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PhD thesis topic: *Synthesis and applications of chiral amine derivatives containing a 2-azabicycloalkane backbone*

SUMMARY

The PhD thesis **„***Synthesis and applications of chiral amine derivatives containing a 2-azabicycloalkane backbone*" is focused on development of synthetic methodology of chiral 2-azabicycloalkane derivatives. The main aims were to determine the scope of applicability of newly obtained compounds as chiral building blocks and as chirality inducers in asymmetric transformations. The explored derivatives have the characteristic structural motif – a 2-azabicycloalkane skeleton, namely 2-azabicyclo[2.2.1]heptane and 2-azabicyclo[3.2.1]octane systems, easily prepared in aza-Diels-Alder cycloaddition reaction from low-cost starting materials. The structure of the azabicycloalkane system opens various routes of possible modifications, which allows introduction of new functionalities of the basic system, leading to the expansion of the areas of its application. Among proposed and synthesised derivatives amides, sulfonamides, sulfonamides and diselenides can be found.

The key part of the research was the use of isolated, enantiomerically pure compounds (polyamines, amides and sulfonamides) in antiproliferative studies on selected tumor cell lines. It was interesting to compare the activity of compounds that differ due to different functional groups in structure, electronic or steric properties and the size of the bicyclic system. The performed biological tests allowed to find the most active sulphonamide with biphenyl moiety for which the cytotoxicity index was significantly higher in comparison with cisplatin, and - what is particularly worth underlining - without toxicity to healthy cells.

Sulfinamide derivatives were tested as chiral organocatalysts in the enantioselective epoxide opening reaction, leading to moderate stereoselectivity. Diastereo- and enantiomerically pure diselenides were invesitigated as electrophiles in the asymmetric methoxyselenylation reaction of styrene. The results of the catalytic tests allowed determination the influence of the structure, including the presence of various substituents (both in the 2-azabicycloalkane and aromatic part) and the size of the bicyclic system on the efficiency and stereoselectivity of performed asymmetric transformations.