Malignant melanoma is the most aggressive of the skin cancers and very resistant to conventional therapies. In Poland, the incidence of melanoma has increased almost 3-fold in the past three decades. Currently there is no effective procedure for the treatment of metastatic melanoma. The methods used in clinical practice and experimental trials are not effective and they are destructive to the patient's body. Therefore, there is a great interest in discovering biomarkers with high sensitivity, specificity and predictive value for screening, monitoring the progress of the treatment, detection of recurrence or distant metastases. Development of new strategies in the fight against cancer is a challenge of our time. We need more basic research to a better understanding of the genetic and molecular basis of melanoma, to discovery of sensitive and specific markers of the disease and targets for novel anti-melanoma therapeutic approaches.

The appearance of tumor-associated carbohydrate antigens on the cell surface is a hallmark of ongoing neoplastic transformation. The altered carbohydrate antigens affect cell−cell and cell−extracellular matrix interactions, play a key role in tumor progression and metastasis, can induce changes in cancer cells' antigenicity and immunogenicity and, by interacting with circulating natural antibodies, can facilitate tumor progression via chronic inflammation and angiogenesis. Moreover, tumor carbohydrate antigens can serve as potent diagnosis and prognosis markers, as well as therapeutic targets. The expression of aberrant glycans is intimately associated with the accumulation of genetic and epigenetic changes which result in dysregulated transcription, causing altered expression, altered activity and/or mislocalization of enzymes engaged in the glycosylation machinery. The cancer-associated changes include underexpression and overexpression of naturally occurring glycans, expression of glycans normally restricted to embryonic tissues (oncofetal antigens), the appearance of incomplete or truncated structures, and, less commonly, the appearance of novel structures (neoantigens). Nowadays, neoantygens are arousing the greatest interest among researchers and clinicians as potential tumor markers with high sensitivity, specificity and positive predictive value.

Recently, our research group has demonstrated that human melanoma L1 cell adhesion molecule (L1CAM) from human primary and metastatic melanoma cells carries novel, not reported so far in human tissues, glycan neoepitopes. In this project we intend to use the modern tools of molecular biology and biochemistry to identify glycosyltransferase and mutations that contribute to the synthesis of these neoepitopes; we intend to analyze the enzymatic specificity of the identified glycosyltransferase and examine whether these neoglycans have an impact on the L1CAM function and melanoma cells behavior. The non-transfected cells and cells with up-regulated or down-regulated expression of an identified glycosyltransferase will be used. Finally, we intend to examine *in vivo* the expression level of mutated gene in melanoma/normal skin tissues using archived tumor samples. Implementation of this part of the project will allow us to pave the way for future research.