The Lung Image Database Consortium (LIDC): Mission, Motivation, and Members

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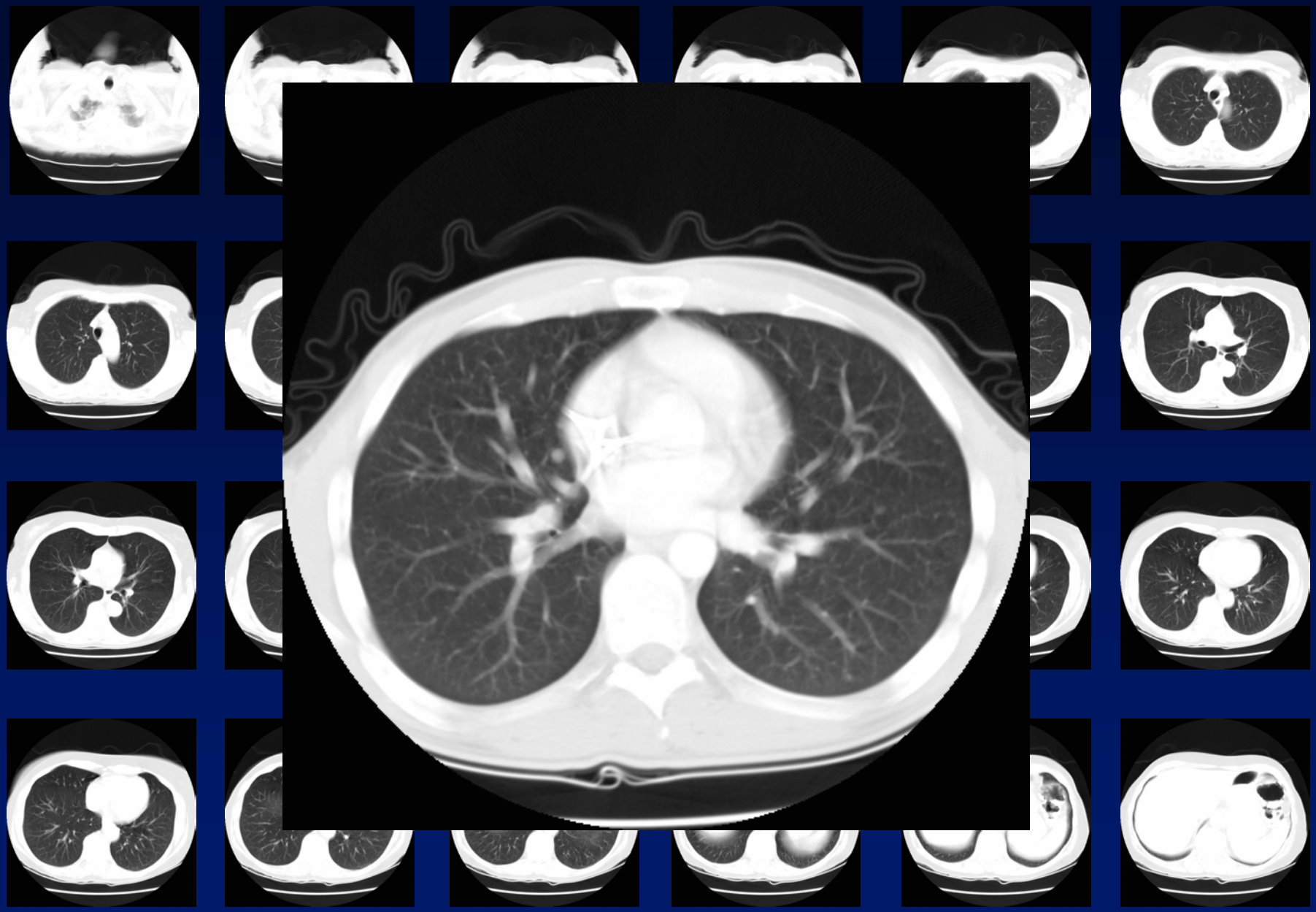
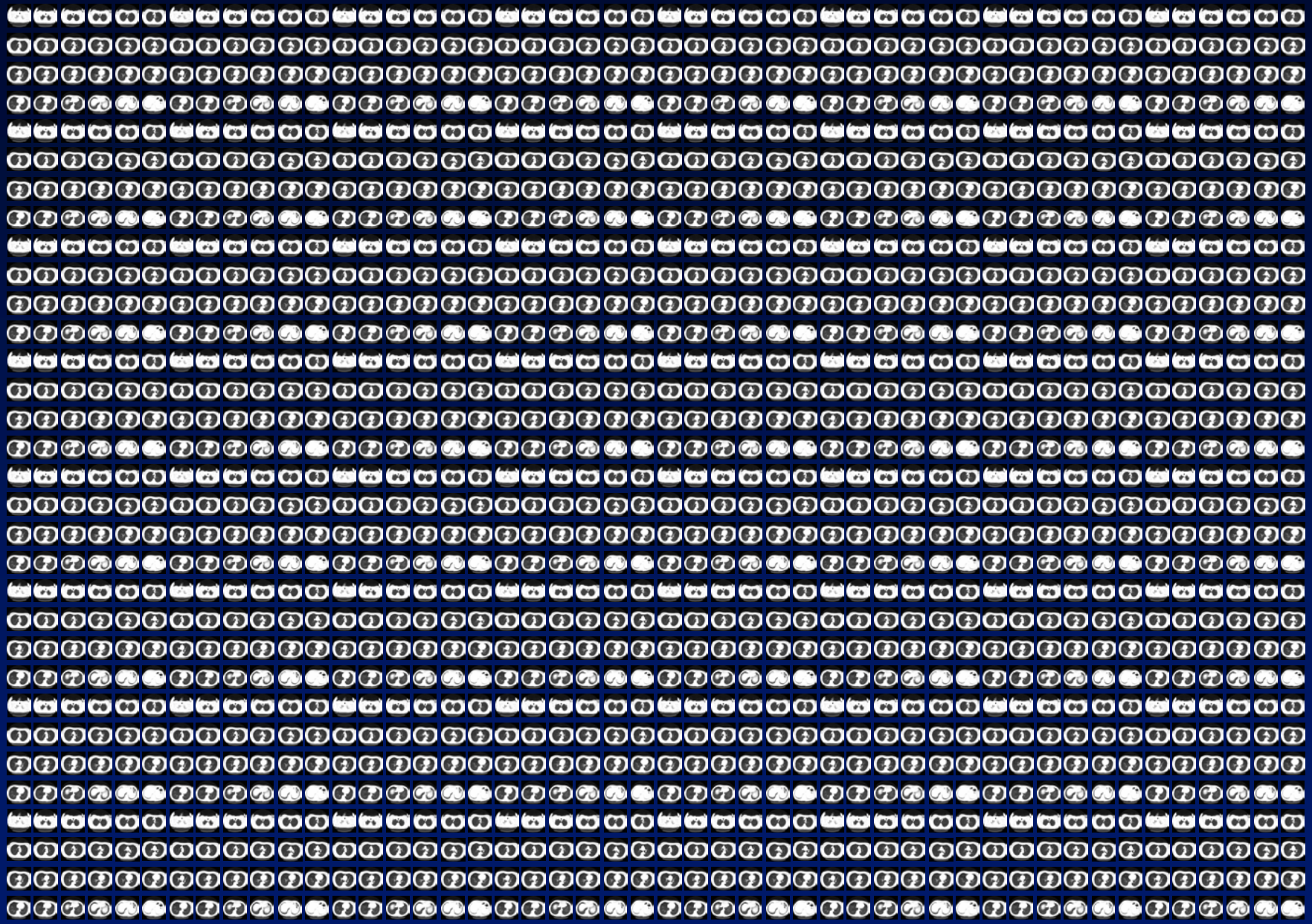
Motivation

