TAILOR-MADE GLYCOPOLYMERS AS PROSPECTIVE THERAPEUTIC TOOLS

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Galectins are a family of soluble human β-galactoside-binding lectins. Their overexpression accompanies a range of pathologies. In cancerogenesis, they promote tumour growth, angiogenesis, tumour cell migration, and evasion from the host immune system [1]. They are also associated with pathological fibrotisation related to the understudied disease of pulmonary hypertension [2]. Synthetic glycopolymers are especially suitable for interacting with biomedical targets like galectins *in vivo* due to their biocompatibility, bioavailability, prolonged half-life and ability of intracellular penetration. Simultaneous presentation of multiple carbohydrates in various architectures [3] on a polymer carrier enhances the biological potency of glycopolymers by many orders of magnitude, reaching outstanding affinity and selectivity in galectin binding and inhibition, which makes these glycopolymers prospective for biomedical research and clinical application.
Here we will present our new results in the synthesis of tailor-made glycopolymers based on *N*-(2-hydroxypropyl)methacrylamide and polyoxazoline carrying various glycomimetic ligands. The glycopolymers efficiently protected immune cells and immune effectors like IFNγ against the detrimental effects of galectin-3. They also decreased the expression of markers of pulmonary hypertension. In a biodistribution and pharmacokinetics study in rat and mouse models, we identified crucial parameters influencing *in vivo* half-life, which further enhances the potential of carbohydrate-loaded glycopolymers as therapeutics of galectin-associated pathologies.

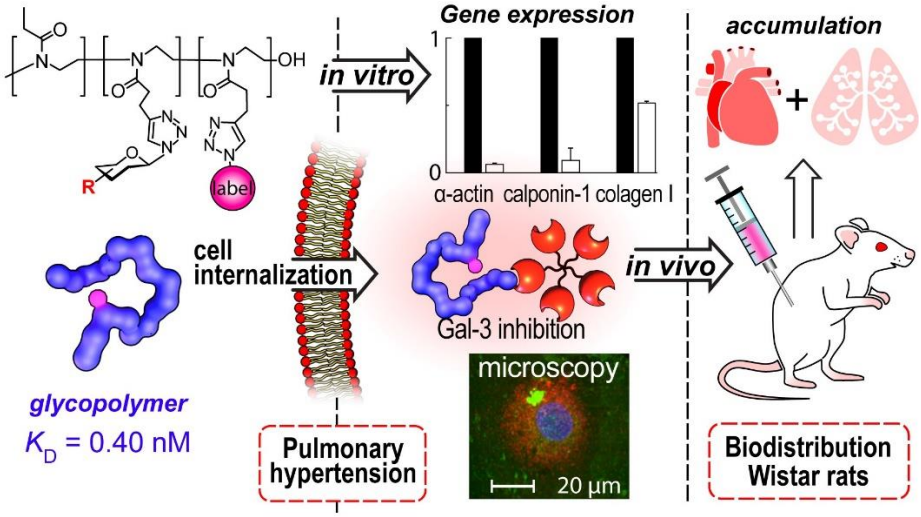

Figure 1. Synthetic glycopolymers as agents prospective for treating pulmonary hypertension.

Acknowledgements: We acknowledge support from the Ministry of Health of the Czech Republic (project NU23-08-00307), and the Ministry of Education, Youth and Sports of the Czech Republic (mobility project LUC23148).

References:
1. M. Filipová *et al*., *Int. J. Nanomedicine* **2025**, *in print.*
2. A. Sedlář *et al*., *J. Med. Chem*. 2024, **2024**, *67*, 9214−9226.
3. A. Vopálenská *et al*., *manuscript in preparation*.