Very low-density lipoprotein triglyceride and free fatty acid clearance rates are linked to brown adipose tissue in women with overweight/obesity

[1,2]Maria Chondronikola, [2]Jun Yoshino, [2]Raja Ramaswamy, [2]Daniel Giardina, [2]Richard Laforest, [2]Adewole Okunade, [2]Bruce W. Patterson, [2]Bettina Mittendorfer, [2]Richard Wahl, [2]Samuel Klein

[1]Departments of Nutrition and Radiology, UC Davis, [2]Washington University School of Medicine, St. Louis, Missouri

Background and aim: Increased plasma triglyceride (TG) and free fatty acid (FFA) concentrations are likely involved in the pathogenesis of insulin resistance, type 2 diabetes, and coronary heart disease. Studies in rodents demonstrate that BAT is an important site for plasma TG and FFA clearance. However, the interrelationship between BAT, TG, and FFA metabolism in people is not clear.

Materials and Methods: Very low-density lipoprotein (VLDL)-TG and palmitate kinetics were assessed during thermoneutrality by using stable isotopically labeled tracer infusions in women with overweight/obesity who had either a low (LBAT, volume <20 mL) or a high (HBAT, volume ≥20 mL) amount of BAT, assessed by using ^{18}F-fluoro-glucose positron emission tomography after exposure to mild cold. Supraclavicular adipose tissue (SCVAT) biopsies were obtained during thermoneutrality for transcriptomic analysis.

Results: The HBAT group had lower plasma TG concentration and higher VLDL-TG and palmitate clearance rates than the LBAT group. VLDL-TG and palmitate clearance rates were associated with BAT volume and activity independent of age and adiposity. SCVAT expression of genes involved in thermogenesis (i.e., UCP1) and lipid uptake (i.e., LDL-R and GPIHBP1) were higher in the HBAT than the LBAT group.

Conclusion: These data suggest BAT is involved in regulating FFA and VLDL-TG clearance rates and plasma TG concentration in women with overweight/obesity.