Critical limb ischemia is an advanced stage of peripheral arterial disease, in which narrowing and obstruction of arteries occurs. In 25-40% of patients with critical lower limb ischemia there is a high risk of limb amputation and mortality is reported in 1 in 5 cases. The latest therapeutic strategies designed to treat this disease focus on the use of exogenous molecular or cellular agents to create new blood vessels.

In our previous research, we focused on the proangiogenic role of mesenchymal stromal cells (MSCs) in two models of ischemic tissue (myocardial infarction and hypoxic limb). In the hypoxic limb model after administration of MSCs, we observed an increased influx of M2 macrophages responsible for tissue repair and an increased amount of emerging blood vessels. In our opinion, the therapeutic properties of MSC are the result of the action of the protein - Interleukin 6, which affects the transformation of macrophages towards M2 phenotype. The continuation of our research will be to examine whether MSCs are necessary in repair processes or whether IL-6 presence alone is sufficient.

We will investigate the effect of IL-6 on M2 macrophages. The purpose of our work is therefore:

(1) Obtaining of M2 macrophages under the influence of IL-6,

(2) To examine their potential in forming new blood vessels in the mouse model of the hypoxic limb.

The obtained macrophages are planned to be tested both at the cellular level - in vitro and in animal models (murine model of the hypoxic limb). In the in vitro tests we will check which cytokines and growth factors are secreted by obtained macrophages and examine the cells' ability to form vascular-like structures under appropriate culture conditions.

The mouse model of the hypoxic limb will be obtained by ligating the femoral artery of the mice. Then the obtained macrophages will be administered to mice. The final stage of the research will be the analysis of the collected muscles after the therapy. We will check both newly created blood vessels, secreted cytokines and the time of residence of the given macrophages in the limb.

We hope that the "cell therapy" proposed by us with the use of ex vivo cultured macrophages will prove to be an effective therapeutic solution. We believe that M2 macrophages transformed under the influence of IL-6 will be involved in the repair processes of damaged tissues. Our work will provide new information on the properties of M2 macrophages obtained after IL-6 stimulation, both in vitro and in vivo.