

BK virus (BKV) has a strong affinity to kidney tissue. It is widely spread in the population, according to a particular study, even up to 90%. This virus belongs to the *Polyoma* family and is a double stranded DNA virus. The project would allow widening the knowledge of BKV influence on urine virom and immunological phenomena occurring in kidney graft recipients. Urine virom is a unique set of viruses present in a certain person's urine. BK virus infection is very common and harmless in the general population. However, it is a great danger for patients after kidney transplantation. It may lead to nephropathy of the graft and even kidney graft function loss. Chronic kidney disease gains the status of civilization disease. Optimal therapy of chronic kidney disease is kidney transplantation. Life length after kidney transplantation is constantly expanding so a reasonable direction is trying to expand the time of graft function. Viral infections, like BKV, are a common problem in the population of patients after transplantation, which shortens the time of graft survival. So far the knowledge about urine virom is very limited, particularly when it comes to a group of kidney graft recipients. The knowledge about viral infections and their influence on immunological phenomena after transplantation is also very fragmented. Expanding this knowledge will allow for a better care for kidney recipients.

The study group will consist of around 150 urine samples from kidney recipients and are under constant care of the Transplantology Service of Clinic of Nephrology, Transplantology and Internal Diseases of Pomeranian Medical University in Szczecin. Samples would be excluded if at a time a certain patient had an active bacterial urinary tract infection or if there were transplant rejection in kidney biopsy. Samples will be taken between the 4th and 12th months after transplantation. The first stage of the study will be DNA isolation from the samples, so in the second stage they could be checked for the presence of BK virus genetic material and divided into BKV (+) and BKV (-) groups. Next, the immunological response in each group will be analyzed via 10 protein markers of antiviral response. The last stage will be the next-generation sequencing to explore virom in each group. Received outcomes will be put under a detailed analysis using machine learning tools.

This study will explore BKV's influence on immunological mechanisms and urine virom after kidney transplantation, which hopefully will improve the quality of patient care in the future. The results of this project will significantly extend the knowledge about virome of the urine and virus infection on the model of kidney recipients urine who are the model for immunocompromised hosts. Extending this basic knowledge of immunology allows the improvement of medical care on kidney recipients.