

ORAL ABSTRACTS

RADIOLOGICAL ASSESSMENT OF MARINE SPECIES IN NEUM BAY (BOSNIA AND HERZEGOVINA): IMPLICATIONS FOR ONE HEALTH AND FOOD SAFETY

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ABSTRACT

Environmental radioactivity is often an overlooked factor in the One Health framework, despite its potential to impact human health through bioaccumulation and trophic web transfer. This study presents a radiological assessment of marine species along Bosnia and Herzegovina's Adriatic coastline, using mussels (*Mytilus galloprovincialis*) and sea cucumbers (*Holothuria sp.*) as bioindicator species.

Samples from each species were collected from Neum Bay and analysed using gamma spectrometry. Activity concentrations of radionuclides K-40, Be-7, Pb-210, Cs-137 and Ra-226 were determined based on their characteristic gamma emission lines or those of their decay products. All activity concentrations are expressed on dry weight (d.w.).

In mussels, the dominant radionuclide was K-40 (340.6 Bq/kg), followed by Pb-210 (15.6 Bq/kg), Be-7 (14.5 Bq/kg), Cs-137 was present at low level (0.1 Bq/kg), and Ra-226 was below the detection limit (<0.4 Bq/kg). In contrast, sea cucumbers showed lower K-40 activity (123.4 Bq/kg), but higher levels of Pb-210 (49.8 Bq/kg), Be-7 (36.9 Bq/kg), and detectable Ra-226 (7.7 Bq/kg), while Cs-137 was not detected.

The activity concentration of Po-210 in *Mytilus galloprovincialis* was not measured directly, however it can be estimated using established relationship between Po-210 and Pb-210 observed in mussels, particularly from the MARIS program. Using a conservative ratio of 15:1, the estimated 210Po activity concentration in Neum Bay mussels is approximately 90 Bq/kg (f.w.).

From a public health perspective, it is likely that ingestion dose would be underestimated due to the absence of alpha-emitting Po-210 data in mussels. These findings highlight the importance of integrating environmental radionuclide monitoring into food safety and marine ecosystem protection strategies, particularly in under-monitored regions such as Bosnia and Herzegovina.

Keywords: Bioindicator species, environmental radioactivity, food safety, One Health, radionuclide risk

RADIOLOŠKA PROCJENA MORSKIH ORGANIZAMA U NEUMSKOM ZALJEVU BOSNE I HERCEGOVINE: IMPLIKACIJE ZA ONE HEALTH PRISTUP I SIGURNOST HRANE

SAŽETAK

Radioaktivnost okoliša često se zanemaruje unutar One Health pristupa, iako može imati značajan uticaj na ljudsko zdravlje putem bioakumulacije i prijenosa kroz trofički lanac. Ova studija prikazuje radiološku procjenu morskih vrsta duž jadranske obale Bosne i Hercegovine, koristeći dagnje (*Mytilus galloprovincialis*) i morske krastavce (*Holothuria sp.*) kao bioindikatorske vrste.

Uzorci obje vrste sakupljeni su u Neumskom zaljevu i analizirani gama spektrometrijskom metodom. Koncentracije aktivnosti radionuklida K-40, Be-7, Pb-210, Cs-137 i Ra-226 određene su na osnovu njihovih karakterističnih gama emisijskih linija ili linija produkata raspada. Sve vrijednosti izražene su na suhe mase (s.m.) uzoraka.

Kod dagnji je dominantni radionuklid bio K-40 (340,6 Bq/kg), zatim Pb-210 (15,6 Bq/kg), Be-7 (14,5 Bq/kg), dok je Cs-137 bio prisutan u niskoj koncentraciji (0,1 Bq/kg), a Ra-226 ispod granice detekcije (<0,4 Bq/kg). Nasuprot tome, morski krastavci su pokazali nižu aktivnost K-40 (123,4 Bq/kg), ali višu aktivnost Pb-210 (49,8 Bq/kg), Be-7 (36,9 Bq/kg), te Ra-226 (7,7 Bq/kg), dok Cs-137 u ovom slučaju nije detektovan.

Iako koncentracija aktivnosti Po-210 u dagnjama nije direktno mjerena, moguća je njena procjena na osnovu poznatog odnosa između Po-210 i Pb-210, koji je utvrđen u prethodnim istraživanjima, posebno kroz MARIS program. Primjenom konzervativnog omjera 15:1, procijenjena aktivnost Po-210 u dagnjama iz Neumskog zaljeva iznosi oko 90 Bq/kg po svježoj masi uzorka.

Iz perspektive javnog zdravstva, nedostatak direktnih podataka o alfa-emiteru Po-210 u dagnjama može dovesti do potcjenjivanja doprinosa stvarnoj godišnjoj efektivnoj dozi putem ishrane. Ova studija pokazuje potrebu za sistemskim uključenjem monitoringa radioaktivnosti u programe kontrole sigurnosti hrane i zaštite morskog okoliša, posebno u nedovoljno istraženim obalnim područjima poput Bosne i Hercegovine.

Ključne riječi: Bioindikatorske vrste, ekološka radioaktivnost, One Health, rizik od radionuklida, sigurnost hrane