PURPOSE: Radiologists routinely compare multiple radiographs of the same patient to identify interval change in anatomy and pathology. The temporal subtraction images that facilitate this comparison have been limited to posteroanterior radiographs. Since the lateral view provides diagnostically important information, the purpose of this study was to develop an automated method for the subtraction of temporally sequential lateral chest radiographs and to evaluate the quality of the resulting images.

METHOD and MATERIALS: An automated method was developed to digitally subtract pairs of lateral chest radiographs. First, multiple rotated versions of the "previous" lateral radiograph were generated. For each of the rotated previous images, the apex of the lungs was identified through gray-level profile analysis. A 251 x 215 mm subimage was then extracted near the apex and used as a template for cross-correlation with the "current" radiograph. The translation and rotation parameters that yielded the highest correlation were used to rigidly transform the "previous" radiograph, which was then subtracted from the current radiograph to yield the temporal subtraction image. 30 pairs of lateral chest radiographs were subtracted. An observer rated the quality of each temporal subtraction image using a 1 ("very poor") to 5 ("excellent") scale.

RESULTS: The average registration accuracy rating was 4.0. 83% (25/30) of the subtraction images were rated as "acceptable" or better (3.0 or higher).

CONCLUSION: Our technique for the automated subtraction of temporally sequential lateral chest radiographs generates a high percentage of subtraction images with acceptable registration accuracy. Such a method is expected to provide a valuable supplement to the conventional posteroanterior temporal subtraction images that have proven beneficial in the diagnostic evaluation of interval change in chest radiography.