Novel Automatic Detection of Pleura and B-lines (Comet-Tail Artifacts) on In-Vivo Lung Ultrasound Scans.

This paper presents a novel automatic method for detection of B-lines (comet-tail artifacts) in lung ultrasound scans. B-lines are the most commonly used artifacts for analyzing the pulmonary edema. They appear as laser-like vertical beams, which arise from the pleural line and spread down without fading to the edge of the screen. An increase in their number is associated with presence of edema. All the scans used in this study were acquired using a BK3000 ultrasound scanner (BK Ultrasound, Denmark) driving a 192-element 5.5 MHz wide linear transducer (10L2W, BK Ultrasound). The dynamic received focus technique was employed to generate the sequences. Six subjects, among those three patients after major surgery and three normal subjects, were scanned once and Six ultrasound sequences each containing 50 frames were acquired. The proposed algorithm was applied to all 300 in-vivo lung ultrasound images. The pleural line is first segmented on each image and then the B-line artifacts spreading down from the pleural line are detected and overlayed on the image. The resulting 300 images showed that the mean lateral distance between B-lines detected on images acquired from patients decreased by 20% in compare with that of normal subjects. Therefore, the method can be used as the basis of a method of automatically and qualitatively characterizing the distribution of B-lines.