EFFECT OF *IN VITRO* BIODEGRADATION ON THE PROPERTIES OF BNC IN THE ASPECT OF ITS USE AS A MATERIAL FOR THE CARDIAC IMPLANTS PRODUCTION

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Introduction
Bacterial nanocellulose (BNC) is a polysaccharide produced, i.a., by *Gluconacetobacter xylinus* strains. Due to its properties, BNC can be an alternative to materials currently used for production of cardiac implants. Preparation of BNC membrane is relatively inexpensive compared to the cost of obtaining materials from synthetic polymers. In contrast to the commonly used biological tissues, BNC membranes are also easily available. This material meets the requirements of biomaterials: is biocompatible, not mutagenic, toxic or teratogenic. Furthermore, it does not induce immune responses, or the tendency to thrombus formation. However, the level of biodegradability of the material in condition simulating human plasma has not been tested yet.

Materials and Methods
The bacterial nanocellulose, obtained according to using the method described in patents PL 171952 and PL 212003, was supplied by Bowil Biotech Sp. o.o. The susceptibility to degradation by the microorganisms was carried out in the presence of *Staphylococcus aureus* PCM 2054, *Candida albicans* ATCC 10231 and *Aspergillus fumigatus var. fumigatus* ATCC 96918. BNC membranes were stored for six months at 37°C in sterile PBS and SBF fluids in the absence and presence of microorganisms. At selected intervals determined: changes in the wet weight (by gravimetric method), the mechanical properties (by the modified ASTM D882-00 and PN-81/C-89034 norms) and number of microorganisms in SBF fluids.

Results and Discussion
Incubation of the BNC membranes both in sterile simulated human plasma fluids and in the presence of pathogenic microorganisms resulted in a change in the properties of the polymer. The increase in wet weight of the samples was noticeable after 2 months of storage, and after 5 months it achieved 100%. Numbers of cells in microorganism population were increased in the presence of BNC, and maintained on the same level for 6 months. The changes in mechanical properties were the most sensitive method of determining biodegradability. In both the sterile liquids and in the presence of microorganisms, a decrease in tensile strength BNC was already found after one month of incubation. The mechanical properties of the BNC incubated for two months in the presence of *A. fumigatus* could not be measured due to the widespread degradation of the sample.

Conclusions
The method allows for the fastest observe changes biodegradation is to determine the changes in the mechanical properties. Moulds *A. fumigatus* resulted in the strongest biodegradation BNC.

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