PROJECT КР-06-N21/13/2018 г.

NOVEL ENZYMES OF SIALIDASE FAMILY IN FILAMENTOUS FUNGI

Funding organization: National Science Fund, Bulgaria
Beneficiary: The Stephan Angeloff Institute of Microbiology, Bulgarian Academy of Sciences
Partner organization*:* Institute of Organic Chemistry with Centre of Phytochemistry, Bulgarian Academy of Science
Start and end date of the project: 12/18/018 –06/08/2021
Total amount of funding:120 000 BGN

This project proposal aims the following **main goal**:

To obtain new knowledge about the distribution of sialidase family enzymes in unexplored group of eukaryotic organisms and to demonstrate the role of these enzymes for adaptation in terms of induced oxidative stress.

Specific goals:

- to establish the synthesis of sialidases from filamentous fungi of various systematic groups;
- to establish the presence of sialidase gene in the model strains and the regulation of its expression;
- to examine the relationship between oxidative stress and sialidase synthesis;
- To obtain comparative data on the functional and structural characterization of sialidase from fungi and bacteria;
- to provide new information to fill in international databases of genes and enzymes;
- enhance the qualifications of the project participants;
- attract young scientists to work in the field of microbiology;

Expected results from the project

After execution of the tasks set out in the work program the following results are expected in particular:

- Establishing the presence of enzymes from the sialidase group in strains of certain types of fungi, which are not known to possess these enzymes;
- Depositing fungal sialidase producing strains in The National Bank for Microorganisms and Cell Cultures;
- Identification, sequencing and analysis of the sialidase gene in filamentous fungi. Comparison with the analogous sequences in NCBI gene bank;
- The expression of genes in selected isolates will be traced and the reason for the lack of sialidase activity will be investigated - sialidase mutated genes or pseudogenes;
- Obtaining new data on the fungal sialidase amino acid composition and sequence, in comparison to similar enzymes from other taxonomic groups;
- Deposition of gene and amino acid sequences in the gene bank;
- The comparative analysis of the nucleotide and amino acid sequences will suggest conclusions about the origin of fungal sialidase and sialic metabolism, which is so far unexplored question;
- Receiving new data on the secretion of sialidase in fungi, structural organization, kinetics and substrate specificity of the enzyme;
- The impact of inducers and catabolic repression on the enzyme secretion will be established;

- Receiving data for the secretion of sialidase in terms of the stress caused by thermal effects and heavy metals - a new science aspect of the study;
- Determining the presence of hitherto unidentified endogenous fungal sialidase. Along with the new data for substrate specificity that would lead to assumptions about the biological role of sialidase in fungi;

The project activities will contribute to increase**:**
• the capacity of the basic organization to develop fundamental projects;
• the opportunities for cooperation with Bulgarian and foreign laboratories;
• the qualification and professional growth of the team members;
• the level of competence of the basic organization for attracting new members and for developing the scientific potential of the scientists in the team.

Research team

Coordinator of the research team

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Publications of the project

Abrashev R., E. Krumova, P. Petrova, R. Eneva, N. Kostadinova, J. Miteva-Staleva, S. Engibarov, G. Stoyancheva, Y. Gocheva, V. Kolyovska, V. Dishliyska, B. Spassova, M.Angelova. 2021, Distribution of a novel enzyme of sialidase family among native filamentous fung. Fungal Biol.**,** *in press*. https://doi.org/10.1016/j.funbio.2020.12.006

Eneva R., S. Engibarov, R. Abrashev, E. Krumova, M. Angelova. 2021, Sialic acids, sialoconjugates and enzymes of their metabolism in fungi. Biotechnol. Biotech. Eq. 35, 1, 364–375. https://doi.org/10.1080/13102818.2021.1879678

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