Fluorine Mapping in Sound and Carious Fissures of Human Teeth Using PIGE

H.Yamamoto¹, M.Nomachi², K.Yasuda³, Y. Iwami¹, N.Yamamoto⁴, T. Sakai⁵ and M. Fukuda

¹ Graduate school of Dentistry, Osaka University
²Graduate school of Science, Osaka University
³Wakasa-wan Energy Research Center
⁴Graduate school of Science, Kyoto University
⁵Advanced Radiation Technology, JAERI

It has been reported that the concentration of fluorine (F) is higher in the carious teeth than in the sound teeth. Complex structure of occlusal fissures of the human teeth has prevented the precise distribution of F. The occlusal fissures in the teeth are one of the places, which are very susceptible to caries. Therefore the studies of occlusal fissures may give a clue for clarifying the relation between F and caries. Here we firstly measured the F concentration at the sound and carious narrow fissures (about 20 μ m width) by using the PIGE (TIARA, Japan).

Human teeth with sound or carious fissures, collected from Osaka prefecture (Jpn.), were embedded in resin and cut through the fissure. F concentration around the fissure in the cut surface was scanned by PIGE. The teeth were grouped to three ranks (Sound, White and Dark). These groups correspond to no caries, incipient caries and advanced caries, respectively. Specimen number of each rank is n=5. A quantitative F measurement and mapping methods are the same as was already reported¹⁾. Location dependent F accumulation was observed both around sound and carious fissures. The maximum F concentration of each group ranged as follows: Sound = $3500 \sim 11700$ ppm (mean = 6000 ppm), White = $2400 \sim 10700$ ppm (mean = 6300 ppm), Dark = $5200 \sim 16900$ ppm (mean = 9300ppm). Although average F concentration of high value was observed in the carious fissures, maximum values of the F concentration showed little difference among three groups (P>0.05).

 H.Yamamoto, M.Nomachi, K.Yasuda, Y.Iwami, S.Ebisu, N.Yamamoto, T.Sakai, T. Sasaki and T.Kamiya; Nucl. Instr. And Meth.B 210 (2003) 388-394.