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RESEARCH AREA

Our group is engaged in the field of synthetic carbohydrate, nucleoside and antibiotic chemistry. We focuse on the production of oligosaccharides of potential antithrombotic, antiviral and antitumor effects, the synthesis of thioglycoside mimetics of biorelevant carbohydrates, the development of new types of nucleic acid analogues and the chemical modification of glycopeptide antibiotics. In the last decade, we have designed and prepared heparin-like pentasaccharides with high anticoagulant activity, and important structure-activity relationships have been revealed in the field of heparinoid anticoagulants. We applied a biocompatible conjugation reaction, the photocatalytic thiol-ene coupling reaction on unsaturated carbohydrates, and prepared a number of biologically active (antiviral, enzyme-inhibiting) glycoconjugates. Significant progress has been made in the synthesis of glycopeptide-based semisynthetic antibacterial and antiviral compounds, as well as in the design and synthesis of new nucleoside analogs with antitumor activity. Our research has recently been extended to the study of NO- and H2S-donor nonsteroidal anti-inflammatory drugs. The biological activity of our compounds is evaluated in extensive domestic and international cooperation.

TECHNIQUES AVAILABLE IN THE LAB

Laboratory work in the field of synthetic organic chemistry, performing reactions (glycosylations, carbanion additions) requiring an inert atmosphere and / or absolute anhydrous conditions. Routine use of UV/visible-light-induced photochemical reactions in the presence of various initiators or catalysts. Synthesis of bodipy conjugates for fluorescence assays. Use of silica gel column chromatography, and gel filtration to purify oligosaccharides, oligonucleotides and glycopeptide derivatives. Application of methods for structure elucidation: recording and evaluation of NMR and MS spectra.

SELECTED PUBLICATIONS

Debreczeni, N., Bege, M., Herczeg, M., Bereczki, I., Batta, G., Herczegh, P., **Borbás, A**. (2021) Tightly linked morpholino-nucleoside chimeras: new, compact cationic oligonucleotide analogues. **Org Biomol Chem 19:** 8711–8721.

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Szőke, K., Czompa,A., Lekli, I., Szabados-Fürjesi, P., Herczeg, M., Csávás, M., **Borbás, A.**, Herczegh, P., Tósaki. A. (2019) A new vasoactive hybrid aspirin containing nitrogen monoxide-releasing molsidomine moiety. **Eur J Pharm Sci 131:** 159-166.

Szűcs, Z., Kelemen, V., Thai, S.L., Csávás, M., Rőth, E., Batta, G., Stevaert, A., Vanderlinden, E., Naesens, L., Herczegh, P., **Borbás, A.** (2018) Structure-activity relationship studies of lipophilic teicoplanin pseudoaglycon derivatives as new anti-influenza virus agents. **Eur J Med Chem 157:** 1017-1030.

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