VEGF expression in skeletal muscles of the rat hindlimb after voluntary running

Neha Valeja, M.S., Matthew Wessner, M.S., Patricia S. Sexton, D.H.Ed., William L. Sexton, Ph.D.

A.T. Still University of Health Sciences, Kirksville, MO.

We have previously shown that in rats voluntary running wheel exercise results in vascular adaptations leading to increased flow capacity and capillary exchange capacity in hindlimb skeletal muscles (J Appl Physiol 79: 287, 1995). Vascular endothelial growth factor (VEGF) is an angiogenic factor known to be involved in the vascular adaptations to regular exercise in skeletal muscle. **AIM:** The purpose of this study was to test the hypothesis that voluntary running will increase VEGF protein expression both among and within rat hindlimb skeletal muscle composed of different muscle fiber types. **METHODS:** Female Sprague-Dawley rats were randomly divided into sedentary control (SC, n=16) and voluntary running (VR, n=16) groups. The VR rats had free access to running wheels for 6 wks. Running distances were monitored daily. After 6 wks, the rats were sacrificed and the soleus, plantaris, extensor digitorum longus (EDL), and the red, white and mixed portions of the vastus lateralis (VLr, VLw, VLm) muscles were collected and flash frozen. The muscle samples were homogenized and VEGF protein expression was quantified using ELISA. **RESULTS:** The average running distance was 41 ± 5 km/wk (11 to 70 km/wk). VEGF expression in SC was greater in the EDL than the soleus and plantaris muscles (P=0.007). Within the vastus lateralis of SC, VEGF in the VLr > VLm > VLw (P<0.001). Compared to SC, VR rats showed increases in VEGF levels only in the plantaris (P<0.05) and the VLr (P=0.08) muscles. **CONCLUSIONS:** The pattern of VEGF expression among the soleus, plantaris and EDL muscles is in contrast to the marked differences in VEGF protein between the VLr, VLm and VLw. Thus, these data do not support a muscle fiber type specific VEGF expression. The voluntary running-induced increases in VEGF in the plantaris and VLr muscles in VR rats suggests an ongoing stimulus for vascular growth. However, it is possible that after 6 wks of running, VEGF in the other muscles may have returned to baseline levels. (Supported by the AHA, Heartland Affiliate and the KCOM Graduate Program.)

**Responsible Author:** William L. Sexton, wsexton@atsu.edu; 660-626-2324

**Keywords:** vascular growth, angiogenesis, angiogenic factor, exercise training