- More CT scans are being acquired for diagnostic and screening purposes.
- Each CT scan generates a large amount of image data for radiologist interpretation.





Motivation

- Radiologists are under an increased burden to:

  (1) identify all abnormal lesions on CT

  (2) reduce the number of unnecessary biopsies

Motivation

- A diagnostic task in radiology generally has two components:

Motivation

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  (1) appreciation of the presence of an abnormality

Motivation

- A diagnostic task in radiology generally has two components:

  (1) "The Detection Task"

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  (1) "The Detection Task"

  (2) assessment of lesion "severity"

Motivation

- A diagnostic task in radiology generally has two components:

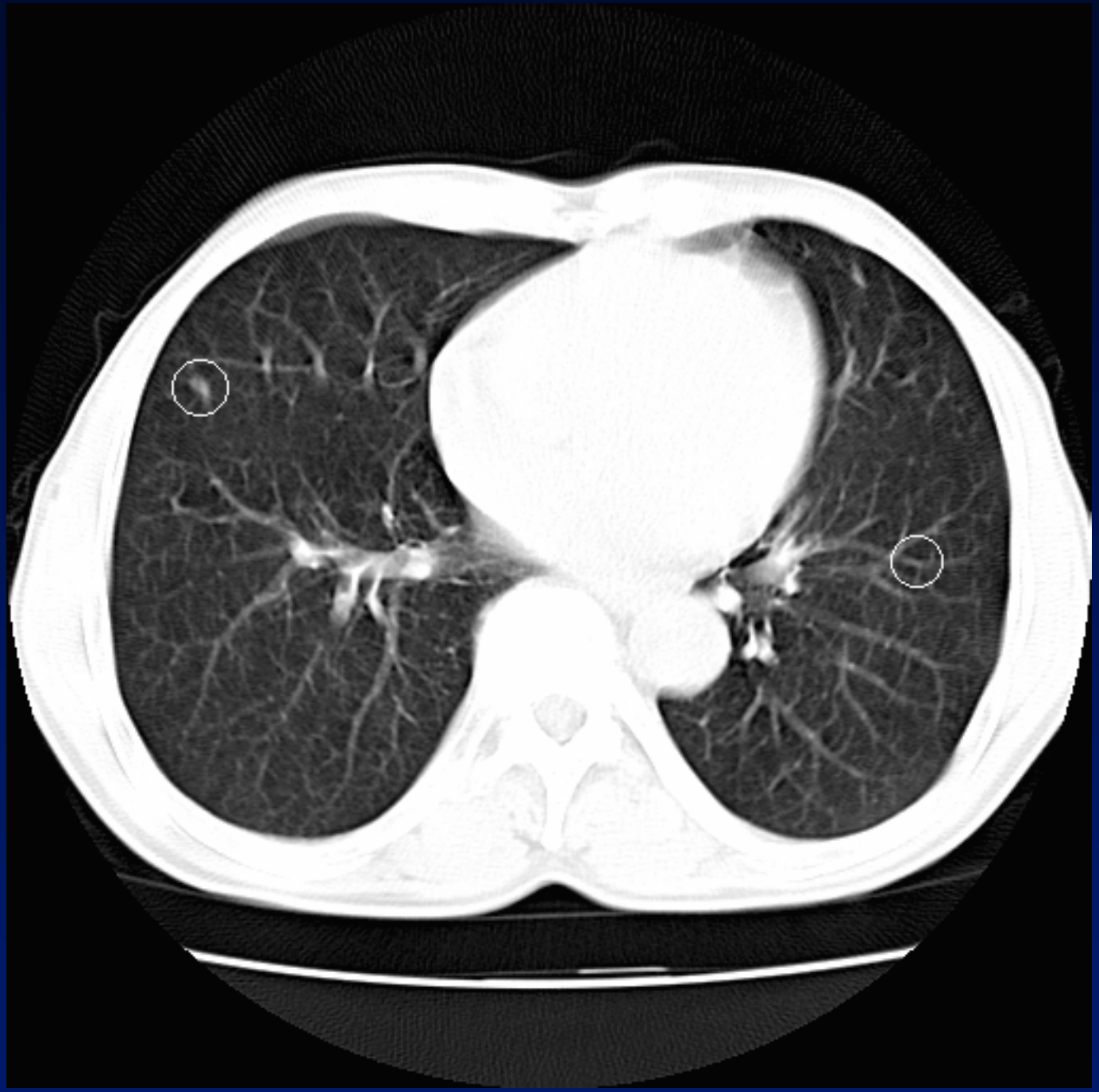
  (1) "The Detection Task"

