P-17

SEX DIFFERENCE AND ROLE OF FEMALE REPRODUCTIVE HORMONES IN THE REGULATION OF MUSCLE BLOOD FLOW DURING THE SUSTAINED HANDGRIP EXERCISE

Akira Takamata, Mari Kawamoto, Keiko Morimoto, and Nina Stachenfeld

Department of Environmental Health, Nara Women's University, Nara 630-8506, Japan; The John B. Pierce Laboratory, and Department of Obstetrics, Gynecology and Reproductive Science, Yale University School of Medicine, New Haven, CT 06519, U.S.A.

Objective: The aim of the present study was to elucidate the sex difference and role of female reproductive hormones in the regulation of muscle blood flow.
Methods: We examined the brachial blood flow response to handgrip exercise and flow mediated vasodilation (FMD) in the brachial artery in young healthy men (n=7) and women (n=7). We tested the women three times: during the early follicular, ovulatory, and luteal phases of the menstrual cycle. In the muscle blood flow study, the subjects performed sustained isotonic handgrip exercise at 20 % of their maximal contraction force for 5 min. %FMD was evaluated by a standard method.
Results: Brachial blood flow increased immediately after the onset of handgrip exercise in women, while blood flow increased gradually in men. In women, hyperemic response occurred with a relatively small increase in blood pressure (5-8 mm Hg), suggesting that immediate vasodilation is the mechanism for exercise-induced hyperemic response. In contrast, the hyperemic response accompanied with increased blood pressure in men (16.5 ± 3.0 mm Hg). %FMD during the ovulatory (11.6 ± 1.2 %) and luteal (9.7 ± 1.1 %) phases in women was significantly larger than that in men (6.1 ± 0.4 %). The magnitude of the vasodilatory response immediately after the onset of exercise was correlated significantly with %FMD.

Conclusion: Immediate vasodilatory response is the primary mechanism for the exercise-induced hyperemia in women, while the contribution of increased perfusion pressure is relatively large in men, indicating important sex differences in the mechanism for blood flow regulation. The data also suggest that endothelial function, which is influenced by sex and female reproductive hormones, plays an important role in the immediate vasodilatory response at the onset of exercise.