The Lung Image Database Consortium (LIDC) :
Fundamental Issues for the Creation of a Resource for the Image Processing Research Community

Samuel G. Armato III, PhD[1], Laurence P. Clarke, PhD[2], Geoffrey McLennan, MD[3], Michael F. McNitt-Gray, PhD[4], Chuck R. Meyer, PhD[5], David Yankelevitz, MD[6], Denise R. Aberle, MD[4], Barbara Y. Croft, PhD[2], Claudia I. Henschke, MD, PhD[6], Eric A. Hoffman, PhD[3], Ella A. Kazerooni, MD[5], Heber MacMahon, MD[1], Anthony P. Reeves, PhD[6], Nicholas Petrick, PhD[7], Robert Wagner, PhD[7], David Gur, PhD[8], Lori Dodd, PhD[2], Carl Jaffe, MD[2], Peyton H. Bland, PhD[5], Keith Brautigam, BA[3], Matthew S. Brown, PhD[4], Barry De Young, MD[3], Roger Engelmann, MS[1], Andinet Enquobahrie, MS[6], Carey E. Floyd, Jr., PhD[9], Junfeng Guo, PhD[3], Aliya Husain, MD[1], Gary Laderach[5], Charles E. Metz, PhD[1], Brian Mullan, MD[3], Richard Pais, BS[4], Christopher Piker, BS[3], James Sayre, DrPH[4], Adam Starkey[1]

[1]Department of Radiology, University of Chicago, [2]Cancer Imaging Program ,National Cancer Institute, [3] University of Iowa Roy J. and Lucille A. Carver School of Medicine, [4]David Geffen School of Medicine, University of California, Los Angeles, [5]Department of Radiology, University of Michigan Medical School, [6]Weill Medical College of Cornell University, [7]U.S. Food and Drug Administration, [8]Department of Radiology, University of Pittsburgh, [9]Department of Radiology, Duke University

THE LIDC AND ITS MISSION

The LIDC is a Consortium of 5 Institutions funded by the National Cancer Institute under the Cancer Imaging Program (CIP). These institutions are:

* **The University of Chicago**
* **University of Iowa Roy J. and Lucille A. Carver School of Medicine**
* **The David Geffen School of Medicine at UCLA**
* **Weill Medical College of Cornell University**
* **The University of Michigan Medical School**

Members of other institutions also participate in key roles such as statistical design.

MISSION

The mission of the LIDC is the sharing of lung images, especially low-dose helical CT scans of adults screened for lung cancer, and related technical and clinical data for the development and testing of computer-aided diagnosis (CAD) technologies.

PRINCIPAL GOALS

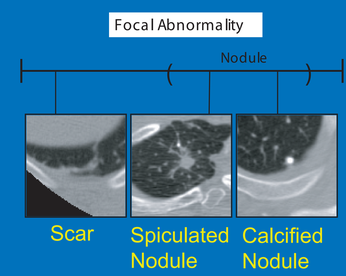
To establish standard formats and processes for managing thoracic CT scans and related technical and clinical data for use in the development and testing of CAD algorithms.

To develop an image database as a web-accessible international research resource for the development, training, and evaluation of CAD methods for lung cancer detection and diagnosis using helical CT.

CHALLENGES IN CONSTRUCTING THE DATABASE

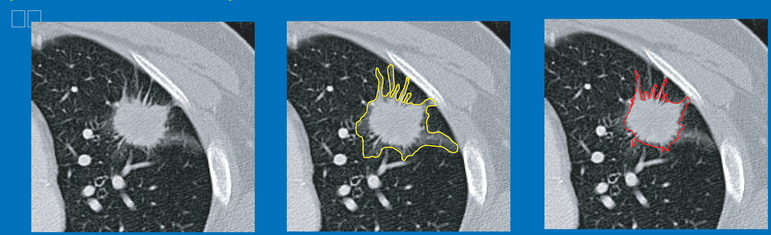
1. Defining a Nodule- The Nodule Visual Library

Written definitions are problematic. We are developing a Nodule Visual Library. This will attempt to describe the full spectrum of "Focal Abnormalities, " of which Nodules are a subset.



2. Establishing Spatial "Truth" for Nodule Boundary

Consensus on boundary is also difficult to arrive at (see below). We will assess reader variability of contours and construct a probabilistic description of boundaries.



Spiculated Nodule | Expert 1 Contour Includes all components | Expert 2 Contour Includes sold/core part

VISIT THIS EXHIBIT FOR CME CATEGORY 1 CREDIT
MONDAY THRU THURSDAY
12:15 pm to 1:15 pm

At that time, LIDC members will be here to describe
* **The efforts of the consortium,**
* **This exhibit and any other questions you might have**
* **Demonstrate some of the boundary drawing/contouring tools**

DATABASE IMPLEMENTATION STEPS

TASKS COMPLETED (see current reports on website):
(1) Specification of Inclusion Criteria:
(a) CT scanning technical parameters
(b) Patient inclusion criteria
(2) Process Model for Data collection
(a) Determination of Spatial "truth" Using Blinded and Unblinded reads
(3) Development of Boundary Drawing/Contouring Tools

TASKS ONGOING (expected completion date):
(1) Definition of Nodule - Nodule Visual Library (Feb 04)
(2) Evaluation of Boundary Variability (Feb 04):
(a) Inter-Reader Variability
(b) Boundary Drawing Tool Variability

IMPLEMENTATION TIMELINE

Task	Date Expected
Specify Complete Data Model	Jan 04
Specify LIDC internal workflow	Jan 04
Data passing, Performing reviews	
Initial implementation, testing of workflow	Jan/Feb 04
Database Implementation- Start	Jan 04
Database Implementation- Completion	Mar/Apr 04
Implementing Public Interface to Database	Apr/May 04

PUBLIC ACCESS TO CASES - EXPECTED MAY/JUN 04

LIDC WEBSITE

Overview - www3.cancer.gov/bip/steer_lidc.htm
Committee Reports - www3.cancer.gov/bip/lidc_comm.htm
Contains publicly available documents describing inclusion criteria, process model details, etc.