  (2) "The Classification Task"

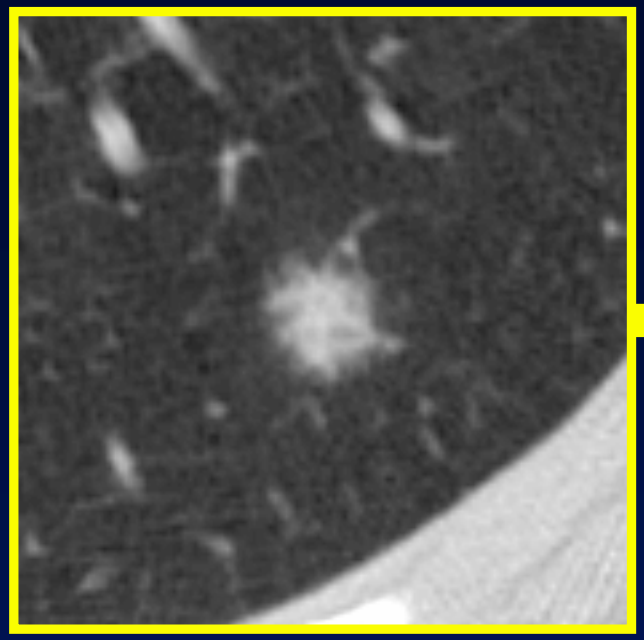
Motivation

- Image processing and computer vision techniques may be developed to facilitate these tasks through a paradigm known as "computer-aided diagnosis" (CAD)

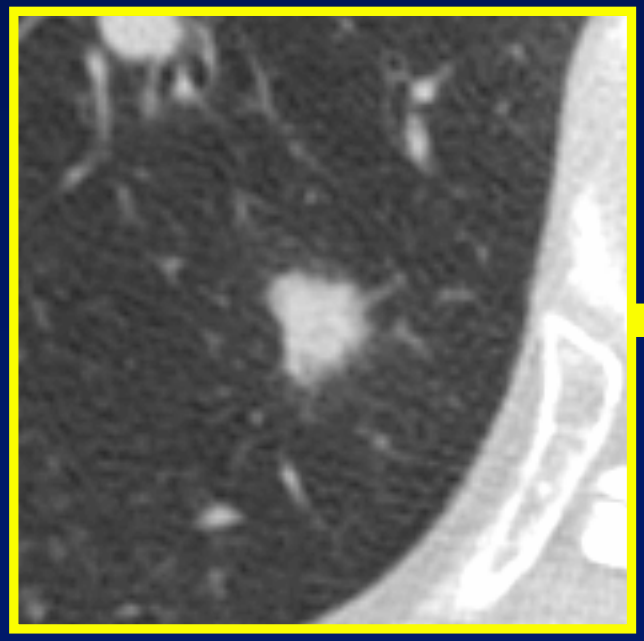
Detection Task



Classification Task



80% likelihood of malignancy



20% likelihood of malignancy

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(1) provide data to researchers without access to clinical images

(2) allow for meaningful comparisons of different CAD methods

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- Five applicant institutions selected to form the Lung Image Database Consortium (LIDC).

