelial cells with convection of ACh in the bloodstream following microiontophoresis (500 nA, 500 ms). Note dilation and subsequent perfusion of daughter branch in upper left that was otherwise closed (without flow) under resting conditions.