PI Name	Institution	Title	Project	Years Awarded	Funding Institute
Dobbins, James T	Duke University	Tomosynthesis For Improved Pulmonary Nodule Detection	CA080490	3 years	NCI

Abstract: DESCRIPTION (Adapted from Applicant's Abstract): The purpose of these studies is to develop and evaluate a method for improving clinical detection of pulmonary nodules, using a technique known as digital tomosynthesis. Digital augments a conventional chest exam by providing three-dimensional information through a series of longitudinal slice images. These slice images are reconstructed from a set of discrete projection images acquired at different angles, using a conventional x-ray tube and a new digital flat-panel x-ray detector. The tomosynthesized images may be viewed slice-by-slice or as a 3-D volume-rendered projection in a "virtual fluoroscopy" viewing environment. The diagnostic benefit of tomosynthesis is the use of 3-D information to improve detection and discrimination of pulmonary nodules by eliminating the confusion of overlying structures. CT would remain the gold-standard for clinical workup once nodules are detected, with tomosynthesis providing a low-dose/low-cost method for improving initial detection accuracy. Clinically the tomosynthesis images would be acquired whenever a digital PA/lateral chest exam is scheduled, but with the lateral image acquired at half the conventional exposure level. The results, using the new flat-panel detector, would be a PA film with improved image quality, a lateral with conventional image quality, and a three-dimensional tomosynthesis data set, all acquired at an overall exposure comparable to a standard screen-film PA/lateral chest exam. Three different tomosynthesis algorithms will be investigated in this proposal: traditional shift-and-add tomosynthesis, a Tuned Aperture Computed Tomography (TACT) algorithm with improved registration of images, and a Matrix Inversion Tomosynthesis (MITS) algorithm for improved elimination of residual blurring from structures not in the plane of interest. The specific aims of the project include: construction of a digital tomosynthesis chest system; improvement of the MITS algorithm; development of a three-dimensional viewing environment; optimization of image acquisition geometry; evaluation of tomosynthesis artifacts; optimization of patient dose; comparison of MITS, TACT, and "conventional" tomosynthesis; and a clinical test of the hypothesis that tomosynthesis improves the detection of pulmonary nodules over what is possible with conventional radiography.