

1,3-Dithiolium Flavonoids With Antimicrobial Activities

Project: 152/PED
Acronym: DT-FLAV

Objectives:

The antibacterial properties of a new class of 1,3-dithiolium flavonoids is investigated in order to disclose new antibacterial drugs, disinfectants or antiseptics products. The objectives of this study are the following:

1. Optimization of 1,3-dithiolium flavonoids synthesis and evaluation of their structural stability. Synthetic optimization targets a one-pot synthesis and a large scale procedure, necessary steps in order to prepare a strategy for a technological transfer. Investigations of the tricyclic flavonoids stability in solutions or in solid state under various conditions will be performed before beginning the antimicrobial or cytotoxicity tests.

2. Preparation and morphology optimization of biocompatible polymeric membranes for controlled release of flavonoides potential drugs using transdermal patches. In order to achieve this objective we intend to use biocompatible polymers and prepare membranes loaded with the flavonoides suitable for controlled drug delivery.

3. To test the antimicrobial properties and understand the mechanism of action. The susceptibility of a wide range of bacteria to 1,3-dithiolium flavonoids will be assessed in relation with reference antibiotics; MIC/MBC values will be determined for future practical applications.

4. To investigate the cytotoxicity effects of the 1,3-dithiolium flavonoids. The output of this objective will guide us through an opinion about the potential use of these compounds as new antibacterial drugs/disinfectants/antiseptics.

5. Comparative analysis of the results for laboratory validation of the best candidate as antibacterial agent

Project Manager:

Prof. dr. habil. Mihail Lucian Bîrsă

Total funding per years:

2017: 537500 lei

2018: 62500 lei

Total: 600000 lei

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Publications:

1. Bahrin, L. G., Sarbu, L. G., Jones, P. G., Birsa, M. L., Hopf, H., Chem. Eur. J., 23, 12338-12345 (2017).
2. Gorodea, I. A., Sandu, I., Sarbu, L. G., Rev. Chim. (Bucharest), 68, 1988-1991 (2017).
3. Babii, C., Mihalache, G., Bahrin, L. G., Neagu, A.-N., Gostin, I., Mihai, C. T., Sarbu, L. G., Birsa, M. L., Stefan, M., PLoS ONE, 13(4), e0194898 (2018).
4. Lungu, N. C., Asaftei, I. V., Sarbu, L. G., Rev. Chim. (Bucharest), 69, 000 (2018).
5. Bahrin, L. G., Sarbu, L. G., Birsa, M. L., Rev. Chim. (Bucharest), 69, 000 (2018).

Scientific report

Results

- A series of synthetic flavonoids have been prepared and tested against two bacteria (Staphylococcus aureus ATCC 25923 și Escherichia coli ATCC 25922).
- An important antimicrobial activity have been recorded against both bacteria; better results were observed against the gram-positive one.
- All tested flavonoids displayed low toxicity.

Accounting the above facts, these compounds can be used at least as disinfectants an important application in the context of nosocomial infections. Specific subsequent tests will confirm their use as drugs.