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IN VIVO BIOCOMPATIBILITY OF CARBON FIBERS /PSU COMPOSITE

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In laryngology for treatment of tissue of larynx resulting from cancer or injuries synthetic materials are becoming frequently used. In the decade there have been made trials with allogenic materials application in larynx and trachea reconstruction such as silastic, teflon and bioglass. Reconstruction of the loss larynx tissue requires recreation of natural anatomic conditions. This is possible when the properties of an implant material are similar to cartilage tissue i.e. it preserves the appropriate shape end elasticity,and its microstructure enablesconnective tissue of larynx to penetrate into micropores of the implant.
Much work have been done on the materials used for attificial tracheas, but a precise machanical evaluation of these structures has not yet been performed.
The present study examined biocompatibility of two types of composite materials which have different mechanical properties. We determined the mechanical properties of implant materials and compared them with native larynx.
Composite materials have been prepared using polysulfone and two type carbon fibers differing in their form (carbon tissue, carbon unwoven fabric) .Two types of materials were prepared; unwoven fabric / PSU - K_w, unwoven fabric / carbon tissue / PSU - K_{wt}. The results of tensile strength and Youngs modulus of two kind of materials exhibits that K_w composite has lower strengh and modulus compare to K_{wt} materials.
The composite implants has been used to reconstruction of experymentaly prepared defects in the thyroid cartilage of the sheep. The tissue samples removed from the implant site together with adjoining tissue were subjected to routine histological analysis. Tissue section were stained with hematoxylin and eosin (H&E). A morphological description of the tissue surrounding and growing into the implants was made.

The nature of interaction between the biological environment and composite implants is clerly influenced by type of implants. The material denoted as K_w having lower Youngs modulus leads to a faster and more intesity tissue response, which simultaneously can influence regenration and repair time of larynx tissue. The histological inspection has shown the formation of connective tissue capsule with numerous fibrocytes and collagen fibers filling the defect.
This study showed that biological behaviour of composite implants may depend not only their chemical state but also on mechanical properties of biomaterials.

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