AbstractID: 5548 Title: CAD scheme for early detection of osteoporosis: Quantitative analysis of vertebral fractures on lateral chest radiographs

Purpose: To develop a computerized method for detection of vertebral fractures on lateral chest radiographs and to help radiologists' diagnosis by using computer output as a "second opinion".

Method and Materials: As an initial test, we examined our computerized method by using a small database (three fractured and three "normal" cases). Our computerized method was based on detection of upper and lower edges of vertebrae. The vertebral area was determined by using the posterior skinline. This vertebral area, the shape of which was curved in general, was straightened into the rectangle so that upper and lower edges of vertebrae would be oriented approximately horizontally. Horizontal-line components were enhanced by using a line-enhancement filter, and vertebral upper and lower edges on the line-enhanced image were detected by using a multiple thresholding technique followed by feature analysis. In some cases, straightening of vertebral area was inadequate. Therefore, second-straightening was provided by using left and right locations of detected vertebral edges. Vertebral heights were estimated from detected edges. Finally, fractured vertebrae were identified by estimated vertebral heights. For evaluation of detected edges by computer, three radiologists provided three vertebral edge locations (anterior, middle, and posterior) for vertebral edges, and their results were averaged as reference standard.

Results: With our method, all of cases with fractured vertebrae were identified correctly with 0.16 false-positive detections per case. The locations of vertebral-edge points detected by computer were very close to the corresponding points determined by radiologists. Results on our computerized detection scheme will be presented for 49 cases (20 cases with fractured vertebrae and 29 normal cases).

Conclusions: We developed a computerized scheme for detection of vertebral fractures on lateral chest radiographs. Our preliminary result indicates that vertebral fractures on lateral chest radiographs can be detected by computer.

Conflict of Interests: KD: shareholder, R2 Technology Inc.