EFFECT OF *IN VIVO* BIODEGRADATION ON THE STRUCTURE OF BNC CARDIAC IMPLANTS

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Introduction

Bacterial nanocellulose (BNC), a natural polysaccharide nanomaterial, is synthesized by bacteria of the *Gluconacetobacter* genus, i.a., by *Gluconacetobacter xylinus* strains. In comparison with plant cellulose, contaminated with hemicelluloses and lignines, BNC is characterized by high purity, high degree of crystallinity and polymerization, and good mechanical properties. This material meets the requirements of biomaterials: is biocompatible, not mutagenic, not toxic and not teratogenic. Furthermore, it does not induce either immune responses or tendency to thrombus formation. Due to these unique properties, BNC membranes are used for wound dressings, and their potential for the production of cardiac implants is currently under study. Although BNC material is not biodegradable in vitro condition, its biodegradation in vivo conditions has not been tested yet. Hence, before using BNC implants in human body it is necessary to carry out pre-clinical tests on animal model.

Materials and Methods

BNC, obtained according to the method described in patents PL 171952 and PL 212003, was supplied by Bowil Biotech Sp. z o.o. The aortic patches implants based on BNC were implanted to pigs body. After 6 months, euthanasia of animals was performed and changes in the structural and morphological properties of the implants were tested by using XRD and SEM techniques, respectively.

Results and Discussion

Presence of the BNC cardiac implant in a pig model body for 6-months, resulted in a change in polysaccharide structure and surface morphology. Results obtained revealed that the crystallinity degree of BNC was deceased compared to the unimplanted sample. In addition, differences in individual cases were noted, possibly related to the biological variability of the examined animals. Microscopic observations showed that natural fiber network structure of BNC was overgrown by biological tissues.

Conclusions

BNC implants integrate with surrounding tissues, so they are biocompatible. After 6 months implantation, they do not biodegrade in the pig animal model.

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