What is the potential bioaccessibility of naturally occurring radionuclides in snus when consumed?

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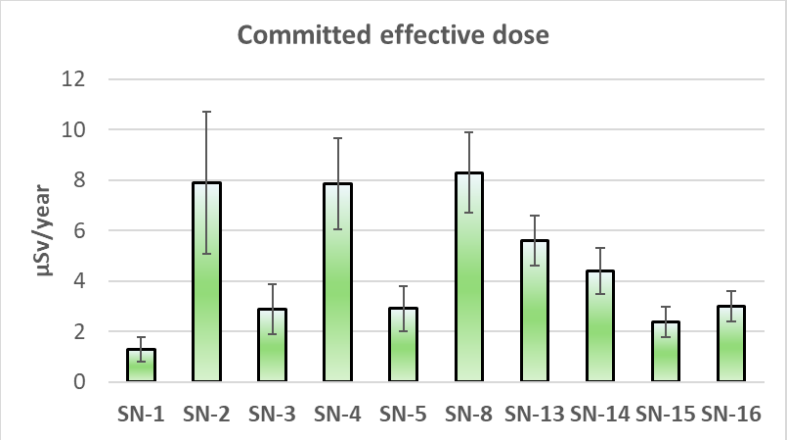
In Sweden, snus is the most common product of tobacco used, more than cigarettes[1]. Snus consumptions rate increases year by year, above all in adolescents and young adults, due to the perception of being less harmful[2]. Swedish snus contains carcinogenic ingredients such as tobacco-specific nitrosamines, high radiotoxicity naturally occurring radionuclides (e.g.^{210}Po), among others[2,3]. This study aimed to investigate the presence of naturally occurring radionuclides in snus, their bioaccessibility during consumption, and the associated radiological risks to consumers. A total of 16 samples were purchased from Swedish stores to reflect the national market. A radiological characterization of the samples was conducted through digestion, radiochemical processing, and alpha spectrometry analysis, focusing on ^{210}Po, ^{232}Th, ^{234}U, and ^{238}U. The activity concentrations of these radionuclides in the snus were calculated. A bioaccessibility study analysed the same radionuclides, simulating real-life snus use to estimate the fraction extracted by saliva.



The radiometric characterization revealed that ^{210}Po ranged from 2.4–3.0 mBq/g in loose snus and 1.2–5.1 mBq/pouch in pouched snus. For ^{232}Th, levels varied between 0.22–0.42 mBq/g in loose snus and 0.1–0.66 mBq/pouch in pouched snus. ^{234}U ranged from 0.22–0.27 mBq/g in loose snus and 0.07–0.21 mBq/pouch in pouched snus, while ^{238}U was between <0.04–0.23 mBq/g in loose snus and 0.08–0.26 mBq/pouch in pouched snus. Minimal or no activity was detected in tobacco-free snus (SN-9 – SN-12). The bioaccessibility study demonstrated that all samples transferred ^{210}Po into saliva, with leaching values ranging from 9 ± 3% to 34 ± 7%. Only a limited number of samples showed leaching of other radionuclides, and just one sample appeared to have transferred all radionuclides into saliva. The committed effective dose from one year of snus consumption attributed to ^{210}Po ranged between 1.3 - 8.3 µSv, averaging at 4.55 µSv.

References:

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