“*In vitro* studies on hemolytic potential of bacterial nanocellulose”
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The title of this dissertation is "In vitro study of the hemolytic potential of bacterial cellulose (BNC) as a material for implants in cardiosurgery and vascular surgery." The aim of the study was to analyze the hemolytic activity of cellulose produced by the bacterium *Gluconacetobacter xylinus* strain E_{25}. The research is part of the Kardio BNC project, the task of which is to obtain a safe and efficient cardiovascular prosthesis made of bacterial cellulose. The project was initiated by the material manufacturer - the Polish company Bowil Biotech Sp. z o. o. The members of the project included 6 scientific entities, including the Department of Animal and Human Physiology at the University of Gdańsk, where all the experiments for this study were performed.

There are great hopes for bacterial cellulose in the context of regenerative medicine. The material shows a number of attractive features in this manner, i.e. high tear strength, biocompatibility with the animal organism, ease, repeatability, and low production costs. Currently, it is being tested as a cartilage, bone, nerve sheath, or trachea implant. CelMat has already been approved for use as a cellulose dressing for burn wounds and ulcers. Like most products of this type, it is protected by patent law. The Polish company Bowil Biotech Sp. z o. o. selected its own strain of *Gluconacetobacter xylinus* E_{25}, highly efficient in producing cellulose. The success of the Kardio BNC project may contribute to the development of transplantology and vascular surgery in Poland and strengthen the country's position in these areas worldwide.

The aim of the study was to investigate the hemolytic potential of bacterial cellulose. To achieve this, two independent experiments were designed. Both experiments involved simulating the circulatory system of a large mammal. The first experiment utilized Heinrich Schima's method for evaluating the hemolytic function of heart pumps. The second experiment utilized Chandler's loops to simulate blood circulation. Both procedures were modified to allow for dynamic conditions, where the material was incubated in contact with circulating pig blood.

The control tests involved running the system without any bacterial cellulose present, while the experimental tests involved introducing a fragment of bacterial cellulose into the flow. By observing changes in blood parameters in both the control and experimental samples, conclusions could be drawn regarding the hemolytic potential of BNC. Based on existing literature, it was hypothesized that the hemolytic potential would be low, which would make the material suitable for further preclinical studies using laboratory animals.

The results of the experiments confirmed that the BNC produced by Bowil Biotech Company Ltd. is a non-hemolytic material, which allows for further preclinical studies to be conducted using laboratory animals.