

Anatomy and dynamics of changes in the morphology of the facial fat compartments in the model based on obese people after massive weight loss due to bariatric surgery

Facial anatomy has a significant influence on human life, being an inseparable element of identity. Disorders of face functions and structure can worsen the quality of life and significantly change our perception of the environment. This process is not surprising since it is the numerous details present on the face that are encoded by our brain as a kind of "personal label". The face performs various functions and has a complex, layered structure. Apart from the skin, which is the body's natural protective barrier, the facial muscles are necessary for expressing precise emotions. In addition to the dense vascular plexuses and numerous nerves, the face is composed of adipose tissue or fat, another often overlooked component. It is this adipose tissue that gives the right curves and volume, causing the subjective perception of the child's face as full and expressive shape, while older people are imagined as having leaner and droopier faces.

A milestone in understanding the anatomy of facial fat was the discovery of subcutaneous adipose tissue that is organized in a repeating pattern. This finding laid the foundation for subsequent studies that demonstrated, among other things, that the changes associated with aging largely coincide with changes in different parts of the fat tissue over time. Contrary to the common perception of adipose tissue as a homogeneous mass, recent reports indicate its rich diversity at the level of its functions and the cells that build it, which are influenced by our habits or environmental factors. Science still does not have a clear answer to the question of how the compartments bounded by fibrous fascia change in a specific individual who has lost a massive amount of weight. The most dynamic, yet tractable, biological change in body weight is seen in patients undergoing bariatric surgery. The "Obesity Epidemic" as the World Health Organization (WHO) terms the phenomenon of massive amounts of weight besides purely physical aspects that has many psychological consequences, including low self-esteem, depressive states, social isolation, and/or stigmatization. Patients seek various sources of help in the fight against obesity, more and more often reaching for the surgical scalpel, so there is no doubt that bariatric surgery saves lives of obese patients.

As seen above, the overarching goal of the project is to determine the relationship between anatomy and the dynamics of change in the dimensions and shapes of facial fat compartments based on a model of obese individuals after losing massive amounts of weight. To perform this study, we will study subjects qualified for bariatric surgery, a procedure that is a surgical method to combat obesity, and a reference group of subjects with normal weight according to BMI measurements. Participants will undergo imaging examinations generally considered safe for health, for example, magnetic resonance imaging (MRI) of the head, which will allow visualization and measurement of individual fat compartments, and densitometry, which will allow determination of body composition. In addition, a satisfaction survey will be conducted with each participant and accurate 3D facial scans will be taken to evaluate the external facial changes during the weight loss process. The entire procedure will be repeated at six and 12 months, and the data obtained will be reliably compiled at the end of the study.

Referring to the literature, the expected outcome will be weight loss, fat rearrangement, improved quality of life, and increased satisfaction with the external facial appearance. We assume a decrease in fat volume with constant dynamics in the zygomatic and cheek region will occur. The borders of individual fat compartments should not change in a statistically significant manner. The expected results will allow us to understand the dynamics of changes in fat compartments correlating with a decrease in BMI. In addition to the primary objective, the project has secondary objectives, such as comparing the patients in the groups and demonstrating the anatomical and physiological differences between the two groups. It is hoped that participation in the study will help patients achieve their goals and provide motivation in their journey to recovery.