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The Effect of Postprandial Lipemia Serum With or Without a Prior Bout of Acute Exercise on Endothelial Cell Function

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Postprandial lipemia (PPL) is a physiological state marked by increased circulating triglycerides, leading to vascular endothelial cell (EC) dysfunction, a precursor to cardiovascular disease. A single bout of acute exercise has been shown to reduce PPL. EC migration, proliferation, and tube formation are important physiological processes involved in maintenance of a healthy endothelium. The effects of PPL on EC migration, proliferation and angiogenic capacity remain largely understudied. Moreover, the influence of a prior bout of exercise and its effect on PPL-induced EC migration, proliferation, and migration remains largely unknown. **PURPOSE:** 1) To determine the effect of PPL serum on human umbilical vein cell (HUVEC) migration, proliferation, tube formation, and ROS production; and 2) to determine the effect of a prior bout of exercise on PPL-induced alterations in EC function. **METHODS:** 10 healthy men were recruited and performed a VO_{2max} test. In 2 separate trials 7 d apart (first trial randomly assigned), participants were given a high fat meal (HF) the morning after a bout of exercise (EX) or a 12 h fast. Exercise was performed on a stationary cycle at 70% VO_{2max} until the participants expended 2.5 MJ. Serum was collected immediately prior (0') and 4 h after (4') ingestion of HF and applied to HUVECs in the following experiments: migration/gap closure, proliferation, and angiogenesis tube formation assays. HUVEC intracellular ROS was measured during migration. Data were analyzed using one- (area under the curve (AUC) analyses), two- (HF x EX), or three-factor (HF x EX x time) ANOVAs. Statistical significance was accepted at $p < 0.05$. **RESULTS:** There were no EX x HF interactions. PPL increased migration (AUC) by 14% (0', 1124±55; 4', 1281±76; $p < 0.05$), and proliferation by 6.4% (0', 2.50±0.04; 4', 2.66±0.05; $p < 0.05$). Of the 4 angiogenic indices examined, PPL reduced network integrity by increasing the number of extremities by 17% (0', 34.1±1.8; 4', 39.9±1.7; $p < 0.05$). There was a main effect of exercise on intracellular ROS, as well, increasing levels by 5.5% (0', 197.9±4.7; 4', 209.3±5.0; $p < 0.05$). **CONCLUSION:** PPL increased EC migration, proliferation, and reduced angiogenic network integrity compared to 0'. A bout of exercise does not alter these effects, but does increase intracellular ROS during migration.