TAMÁS MARTINEK

Department of Pharmaceutical Analysis
University of Szeged

Address: Somogyi u. 4., H-6725 Szeged, Hungary

RESEARCH AREA

The aim of our research group is to create new macromolecules from unnatural building blocks (foldamers), of which 3D structure can be predicted and programmed. Manipulating protein-protein, protein-membrane and protein-carbohydrate interactions by these chemically well defined substances is a great challenge and holds promise. While small molecule drugs can not effectively decouple macromolecule interactions in general because of their geometry, the right sized and often used antibodies have many disadvantages. We utilize foldamers as artifical self-organizing protein mimetics to modulate protein interactions, to develop diagnostic tools and novel antibacterial materials.

TECHNIQUES AVAILABLE IN THE LAB

Foldamers are synthetised chemically by using automated methods and the desing heavily relies on computer modelling. Their structure is analyzed by HPLC-MS. To analyze protein-ligand interactions, NMR spectrometry is deployed with a special emphasis on protein NMR methods including 3D structure refinement and the analysis of protein dynamics. Proteins are produced via bacterial expression systems. We analyze protein – ligand interactions with the help of isothermal titration calorimetry and various fluorescent techniques. Biological activity of the compounds are tested in cell-based assays.

SELECTED PUBLICATIONS

Bartus, E., Hegedüs, Z., Wéber, E., Csipak, B., Szakonyi, G., **Martinek, T.A.** (2017) De Novo Modular Development of a Foldameric Protein-Protein Interaction Inhibitor for Separate Hot Spots: A Dynamic Covalent Assembly Approach. **Chemistryopen 6:** 2 pp. 236-241.

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Olajos, G., Hetényi, A., Wéber, E., Németh, L.J., Szakonyi, Z., Fülöp, F., **Martinek, T.A.** (2015) Induced Folding of Protein-Sized Foldameric β-Sandwich Models with Core β-Amino Acid Residues. **Chemistry-A European Journal 21:**(16) pp. 6173-6180. IF: 5.731

Hegedus, Z., Weber, E., Kriston-Pal, E., Makra, I., Czibula, A., Monostori, E., **Martinek,** T.A. (2013) Foldameric alpha/beta-Peptide Analogs of the beta-Sheet-Forming Antiangiogenic Anginex: Structure and Bioactivity. **Journal of the American Chemical Society, 135 (44):** 16578-16584., IF: 10.677

Berlicki, Ł., Pilsl, L., Wéber, E., Mándity, I.M., Cabrele, C., **Martinek, T.A.,** Fülöp, F., Reiser, O. (2012) Unique α,β- and α,α,β,β-peptide foldamers based on cis-β-aminocyclopentanecarboxylic acid. **Angewandte Chemie International Edition, 51 (9):** 2208-2212., IF: 13.734