

***Effect of obesity on different adipose tissues in inbred obese mouse models:
An ATR-FTIR study***

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Obesity is a metabolic disorder that results in elevated levels of free fatty acids and triglycerides in the blood circulation, which further leads to accumulation of lipids within various tissues. Like in other similar metabolic disorders, obesity is thought to be originating due to dysfunctionalities resulting from structural and regulatory changes in tissue molecules and macromolecular assemblies. Despite the fact that information on this subject is still lacking, these alterations are expected to be based on variations in macromolecular content, structure and function. In this study, inguinal (IF) and gonadal (GF) adipose tissues of males and females of Berlin Fat Mouse inbred (BFMI) strains, which had been selected for high fat content before inbreeding (BFMI852, BFMI856, BFMI860 and BFMI861 lines), and control DBA/J2 mice were examined in order to investigate the structural and functional differences among the control and inbred mice models for obesity. This is an important model because BFMI mice have a complex genetic background and generate spontaneous obesity although they were fed with standard breeding diet (SBD). In this experiment, adipose tissue samples were directly placed on the ATR (Attenuated Total Reflectance) Diamond/ZnS crystal without any pretreatment of the sample. The spectra were collected in the region between 4000-650 cm⁻¹ with 4 cm⁻¹ resolution. Structural and functional information about proteins, lipids, saturated and unsaturated lipid content, lipid chain length, nucleic acids and carbohydrates content were determined. A significant increase in saturated lipid concentration in GF of male mice and significant decrease in the content of unsaturated lipids in male and female IF were obtained. Furthermore, the shift to lower values in CH₂ anti-symmetric band frequency in male GF implies an increase in the order of the system and in trans-conformers in the membrane [1,2,3]. In addition, there is a significant decrease in nucleic acid concentration and protein content, especially in female IF, that is likely due to the escalation in proteolysis during obesity [4]. To conclude, obesity affects IF and GF of the male and female BFMI mice differently via altering the structure, function and composition of the macromolecules.

References

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