

## Monitoring the Effectiveness of Chemotherapy Treatments Utilizing Artificial Intelligence-based N-Glycome Analysis

**Rebeka Torok<sup>1</sup>, Brigitta Meszaros<sup>1,2</sup>, Veronika Gombas<sup>3</sup>, Agnes Vathy-Fogarassy<sup>3</sup>, Miklós Szabó<sup>4</sup>, Eszter Csánky<sup>4</sup>, Gabor Jarvas<sup>1</sup>, and Andras Guttman<sup>1,2</sup>**

<sup>1</sup>*Research Institute of Biomolecular and Chemical Engineering, University of Pannonia, Veszprem, Hungary, torokrebeka@gmail.com*

<sup>2</sup>*Horváth Csaba Memorial Laboratory of Bioseparation Sciences, Research Center for Molecular Medicine, Doctoral School of Molecular Medicine, Faculty of Medicine, University of Debrecen, Debrecen, Hungary*

<sup>3</sup>*Department of Computer Science and Systems Technology, University of Pannonia, Veszprem, Hungary*

<sup>4</sup>*Department of Pulmonology, Semmelweis Hospital, Miskolc, Hungary*

### Summary

A unique methodology is presented to investigate the impact of chemotherapy on individuals with lung cancer through the examination of serum N-glycome, coupled with data analysis employing artificial intelligence-based machine learning techniques. The research encompassed serum specimens from 33 lung cancer patients undergoing chemotherapy, emphasizing 21 specific asparagine-linked glycan structures both before and after treatment. Enzymatic release, fluorophore labeling, and capillary electrophoresis with laser-induced fluorescent detection (CE-LIF) were utilized for the analysis of N-linked glycan structures. Employing Quadratic Discriminant Analysis (QDA) classifier data processing techniques revealed a correlation between structural modifications in the targeted N-glycans attributable to chemotherapy. This integrated bioanalytical-artificial intelligence approach represents a novel contribution to the field, holding the potential for accurate and expeditious assessment of treatment outcomes.

### Acknowledgement

The authors gratefully acknowledge the support of the Andras Koranyi Foundation, the Cooperative Doctoral Programme of the Ministry of Culture and Innovation, and the National Research, Development, and Innovation Office. This is contribution #211 of the Horváth Csaba Memorial Laboratory of Bioseparation Sciences.