AbstractID: 1487 Title: Computerized methods for determining respiratory phase on dynamic chest radiographs obtained by a dynamic flat-panel detector (FPD) system

Chest radiography using a dynamic flat-panel detector (FPD) system with computer analysis of respiratory kinetic has potential for diagnosing certain pulmonary disease. In order to analyze respiratory kinetics validly in diagnosis, the associating the kinetics with the respiratory phase is crucial. The purpose of this study was to develop several methods for determining respiratory phase on dynamic chest radiographs obtained by a dynamic FPD system. We also investigated an accuracy of each method. Dynamic chest radiographs during respiration were obtained 30 frames in 10 seconds by using a modified FPD system (CXDI-40G, Canon Inc., Tokyo, Japan). Exposure conditions were 110 kV, 80 mA, 6.3 msec, attached 2.0 m Al filter, 3 frames per second, and SID=2m. We studied four methods for determining respiratory phase based on the analysis of diaphragmatic level measured by edge detection technique, summation of pixel values in a region of interest (ROI) covering both lung fields, the residual derived from subtraction between each frame and a minimum intensity projection (MIP) image created from dynamic chest radiographs, and respiratory vectors of lung structures measured by a cross-correlation technique. According to our result, the method based on summation of pixel value in a ROI was most accurate and stable. Information about respiratory phase obtained by our methods would improve the accuracy for evaluating respiratory kinetics, such as sequential lung recognition and the trace of certain target in the lung.

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