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Conference Abstract

Pilot assessment of cyanotoxins as potential risk factors for cancer in Bulgaria

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Abstract

Cyanoprokaryotes (=cyanobacteria, blue-green algae) are the most ancient oxygen-producing phototrophic microorganisms, spread all over the Globe, which form the important basis of different food chains in aquatic and terrestrial habitats. However, due to strong anthropogenic pressure during the last decades they are also responsible for causing nuisance algal blooms in different water bodies with deleterious effects on the mankind and ecosystems mainly due to production of toxic substances (cyanotoxins). Amongst them are the microcystins, nodularins, lyngbyatoxins and aplysiatoxins, known as tumor-promotors with increase of exposure routes through which humans and animals can be placed at risk (Meriluoto et al. 2017). However, the investigations on the relations between the occurrence and development of such diseases with the cyanotoxins and their producers are extremely scarce at a global scale (Yu and Chen 1994, Ueno et al. 1996, Fleming et al. 2002, Svircev et al. 2009, Drobac et al. 2011, Labine et al. 2015). During the last 15 years cyanoblooms and microcystins, nodularins and saxitoxins were detected in 16 different Bulgarian freshwater bodies, including some drinking-water reservoirs (Stoyneva-Gärtner et al. 2017). Amongst the detected toxins some new forms were recognized by their characteristic spectra (Pavlova 2007, Pavlova et al. 2007), and, more recently, a new potential producer of lyngbyatoxin was found in the Black Sea (Stoyneva et al. 2015). The poster shows a pilot assessment of the spread of cancer distribution and mortality vs. spread of cyanoblooms and cyanotoxins in Bulgaria.

The pilot assessment is made on the basis of comparison of the general regions of spread of cyanotoxins in Bulgarian water bodies and toxin-producing cyanospecies during the period 2000-2017 (Stoyneva-Gärtner et al. 2017) with the spread of cancer in Bulgaria (e.g. Valerianova et al. 2015).

The comparison shows general conformities between the spread of the “most dangerous” water bodies and main regions of cancer diseases in the country. The results obtained served as a basis for a new project proposal which aims at a deepening of the studies for improvement of prevention of cancer in the country.

Keywords

algae, cyanotoxins, harmful blooms

Presenting author

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Conflicts of interest

Authors declare that there is no conflict of interests regarding this publication.

References

- Drobac D, Svirčev Z, Tokodi N, Vidović M, Baltić V, Božić-Krstić V, Lazić D, Pavlica T (2011) Microcystins - potential risk factors in carcinogenesis of primary liver cancer in Serbia. Geographica Pannonica 15 (3): 70-80.
- Fleming LE, Rivero C, Burns J, Williams C, Bean JA, Shea KA, Stinn J (2002) Blue green algal (cyanobacterial) toxins, surface drinking water, and liver cancer in Florida. Harmful Algae 1: 157-168. https://doi.org/10.1016/S1568-9883(02)00026-4
- Labine MA, Green C, Mak G, Xue L, Nowatzki J, Griffith J, Minuk GY (2015) The Geographic Distribution of Liver Cancer in Canada Does Not Associate with Cyanobacterial Toxin Exposure. International Journal of Environmental research and Public Health 12: 15143-15153. https://doi.org/10.3390/ijerph121214969
- Meriluoto J, Spoof L, Codd G (Eds) (2017) Handbook of cyanobacterial monitoring and cyanotoxin analysis. Wiley, 548 pp.

- Pavlova V (2007) Hygiene and Analytical Aspects of Microcystins Occurrence in Surface Water. National Center of Public Health Protection, Sofia, 95 pp. [In Bulgarian].
- Pavlova V, Stoyneva M, Babica P, Kohoutek J, Bratanova Z (2007) Microcystins contamination and cyanoprokaryote blooms in some coastal Bulgarian wetlands. Sofia. Conference Preprint Book BULAQUA, 7 pp.
- Stoyneva-Gärtner MP, Descy J-, Latli A, Uzunov B, Pavlova V, Bratanova Z, Babica P, Maršálek B, Meriluoto J, Spoof L (2017) Assessment of cyanoprokaryote blooms and of cyanotoxins in Bulgaria in a 15-years period (2000-2015). Advances in Oceanography and Limnology 8 (1): 131-152.
- Stoyneva MP, Dobrev HP, Pilarski PS (2015) *Calothrix confervicola* Agardh ex Bornet et Flahault (Cyanoprokaryota) – a new possible causative agent of *seeweed dermatitis*? Ann. Sof. Univ., Fac. Biol., Book 2 – Botany 99: 11-18.
- Svircev Z, Krstic S, Miladinov-Mikov M, Baltic V, Vidovic M (2009) Freshwater cyanobacterial blooms and primary liver cancer epidemiological studies in Serbia. Journal of environmental science and health. Part C, Environmental carcinogenesis & ecotoxicology reviews 27 (1): 36-55. https://doi.org/10.1080/10590500802668016
- Ueno Y, Nagata S, Tsutsumi T, Hasegawa A, Watanabe MF, Park HD, Chen GC, Chen G, Yu S- (1996) Detection of microcystins, a blue-green algal hepatotoxin, in drinking water sampled in Haimen and Fusui, endemic areas of primary liver cancer in China, by highly sensitive immunoassay. Carcinogenesis 17: 1317-1321. https://doi.org/10.1093/carcin/17.6.1317
- Valerianova Z, Dimitrova N, Vukov M, Atanasov T (Eds) (2015) Cancer incidence in Bulgaria, 2013. Bulgarian National Cancer Registery. 24. Paradigma Publisher
- Yu SZ, Chen G (1994) Blue-green algae toxins and liver cancer. Chin. J. Cancer Res. 6: 9-17. https://doi.org/10.1007/BF02672256