EFFECTS OF COMBINED INHIBITION OF NITRIC OXIDE AND PROSTAGLANDINS ON NITRITE AND ADENOSINE LEVELS IN SKELETAL MUSCLE INTERSTITIAL FLUIDS AND LOCAL MUSCLE BLOOD FLOW
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Introduction. Mechanisms by which blood flow is regulated locally at the muscle-vascular interface to match oxygen delivery to the metabolic demands of tissues are not precisely known, especially during exercise. We tested how local blockade of nitric oxide and prostaglandins affects on muscle interstitial concentrations of nitrite and adenosine, along with muscle blood flow.

Methods. Five healthy young men participated in this study. Skeletal muscle blood flow index was measured using near-infrared spectroscopy and indocyanine green and the concentrations of nitrite and adenosine in the muscle interstitial fluid with microdialysis without and with local blockade of nitric oxide (NO) and prostaglandins (PG) at rest and during one-legged dynamic knee-extension exercise. Local blockade was produced by infusing nitro-L-arginine methyl ester (L-NAME) and indomethacin (INDO) directly into the muscle via a microdialysis catheter. Blood flow and vasodilator concentrations were measured in the region of blockade and in two additional regions of vastus lateralis muscle 1 and 4 cm away from the infusion of blockers.

Results. Local blockade decreased nitrite concentration in the infusion region and in the region of 1 cm away from the site of infusion but not in the region 4 cm away prominently during exercise at 40 watts (infusion probe at 40W: 4.7±0.7 vs 2.1±1.1 mikroM, without vs with blockade, and 1 cm probe: 3.9±0.5 vs 2.2±0.1 mikroM, respectively). Blood flow index decreased also similarly during blockade, especially at 40W (infusion probe at 40W: 60±8 vs 38±7 mikrog/s, without vs with blockade, and 1 cm probe: 65±2 vs 46±12 mikrog/s, respectively). In contrary, against assumptions, adenosine level in the interstitial space was not reduced On the other hand; blockade did not have any significant effects on interstitial adenosine level (infusion probe at 40W: 1.00±0.6 vs 0.90±0.5 mikroM, without vs with blockade, and 1 cm probe: 0.72±0.5 vs 0.77±0.6 mikroM, respectively).

Discussion. These results confirm previous findings that nitric oxide and prostaglandins play a significant role in the regulation of local skeletal muscle blood flow, since the double blockade decreased muscle blood flow in the infusion region. However, the results fail to demonstrate any compensatory increase in interstitial adenosine level, thereby suggesting that adenosine may not have important role in the regulation of local blood flow when two important vasodilators are blocked.

Keywords: Muscle, Blood Flow, Applied Physiology