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IMPROVING BIOLOGICS DEVELOPMENT BY HIGH PERFORMANCE GLYCOANALYSIS

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Glycomics is a rapidly emerging field that can be viewed as a complement to other „omics“ approaches including proteomics and genomics. Hence, there is a dramatic increase in the demand for analytical tools and specific databases in glycobiology, respectively, glyco biotechnology. In order to enhance and improve the comparatively small existing glycoanalytical toolbox, fully automated, highly sensitive, reliable, high-throughput and high-resolution analysis methods including automated data evaluation are required.

One very promising method is based on multiplexed capillary gelelectrophoresis with laser induced fluorescence detection (xCGE-LIF). The glycoanalytical approach established includes sample preparation and measuring methods, software, and database solutions to tackle challenges in a great number of application fields.

First, an optimized modular sample preparation workflow is presented with respect to performance and feasibility regarding high-throughput analytics [1-5]. Second, parallel sample-measurement is shown to result in massive reduction of the effective run-time per sample [4]. Third, automated data analysis with a newly developed modular software-tool for data processing and data analysis is demonstrated that involves integration of a corresponding oligosaccharide-database [6-8].

Using this high-performance xCGE-LIF based glycoanalysis system, the generated “normalized” electropherograms of glycomoieties (“fingerprints”) can be evaluated on three levels: (1) “simple” qualitative and quantitative pattern comparison (“fingerprinting”), (2) identification of compounds in complex mixtures via database matching (“glycoprofiling”) and (3) extended structural analysis using exoglycosidase sequencing in combination with xCGE-LIF based glycoprofiling.

The broad applicability of the system is demonstrated for different types of glycosamples: from manufacturing of biologics and vaccines (including recombinant and viral glycoproteins) [1-3], to human stem cells, blood serum [4,5] and milk [8].

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