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Genetic and environmental effects on eutopic and ectopic adipose tissue quantities: a classical twin study

Abstract: 2852

Genetic and environmental effects on eutopic and ectopic adipose tissue quantities: a classical twin study

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Background: Different adipose tissue compartments (eutopic adipose tissues) and ectopic lipid accumulations may play a role in the patomechanism of type 2 diabetes and cardiovascular diseases.

Purpose: We sought to investigate the genetic and environmental influences on the volume of eutopic adipose tissues (epicardial adipose tissue - EAT, abdominal subcutaneous adipose tissue – SAT, abdominal visceral adipose tissue – VAT) and ectopic lipid accumulation (hepatic lipid accumulation – NAFLD, pancreatic lipid accumulation – NAFPD) among adult monozygotic (MZ) and dizygotic (DZ) twin pairs.

Methods: As a total, 101 adult twin pairs (202 twin subjects, 64.4% women, 122 MZ and 80 DZ same-gender twin subjects, age: 65.2±9.4 years) underwent low-dose native CT imaging. Co-twin correlations between the siblings were analysed in MZ and DZ pairs separately. Next, genetic structural equation A-C-E models were used to model the magnitude of genetic and environmental factors influencing the different fat compartments.

Results: EAT volume was predominantly determined by genetic factors (rMZ = 0.81, rDZ = 0.32; 80% genetic and 20% environmental effect). Nearly similar determinations were found in SAT volume (rMZ = 0.80, rDZ = 0.68; 78% genetic and 22% environmental effect) and in abdominal VAT volume (rMZ = 0.79, rDZ = 0.48; 70% genetic and 30% environmental effect). None of the volumetric phenotype of EAT, SAT and VAT proved to be completely independent of the other two. The phenotypic appearance of NAFLD was predominantly influenced by environmental factors (rMZ = 0.34, rDZ = 0.16; 34% genetic and 66% environmental effect) similarly to that of NAFPD (rMZ=0.498, rDZ=0.080; 41% genetic and 59% environmental effect).

Conclusions: The quantities of different eutopic adipose tissue compartments have predominant genetic influence. On the contrary, development of ectopic lipid accumulation in the liver and in the pancreas is driven by environmental rather than genetic factors