

## **Assessment of natural radioactivity and associated radiological risks in selected fish from coast of Terengganu, Malaysia**

### **ABSTRACT**

Radionuclide concentrations in seawater and marine organisms are important inputs for assessing radiological impacts on human health and marine ecology. Among the notable radioactive elements are  $^{232}\text{Th}$ ,  $^{238}\text{U}$ , and  $^{40}\text{K}$  that were used to determine radiological risk. Since Malaysia is considered among the highest seafood consumers in the Southeast Asian region, it is important to assess the natural radioactivity, particularly in commercial fish coastal such as Terengganu. Herein, using the mentioned radioactive elements, calculation for annual effective dose and cancer risk concentration of radionuclides presence in fish was conducted. The ICP-MS technique was used to determine the levels of natural radionuclide  $^{232}\text{Th}$ ,  $^{238}\text{U}$  and  $^{40}\text{K}$  in five fish species taken from three locations along the coast of Terengganu, Malaysia. The activity concentration ranges from  $63.05 \pm 8.65$  to  $81.21 \pm 8.98$  for  $^{40}\text{K}$ ,  $7.67 \times 10^{-3} \pm 0.89 \times 10^{-3}$  to  $22.50 \times 10^{-4} \pm 7.15 \times 10^{-4}$  for  $^{232}\text{Th}$  and  $1.54 \times 10^{-3} \pm 0.10 \times 10^{-3}$  to  $5.20 \times 10^{-3} \pm 0.10 \times 10^{-3}$  for  $^{238}\text{U}$ . The results indicated that the annual effective doses ( $\text{mSv year}^{-1}$ ) for  $^{232}\text{Th}$ ,  $^{238}\text{U}$  and  $^{40}\text{K}$  were estimated to be  $1.49 \times 10^{-4}$ ,  $7.46 \times 10^{-6}$  and  $2.57 \times 10^{-2}$  respectively were significantly lower than the UNSCEAR recommendation. Assuming that an individual's life expectancy is 70 years, the cancer risk factor for adults is projected to be  $9.04 \times 10^{-5}$  based on the estimated annual effective dose. This number is significantly lower than the UNSCEAR cancer risk factor of  $8.4 \times 10^{-3}$  and ICRP cancer risk factor of  $3.5 \times 10^{-3}$ . The current study suggests that the dose obtained by the locals because of eating fish is relatively low, does not harm human health and is safe for consumption.