

ACTIVITY LEVELS OF GAMMA-EMITTERS AND BARIUM CONCENTRATIONS IN BRAZIL NUTS

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In recent years, nutritionists have suggested daily intake of a certain portion of Brazil nuts (*Bertholletia excelsa*, family Lecythidaceae) because of its high selenium concentration. In addition to selenium, it is known that barium and radium are also accumulated in Brazil nuts. Smith¹ also reported that the Brazil nut tree has a unique capacity for accumulating barium and radium in its fruit. This accumulation for Ba and Ra has been explained as a possible formation of organic complexes which increase the mobility of alkaline earth ions, particularly for these two elements, favoring their movement redistribution during fruit development. In addition, the soil of the Amazon region where the Brazil nuts grow on wild trees, is rich in the mineral Hollandite (Ba₂Mn₈O₁₆)².

Barium is not considered essential and can be toxic depending on its chemical form. The Ba²⁺ ion and the soluble compounds of barium (notably chloride, sulfide, nitrate, hydroxide) are toxic to animals and humans. Several radioactive substances are considered carcinogens (Group 1 agents), according to the IARC publication³. The carcinogenic activity is attributed to radiation, for example radiation emitted by Ra radionuclides (²²⁴Ra, ²²⁶Ra and ²²⁸Ra) and their decay products. In this study, the activity concentrations of: natural (²²⁶Ra, ²²⁸Ra, and ⁴⁰K) and artificial (¹³⁷Cs) radionuclides were evaluated by gamma ray spectrometry, and Ba concentration were determined by Instrumental Neutron Activation Analysis (INAA) in samples of Brazil nuts acquired in several points of sale between 2010 and 2013. The activity concentrations for the investigated samples ranged from: (0-26), (113–379), (20–80) and (17–317) Bq kg⁻¹ for ¹³⁷Cs, ⁴⁰K, ²²⁶Ra and ²²⁸Ra, respectively. Taking into account, the highest activity concentration obtained for each radionuclide and, assuming an annual consumption of 1.5 kg, the estimated annual effective dose due to ingestion of Brazil nuts is 27% of annual dose limit of 1 mSv y⁻¹ to the public exposure, according to ICRP⁴. Preliminary results for the Ba concentration showed a variation from 32.7 to 60.3 µg g⁻¹.

REFERENCES

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