This joint application for the NCN/DFG OPUS-2020-LAP project call focuses on antagonizing detrimental cytokine signaling and angiogenesis to expand access and duration of PD treatment (Acronym - EXPAND-PD).

Chronic kidney disease (CKD) affects more than 10% population and is an increasing burden on public health. Moreover, the number of patients with CKD requiring dialysis is rising steadily. The situation has been further aggravated by the Coronavirus 2019 (COVID-19) pandemic, which leads to an increase in new cases of kidney disease, almost 25% of which require dialysis. The most common form of dialysis is hemodialysis (artificial kidney), which, however, is associated high annual treatment costs. Moreover, it requires regular visits to the local dialysis unit, greatly limiting the patients' social mobility. In contrast, peritoneal dialysis (PD) is a viable treatment option that uses the patient's own peritoneum (the lining of the abdomen) as a filter that removes waste products from the body. PD is used by approximately 10-15% of patients requiring dialysis in Germany and Poland (up to 30% in other countries). These are typically younger patients, who are in the midst of their professional careers, thus contributing to the public budget though personal incomes. In addition to several medical advantages, the use of PD is associated with lower treatment costs and greater patients' mobility and independence. Moreover, PD is well suited for home therapy, thus offering an ideal treatment option during the COVID-19 pandemic, as it allows the patients to remain isolated, lowering the risk of virus transmission. Unfortunately, the overall duration of PD treatment is currently limited to approximately 5 years due to the inflammation-induced progressive decline in peritoneal membrane filtration. It is related largely to the abnormal formation of new blood vessels (angiogenesis) in the peritoneum, which – paradoxically – hinders the effective removal of waste and excess water from the blood. The whole process of inflammation-induced angiogenesis is probably governed by small regulatory proteins, known as cytokines. Therefore, elucidating how these molecules work and interact may help find effective measures to counteract peritoneal inflammation and pathological angiogenesis, and consequently extend the use of PD as highly beneficial treatment modality. This has been one of the focuses of our research collaboration in the past and is the topic of the current proposal. The three main project partners Prof. Janusz Witowski (Poznan University, Poland), Dr. med. Rusan Catar and Dr. Dipl. Ing. Guido Moll (both Charité Universtätsmedizin in Berlin, Germany) can look back at many years of fruitful collaboration between Germany and Poland in this field. Noteworthy, Drs. Witowski and Catar collaborated within the EU project dedicated specifically to PD (EUTRiPD – European training and research in PD) and Dr. Moll grew up in a German-Polish border town Guben/Gubin, which has established a long-standing German-Polish partnership linked within the 'Euroregion Spree-Neiße-Bober' This has now been extended to our research collaboration between Charité Berlin and Poznan University.

In our research we will attempt to identify which factors present in the peritoneum of PD patients contribute to the peritoneal membrane dysfunction, which hampers the use of PD. The strength of our proposal is the unique combination of a) direct access to fresh patient samples through our associated clinical departments, b) cutting-edge scientific methodologies available at site, and c) high competence in translational mechanistic studies to decipher the underlying mechanisms of cytokine signaling.