

Cancer diagnostics is constantly developing. In the case of leukemias, modern techniques often do not take into account information about the chemical composition of cancer cells. These may not be crucial data at first glance, but in the clinic they can influence treatment strategies and provide scientists with additional information needed to better understand cancer.

Raman spectroscopy (RS) may be a good tool to solve this issue. It allows to gather information about the chemical composition inside cells by measuring vibrations in molecules that are impossible to catch using other equipment.

In a TEAM NET project, we investigated whether we could use RS to capture chemical changes in acute myeloid leukemia (AML) cells caused by genetic mutations. It turned out that many common mutations found in AML patients cause subtle chemical changes in cells that allow healthy cells to be distinguished from diseased ones. Our initial findings suggested that patients with BAALC overexpression (resulting in greater production and accumulation of this protein) have a specific spectroscopic profile.

We were not initially interested in BAALC, but in light of these results we want to further investigate the effect of overexpression of this gene on the chemical composition of the cell. For this purpose, we will use the SRS built in the previous project, which is an improved version of RS allowing faster measurements and providing information about cell biochemistry in the form of images. We will investigate whether the occurrence of BAALC overexpression is a sufficient factor to distinguish these cells from those with normal levels of expression. BAALC gene expression indicates the aggressiveness of AML. High levels of BAALC are linked to a poor prognosis in AML. Our goal is to create an artificial intelligence-based algorithm that will recognize BAALC overexpression in leukemic cells.

We hope that in the future we will be able to introduce the results of this project into diagnostic laboratories, which will improve the diagnosis of leukemia and enable better patient care - treatment tailored to individual needs.