

CYANOCOST – ES 1105 Action

Cyanobacterial blooms and toxins in water resources:
Occurrence, impacts and management.

Short Term Scientific Mission (STSM)

Title: *Nostoc edaphicum* a rich source
of bioactive peptides

Objectives

The main aim of the visit at Robert Gordon University in Aberdeen was to initiate collaboration in the field of bioactive peptides produced by cyanobacteria. During the visit, the pilot studies on structure and activity of peptides produced by *Nostoc edaphicum* CCNP1411 isolated from coastal waters of the Baltic Sea were carried out.

Methodology

Nostoc edaphicum CCNP1411 was grown for biomass in Z8S medium. The lyophilised material was extracted in 75% methanol. The obtained sample was diluted in water and subjected to flash chromatography on Biotage SNAP cartridge KP-C18-HS. Fractions containing the same peptides were pooled, concentrated and subjected to preparative HPLC using Xbridge Prep C18 column (5 µm CBD, 19 × 250 mm) and gradient elution with 0.1 FA in water (A) and 0.1 FA in acetonitril (B). At each stage of the process, the content of the obtained fractions was checked with Acquity Ultra Performance LC coupled to a photodiode array detector and Xevo quadrupole time of flight mass spectrometer (Waters) equipped with BEH C18 column (100 × 2.1 mm; 1.7 µm).

The pooled fractions obtained as a result of flash chromatography were tested with the application of MTT assay and breast cancer cell lines (MDA-MB-231).

Results

As a result of the pilot experiment conducted with the application of *Nostoc edaphicum* CCNP1411, eight pooled fractions, ten fractions containing isolated peptides classified to cyanopeptolins (purity > 95%) and approx. 30 fractions containing a mixture of 2-3 peptides were collected. Several fractions contained different analogues of peptides classified to nostocyclopeptides. In the case of three pooled fractions, the MTT assay revealed cytotoxic activity.

Highlights

- *Nostoc edaphicum* CCNP1411 is a rich source of peptides classified to cyanopeptolins and nostocyclopeptides
- At least some of the peptides showed cytotoxic activity against breast cancer cell line
- The future cooperation and further experiments to confirm the structure of the isolated peptides and characterised their activity were planned

Researcher

Hanna Mazur-Marzec
Dept. Marine Biotechnology
University of Gdansk, Poland



Host Organization

Dr. Christine Edwards
Prof. Linda Lawton
IDEAS Research Institute
Robert Gordon University, Aberdeen
Scotland, UK



Nostoc edaphicum (photo J. Kobos)

