How changes in body weight affect the human metabolism

March 11 2015

Until now there have been few molecular epidemiological studies regarding the effects of weight changes on metabolism in the general population. In a recent study conducted and funded within the framework of the Competence Network Obesity, researchers at the Institute of Epidemiology II at Helmholtz Zentrum München (HMGU) evaluated molecular data of the KORA study.

"Techniques such as metabolomics and transcriptomics allow the simultaneous determination of a variety of low molecular weight metabolites or gene activities (transcripts of genes) using high-throughput methods," said Simone Wahl and Susanne Vogt, doctoral students at the Institute of Epidemiology II of HMGU. They found that various metabolic pathways are associated with changes in weight. These include the metabolism of lipoproteins such as VLDL (very low density lipoprotein), LDL (low density lipoprotein) and HDL (high density lipoprotein). Furthermore, the association of a group of gene transcripts with weight change suggests that weight change also has an effect on red blood cell development.

Innovative approach provides new insights

"Through our experimental approach, which involves both metabolomics and transcriptomics data, we have gained insights into the molecular mechanisms that are affected by weight gain," said Dr. Barbara Thorand, who heads the research group "Diabetes Epidemiology" at the Institute

of Epidemiology II. Thus, the researchers were able to establish associations between weight gain and changes in lipid and amino acid metabolism, insulin sensitivity, mitochondrial functioning and the development and function of blood cells at the molecular level. "The chosen evaluation strategy is a promising approach to better elucidate the relevant molecular relationships and to understand how weight changes affect metabolism and contribute to the development of certain diseases," added Dr. Harald Grallert, head of the research group "Diabetes and Related Traits" of the Department of Molecular Epidemiology (AME) at the Institute of Epidemiology II.

More information: Wahl, S. et al. (2015). "Multi-omic signature of body weight change: results from a population-based cohort study." *BMC Medicine* 2015, DOI: 10.1186/s12916-015-0282-y

Provided by Helmholtz Association of German Research Centres