It has been postulated that complex interactions between tumor and its microenvironment determine tumor development and progression. Tumor microenvironment includes non-malignant cells like: fibroblasts, endothelial cells, cells that comprise the blood and lymphatic vessels and immune cells (macrophages, neutrophils, dendritic cells, regulatory T-cells, etc.). They communicate via the network of various cytokines and other particles that mobilize selected populations of the cells in the bone marrow, recruit them into the bloodstream and, consequently, the tumor mass. There are two common features of these cells: immature phenotype and the ability to promote the development of the disease, showing abnormal functions. One of the „tumor associated" cell population are myeloid-derived suppressor cells (MDSCs), first described in the 90s of the last century. They are capable of regulating the immune system, allowing the tumor to „escape from immune surveillance." They are present in bone marrow, spleen, tumors and blood of cancer patients. In a healthy mice they account for about 2-4% of splenocytes, while in tumor-bearing mice, number of them can increase up to 50% of spleen cells. The percentage of MDSCs in the blood of cancer patients is significantly increased, which positively correlates with the progression of the cancer.

MDSC are a population of cells that morphologically and phenotypically resemble immature monocytes and granulocytes. In mice, their phenotype is characterized by expression of the two antigens: Gr1 and CD11b, while in human, MDSCs' phenotype is described as CD11b $^{+}$/ CD33 $^{+}$/ HLADR^{low}. They represent a heterogeneous group of cells, which, based on the phenotype, is divided into two major subsets: G-MDSCs that resemble granulocytes and M-MDSCs showing similarity to monocytes. Both of the subpopulations impair the function of T lymphocytes using different mechanisms. Some effects of their abnormal function are suppression of CD8^{+} cytotoxic cells, NK and NK-T cells, macrophages, dendritic cells as well as T helper lymphocytes. They also promote the activity of suppressor T regulatory cells, showing another mechanism of immune suppression. In addition, MDSC act like antigen presenting cells (APC) with suppressor activities, which means that they are capable to induce antigen-specific T-cell tolerance to tumors. The percentage of M-MDSCs is typically less than G-MDSCs, but they show greater suppression properties, which suggests that their presence can not be ignored. In humans and mice, several subsets of MDSCs have been described. Each of them may have slightly different features and exhibit different activity in a particular type of cancer. It is known that in such malignancies as carcinomas, sarcomas or melanomas, the percentage of some of these sub-populations is greatly increased. In contrast, little is known about the occurrence and significance of MDSCs in lymphomas.

Lymphoma in dogs in terms of morphology, the biological behaviour, outcome of the disease or response to a treatment, is very similar to the corresponding lymphoid neoplasms seen in humans. For this reason, this species is an adequate model for the study of human lymphomas. Comparing to human, relatively short life span of dogs gives an opportunity to monitor throughout the course of the disease. Dog as an animal model affords several important advantages over the mouse model including: opportunity to compare the results of clinical trials and the analysis of spontaneously occurring tumor growths. It was observed that the percentage of MDSCs in the blood of both humans and dogs with cancer is elevated, which allows evaluation of the suppression of the immune system, but may also be a value as a biomarker of response to therapy. Recently, two scientific groups have published results of identifying MDSCs in the blood of dogs with cancer and proposed their possible phenotype. Based on these data, the aim of our research is to identify MDSCs in the canine blood and cancer affected lymph nodes. The results of the research project will be the first step to assess the role of these cells in the microenvironment of lymphoma, and assess their value as prognostic markers as well as may be useful to search for new therapeutic solutions.

The impact of tumor microenvironment on tumor growth and metastasis is one of the key elements in cancer research. The numerous, and still discovered new populations of tumor-associated cells, represent a wide field of research, showing valuable scientific potential. As the role of the tumor microenvironment is not yet well understood, this subject requires further studies, the results of which will broaden the basic knowledge in the field of oncology. In the present study, there will be evaluate the correlation between the presence of MDSCs and expression of enzymes impairing the function of T lymphocytes (arginase-1 and indoleamine 2,3-dioxygenase). For this purpose, cytometric identification and isolation of MDSCs in lymphoma-bearing dogs will be carried out as well as their suppressive activity to T lymphocytes will be investigated. In summary, it is also planned to evaluate the correlation between MDSCs, lymphoma type, clinical signs and the results of blood tests. The study that is planned, will allow to understand MDSCs population in terms of their functions and the relationships that exist between them, and lymphoma cells in the dog. The study of lymphoma in dogs microenvironment may contribute not only to progress in the diagnosis of this disease (tumor markers) and the development of cancer immunotherapy in veterinary medicine, but may also bring benefits for human medicine.