EDIT WÉBER

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RESEARCH AREA

Protein-protein interactions play an important role in a number of therapeutically relevant pathophysiological processes. These interactions include large protein surfaces; hence their modulation is challenging. While small-molecule drugs cannot effectively decouple macromolecule interactions in general because of their small size, the right sized and often used antibodies have many disadvantages. Thus, proteomimetic compounds and innovative drug development strategies are required. The aim of our research group is to create new proteomimetic macromolecules from unnatural building blocks (foldamers), of which 3D structure can be predicted and programmed. Manipulating protein functions by these chemically well-defined substances is a great challenge and holds promise. We utilize foldamers as artificial self-organizing proteomimetics to modulate protein-protein interactions or to develop diagnostic tools. Our targets are proteins that have a key role in tumour development and progression. We aim to design foldamers that can bind to our target proteins and are able to inhibit their interactions, thereby modulating their function. Our goal is to construct new foldamers which can inhibit tumour growth in cells.

TECHNIQUES AVAILABLE IN THE LAB

Target proteins are produced via bacterial expression systems. Foldamers are synthetized chemically. To detect and analyze protein-ligand interactions, various techniques are applied: pull-down methods with HPLC-MS analysis, protein mass spectrometry, NMR spectrometry methods, isothermal titration calorimetry and various fluorescent techniques. Structure-based drug design. Foldamer structure design relies on computer modelling. In order to determine the binding site of the foldamers and to characterize the structure of the protein-ligand complexes, NMR spectroscopy is deployed with a special emphasis on protein NMR methods.

SELECTED PUBLICATIONS

Tököli, A., Mag, B., Bartus, É., **Wéber, E.**, Szakonyi, G., Simon, M. A; Czibula, Á., Monostori, É., Nyitray, L., Martinek, T.A. (2020) Proteomimetic surface fragments distinguish targets by function. **Chem Sci 11:** 10390.

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