Superficial Subcutaneous Fat - A Putative Distinct Protective Fat Sub-Depot in Type 2 Diabetes

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Objective: Unlike Visceral Adipose tissue (VAT), the association between Subcutaneous-Adipose Tissue (SAT) and obesity-related morbidity is controversial. We assessed in patients with type 2 diabetes if this variability can be explained by a putative favorable, distinct association between abdominal superficial-SAT (absolute amount or its proportion) with cardio-metabolic parameters.
Research Design and Methods: We performed abdominal Magnetic Resonance Imaging (MRI) among 73 patients with diabetes [mean age=58, 83% men] and cross-sectionally analyzed fat distribution at S1-L5, L5-L4 and L3-L2 levels. Patients completed food frequency questionnaires, and subgroups had 24-hour ambulatory-blood-pressure (ABP)-monitoring and 24-hour ambulatory-ECG.
Results: Women had higher %SSAT (37% vs. 23% in men; $p<0.001$), despite a similar mean waist circumference. Fasting plasma glucose ($p=0.046$) and HbA1c ($p=0.006$), were both lower with increased tertile of absolute SSAT. In regression models adjusted for age, waist circumference and classes of medical treatments used in this patient population, increased %SSAT was significantly associated with decreased HbA1c (beta=-0.317;$p=0.013$), decreased daytime ABP (beta=-0.426;$p=0.008$) and increased HDL-c (beta=0.257;$p=0.042$). In contrast, increased %DSAT was associated with increased HbA1c (beta=0.266;$p=0.040$) and with poorer heart rate variability parameters ($p=0.030$). Although total fat and energy intake were not correlated with fat tissue distribution, increased intake of trans fat tended to be associated with total SAT($r=0.228$;$p=0.05$) and DSAT ($r=0.20$;$p=0.093$), but not SSAT.
Conclusions: Abdominal SAT is composed of two sub depots that associate differently with cardio-metabolic parameters. Higher absolute and relative distribution of fat in abdominal SSAT may signify beneficial cardio-metabolic effects in patients with type 2 diabetes.