Contribution ID: **197** Type: **Poster**

Characterization Analysis of Benign or Malignant Microcalcifications Using Dual-Energy Imaging

Wednesday, 29 June 2022 16:45 (1 minute)

The purpose of this study is to distinguish and characterize breast microcalcification types (benign and malignant) non-invasively using a mass ratio based on the dual-energy method. In this study, a photon-counting spectral mammography system was simulated and dual-energy images were acquired using two energy bins. Two types of microcalcification were embedded in the breast phantom. Calcium oxalate (CO, CaC2O4) and calcium hydroxyapatite (HA, Ca5(PO4)3(OH)) were used for benign and malignant microcalcifications, respectively. As a quantitative characteristic evaluation for two types of microcalcification related to etiology, an analytical model was implemented for the determination of the Calcium/Phosphorus mass ratio (mCa/mP) based on the dual-energy method. In the chemical composition of each microcalcification, the calcium hydroxyapatite has a phosphate substance, and calcium oxalate has an oxalate substance. Because unknown microcalcification types should be characterized by attenuation intensity measurements, the calculation of mCa/mP uses linear attenuation coefficients of PO4 for all calcification types. The thicknesses of the CO corresponding to HA were calculated to preserve equal photon beam attenuation (Figure 1, Table 1). Figure 2 (a) shows the variation in the mass ratio of each microcalcification and indicates a higher mass ratio value in malignant microcalcification compared to benign. In these results, because the benign microcalcification used thicker, the difference in mass ratio calculated at the same thickness will be greater. Figure 2 (b) shows the comparison of the mass ratio of HA and CO according to breast thickness. Although the breast thickness increased to 3, 4, and 5 cm, the difference in mass ratio showed a similar tendency. We demonstrated that it is possible to quantitatively distinguish the two types of microcalcification using a mass ratio based on the dual-energy method. Therefore, we propose a mineral characterization method as a quantitative analysis criterion for non-invasively differentiating between malignant and benign.

Primary author: Dr KIM, Hyemi (Wonju Severance Christian Hospital, Yonsei University Wonju College of Medicine)

Co-authors: Prof. KIM, Hee-Joung (Yonsei University); Mr LEE, Minjae (Yonsei University)

Presenter: Dr KIM, Hyemi (Wonju Severance Christian Hospital, Yonsei University Wonju College of Medicine)

Session Classification: Poster