- The NCI represented in the LIDC by:

Laurence P. Clarke
Barbara Y. Croft

Member Institutions

Cornell University

UCLA

University of Chicago

University of Iowa

University of Michigan

Steering Committee

Cornell University	David Yankelevitz Claudia I. Henschke
UCLA	Michael F. McNitt-Gray Denise R. Aberle
University of Chicago	Samuel G. Armato III Heber MacMahon
University of Iowa	Geoffrey McLennan Eric A. Hoffman
University of Michigan	Charles R. Meyer Ella Kazarooni

Other Participants

Anthony Reeves, Cornell University

David Gur, University of Pittsburgh

Ed Staab, NCI

Lori Dodd, NCI

Robert F. Wagner, FDA

Nicholas Petrick, FDA

Michael Vannier, NCI

Daniel Sullivan, NCI

Carey Floyd, Duke University

Houston Baker, NCI

Mission

- "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 computed tomography (CT)."

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- "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 computed tomography (CT)."

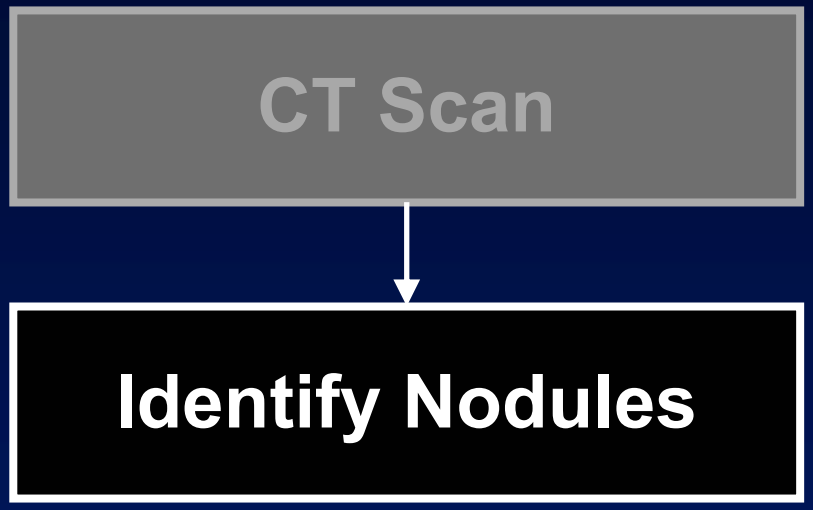
- "The database should enable the correlation of performance of CAD methods for detection and classification of lung nodules with spatial, temporal and pathological ground truth."

Methods

CT Scan

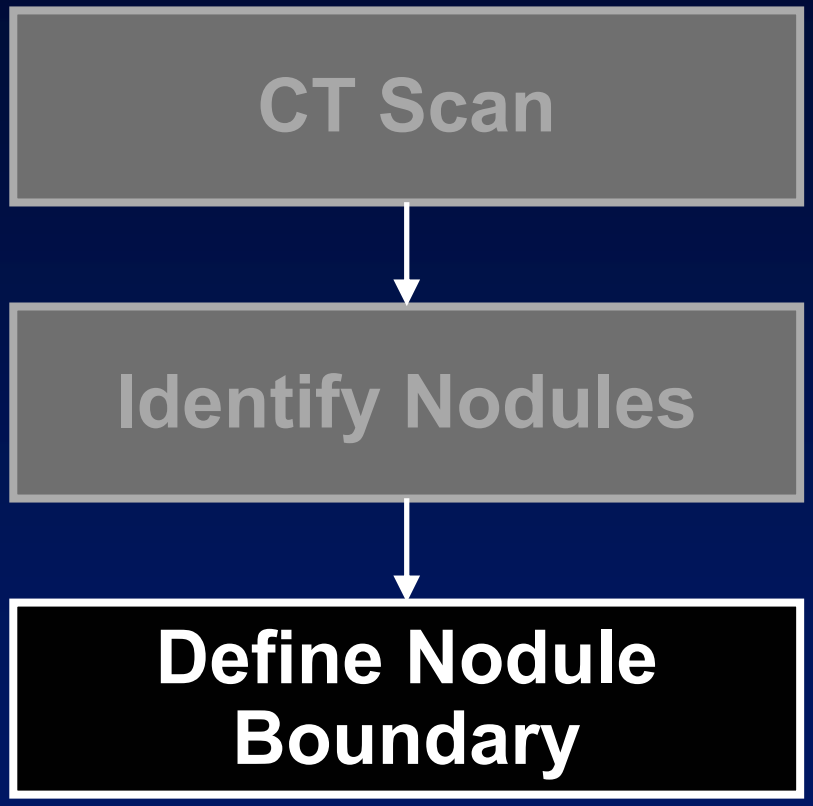
- Low-dose screening CT scans and standard-dose diagnostic CT scans
- Technical factors
- Acceptable image quality
- Artifacts

