The main aim of this project is to develop **Point-of-care diagnostic devices for the determination of lithium and creatinine in serum, blood and oral fluid**. During the research, four analytical and diagnostic devices for the separate and simultaneous determination of lithium and creatinine will be developed.

First, it is planned to develop a **Point-of-care diagnostic devices enabling the separate and simultaneous determination of lithium and creatinine in blood serum and whole blood**. These solutions aim to develop simple devices that will allow the patient to determine these analytes at home. In the last stage, it is planned to adapt the devices for the determination of lithium and creatinine in oral fluid. During the development of diagnostic devices, **two types of detection will be tested: using a digital imaging system and electrochemical detection.**

The motivation to undertake the research is the **necessity to constantly monitor the lithium concentration in patients taking lithium carbonate**, which is used in the treatment and prevention of mood disorders, and in particular, in bipolar disorder and treatment-resistant depression. The orally administered dose as well as the concentration of lithium in the blood serum is fundamental in ensuring both optimal treatment efficacy and the avoidance of lithium intoxication. The recommended therapeutic serum lithium concentration varies with the type of disease being treated and its severity and most often it ranges from 0.4 to 0.8 mmol/L. In extreme cases the recommended serum lithium level may be 1.5 mmol/L, this concentration is also a limit between therapeutic and potentially toxic concentrations. Lithium poisoning is characterized by apathy, weakness, muscle tremors, convulsions, abnormal heart rhythm and can also lead to damage of kidney function, and finally to chronic kidney disease. Nowadays chronic kidney disease is most commonly monitored by determination of creatinine in blood. **Determination of lithium and creatinine in blood is crucial in monitoring the course of treatment with lithium**. **When a patient has a blood lithium concentration above 1.0 mmol/L, routine monitoring of serum levels of lithium and creatinine is required. Therefore, the author of the application is convinced of the necessity to develop Point-of care diagnostic devices enabling the monitoring of the concentration of these analytes by the patient at home.** Because frequent blood sampling is burdensome for patients, studies on the applicability of alternative modes to control the therapeutic and toxic dose of lithium are ongoing. **There are several literature reports proving the correlation of lithium and creatinine concentration in saliva and blood. Hence, it seems reasonable to make attempts to prepare a simple analytical and diagnostic Point-of-care devices that will allow to quick, efficient and accurate determination of lithium and creatinine at home also in oral fluid**.

The developed Point-of-care diagnostic devices **will be used for further development in the determination of these analytes in saliva without the need to use traditional diagnostic devices.** They can also be used by scientists in further studies on the correlation of the concentration of creatinine in saliva and blood serum in order to implement the method of measuring creatinine in saliva as a diagnostic tool for the evaluation of patients with chronic kidney disease. Each of the proposed devices **can also be used by scientists to study the relationship between short and long-term lithium intake on blood serum creatinine levels.**