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Dynamic of human adipose tissues and ectopic fat deposits induced by different lifestyle interventions: a long-term MRI randomized trial

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Background: It remains unclear whether specific lifestyle strategies can differentially mobilize fat depots/ectopic-fat-deposits.**Methods:** During an 18-month trial in an isolated workplace with monitored, provided lunch, we randomly assigned participants with abdominal obesity/dyslipidemia to iso-caloric low-fat (LF) or low-carbohydrate/Mediterranean (LC/MED) diets. After 6 months, we re-randomized half of each arm to moderately-intense physical-activity (PA⁺; 80%-aerobic; free gym membership). We performed whole-body magnetic-resonance-imaging (3-Tesla-MRI) at 0, 6, 18 months.**Results:** Of 278 randomized participants [age= 48 yr; 88% men; body-mass-index= 30.8 kg/m²] 86.3% completed the trial. While the caloric deficit was similar, the LF group preferentially decreased saturated/unsaturated fats ($p < 0.001$), and the LC/MED decreased carbohydrates ($p < 0.001$) and trans-fat intake ($p = 0.029$ vs. other diet). The PA⁺ group increased their MET/wk ($p = 0.009$ vs. PA⁻). Fat depots/deposits were significantly reduced to different degrees [Hepatic: (-32%); deep-subcutaneous-adipose-tissue (SAT): (-29%); visceral-adipose-tissue (VAT): (-25%); superficial-SAT: (-19%) and intra-pericardial: (-14% (-25mL))], with lesser changes of renal: (-9%); intermuscular: (-2%) and pancreatic-fat: (-1%). Although weight loss was comparable, LC/MED^{PA+} favorably reduced waist-circumference ($p < 0.05$), and induced -14% further loss of intra-pericardial; $p = 0.003$, -4% VAT; $p = 0.037$ and -1.9% pancreatic-fat; $p = 0.007$, compared to LF^{PA+} changes (reference-group; weight-loss-adjusted for all). LC/MED decreased hepatic fat beyond LF diet by -15%; $p = 0.044$. Conversely, renal-sinus and femoral-intermuscular fat dynamics were similarly altered by lifestyle strategies. VAT and intrahepatic fat loss associated with an improved lipid profile, and deep-SAT loss with improved glycemic control.**Conclusions:** Human depots/ectopic-fat-deposits are substantially variable in their capacity to respond to different long-term moderate weight-loss strategies. LC/MED diet, particularly with PA, can favorably enhance fat mobilization in several depots. These findings may suggest defined lifestyle protocols for targeting specific fat storage sites.

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Immunomodulation by Food

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An optimally active and balanced immune system is a pre-requisite for maintaining health. Immunity strongly varies at different life stages. Over past few decades, well balanced immune system for maintaining good health has been crucial. There is a strong consensus that nutrition plays a role in modulating immune function and that the immune system needs adequate supply of nutrients to function properly. The intricacy of the immune system supports this idea because its optimal functioning involves a variety of biological activities including cell division and proliferation, energy metabolism, anti-genotoxicity and production of proteins. The micronutrients most often cited as being important to immune function include vitamins A, C, E, and B6, folate, iron, zinc, and selenium. Other nutrients mentioned as playing a role in immune function include beta-carotene (a precursor to vitamin A), vitamin B12, and vitamin D. On the other hand, over-activation of the immune system can lead to detrimental effects such as chronic inflammation or autoimmune diseases. In persons with allergies, a normally harmless material can be mistaken as an antigen. This review will highlight the interaction between the immune system and some foods and food components in terms of modulation of immune functions by a variety of mechanisms.

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