Methods



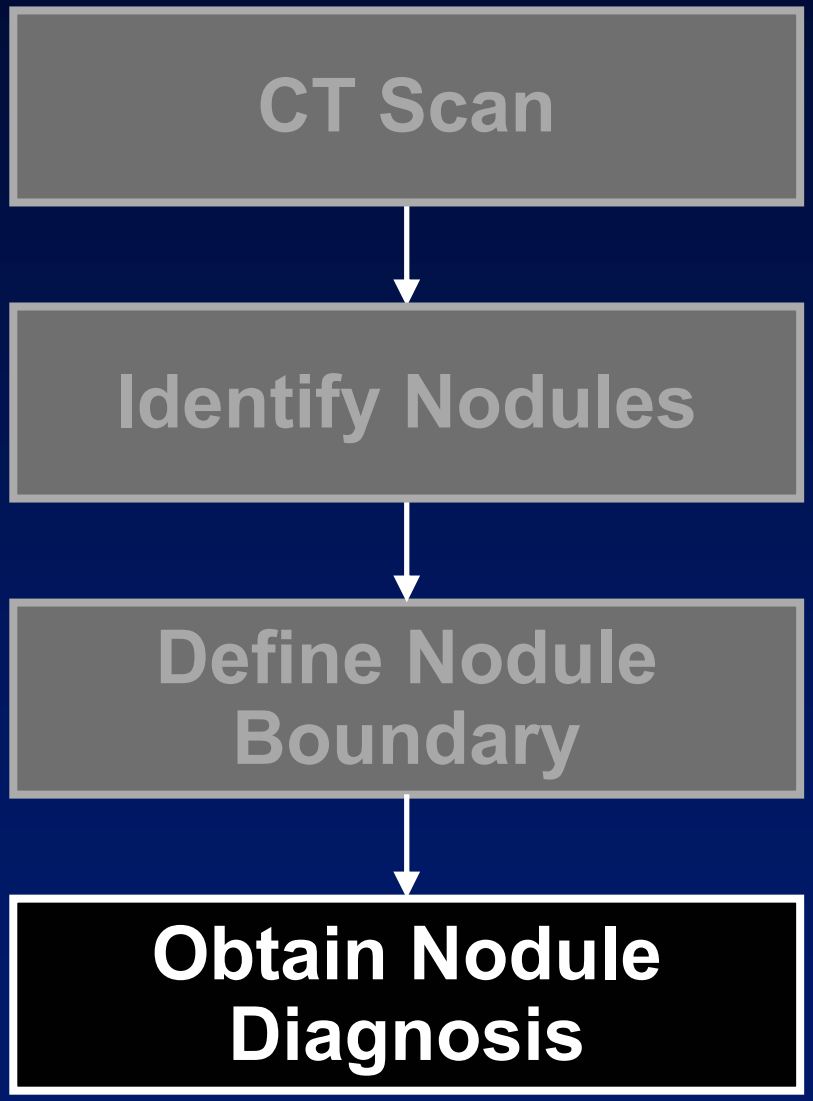
- Definition of nodule
- Other “non-qualifying” abnormalities
- Confidence that a nodule is present at a specific location
- Subjective evaluation of nodule characteristics

Methods



- Boundary definition approach
- Capture probabilistic boundary information

Methods



- Define subdivisions of pathologic diagnoses
- Independent evaluation by pathologists with arbitration

Methods

- Information from this process will be captured in the fields of a relational database.

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- Decisions must be made regarding

  (1) <u>what</u> information to capture and

  (2) <u>how</u> to capture it.