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The nasal cartilage damaged or lost is an important problem for the patients and also for the laryngologist and plastic surgeons. Injured natural cartilage is slow and difficult to heal, and has almost no ability to regrow itself. Untreated cartilage defects lead to degeneration of tissues. Even small chondral defects may necessitate surgical intervention. Nowadays tissue engineering has appeared as a new approach in treatment of damaged or lost cartilage. Tissue Engineering (TE) is engaged in reconstruction and restoration of damaged function of tissues and organs. TE methods consist of collecting cells from the patient, seeding them on especially prepared material and growing in the laboratory. The material is used as a scaffold for the newly formed cartilage and dissolves at the time when the tissue will no longer have adequate mechanical properties. The resulted tissue is then transplanted into the patient. The tissue scaffold material should have a three dimensional porous structure facilitating the tissue formation by the cells, and allowing penetration of the growing tissue into the scaffold. The scaffold should provide the mechanical integrity depending on the defect location and adhere and integrate with the surrounding native cartilage. The requirements for scaffolding materials for use in cartilage tissue engineering are well-defined; however the ability to produce such materials has been limited.

In the frame of this project we would like to develop innovative, layered, scaffolds for tissue engineering, for nasal cartilages reconstruction. Using two different techniques for the preparation of scaffolds (3D printing method and electrospinning) we would like to produce porous scaffold with a three-dimensional structure and appropriate mechanical properties for injured nasal cartilage reconstruction. Produced biodegradable materials composed of two or three different polymers will be modified during manufacturing process with drugs or other biologically active particles, that promote regeneration of cartilage tissue.