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The inflammed adipose organ and pathogenesis of T2 diabetes

Saverio Cinti

Department of Molecular Pathology and Innovative Therapies, University of Ancona, Italy

All mammals are provided with two type of distinct adipose cells: white and brown adipocytes.

White adipocytes are mainly assigned to store highly energetic molecules to provide fuel to the organism in order to allow an interval between meals. Brown adipocytes are thermogenetic due to the fact that their special mitochondria are provided with a protein (UCP1) that allow the production of heat. Previous anatomical descriptions of WAT and BAT implied their localization in distinct sites of the body, our observations demonstrated that they are both present together in many depots rising the new concept of adipose organ. The reason for their cohabitation is unknown. We raised the explanation with the hypothesis of reversible physiologic transdifferentiation (RPT): they are contained together because they are able to convert, one into each other. If needed, in fact, the brown component of the organ could increase at expenses of the white component and vice versa. Experimental data from our and other's laboratories seem to support the RPT hypothesis. Visceral fat is different from subcutaneous fat mainly because visceral adipocytes are smaller than subcutaneous adipocytes.

Accumulation of visceral fat is a key phenomenon in the onset of obesity-associated metabolic disorders. Macrophage infiltration induces chronic mild inflammation widely considered as a causative factor for insulin resistance and eventually diabetes. We previously showed that >90% of macrophages infiltrating the adipose tissue of obese animals and humans are arranged around dead adipocytes, forming characteristic crown-like structures (CLS). We then quantified CLS in visceral and subcutaneous depots from two strains of genetically obese mice, db/db and ob/ob. In both strains, CLS were prevalent in visceral compared with subcutaneous fat. Adipocyte size and CLS density exhibited a positive correlation both in visceral and in subcutaneous depots; however, the finding that adipocyte size was smallest and CLS density highest in visceral fat suggests a different susceptibility of visceral and subcutaneous adipocytes to death. Visceral fat CLS density was 3.4 times greater in db/db than in ob/ob animals, which at the age at which our experimental strain was used are more prone to glucose metabolic disorders.

Key words
Adipocytes, inflammation, visceral, fat, diabetes