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Fund “Nauka” Project № 22004 Resume – Competition-Based Session 2022:

“The role of circulating microRNAs in epigenetics in newly diagnosed patients with multiple myeloma”

Project leader: Prof. Ilina Dimitrova Micheva, MD, PhD

MicroRNAs are epigenetic modulator with confirmed role in the pathogenesis of a number of malignant diseases including multiple myeloma.

The aim of this research is to establish the values of selected plasma microRNAs in patients with untreated multiple myeloma, compared to healthy individuals, and the follow up in 6 months, relative to response of treatment (according to IMWG 2014), change in the clinical status and laboratory results. In that way to establish their diagnostic and prognostic significance. Investigations like this are scarce in the foreign and absent in Bulgarian literature.

The research will involve patients over 18 years of age with newly diagnosed multiple myeloma (according to IMWG criteria for the diagnosis of multiple myeloma) and healthy individuals. After obtaining consent from the research participant, a venipuncture will be performed for obtaining biological material (blood) and after its preparation the sample will be used for the extraction and quantitative characterization of microRNAs by Real-time PCR.

The expected result of this study is to determine the expression levels of some plasma microRNAs in patients with newly diagnosed multiple myeloma compared to healthy individuals and to follow their plasma concentration after six months of treatment. In that way, their role as non-invasive biomarkers with diagnostic and prognostic value will be established.

The results showed:

1. Significantly higher levels of miR-126 and miR-199a were observed in patients with multiple myeloma compared with healthy controls.
2. A significant inverse relationship was demonstrated between the levels of miR-126-5p and miR-199a and beta-2 microglobulin.
3. A moderate positive association was also found between the expression levels of miR-199a-5p and hemoglobin.
4. Significantly higher levels of miR-126-5p were recorded in patients who achieved (CR+VGPR) after treatment compared with untreated patients, with values approaching those of the control group.
5. MiR-126-5p and miR-199a-5p demonstrated significant characteristics as diagnostic biomarkers based on ROC analyses.
6. High levels of miR-214-3p and miR-497-5p were associated with an increased risk of disease progression and early mortality.

The results were presented at an international forum – the Lymphoma Leukemia and Myeloma Congress, October 16-19, 2024 – and published in the American Journal of Hematology (Volume 99, Issue S2, Supplement), as well as at a national forum.

A manuscript has been prepared and is currently awaiting acceptance in a peer-reviewed journal (Scripta Scientifica Medica).

The project also supported the successful defense of a dissertation and the awarding of the PhD degree (Educational and Scientific Degree “Doctor”).