

Integrating AI Into the Lung Health Workflow

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Disclosures

- Accumetra, LLC shareholder
- Kitware, LLC shareholder
- Kitware, Inc shareholder

Generative AI



Generative AI Gone Wrong



Salmon Swimming Down River



More Seriously...



Bottom line: AI Can Make Shockingly Bad Mistakes.
So We Need To Be Very Careful How We Deploy In Mission Critical Situations.

Recent LinkedIn Post

 **Chuck Hatt** commented on this ...

 **Tarek Roustom, MD** · 2nd
Transforming healthcare data into impact [+ Follow](#)
2h · Edited · 

Can generating synthetic medical images be the next big trend in healthcare AI !?

Imagine the patient having to go through a single body scan, while the software takes care of generating images in different modalities. This might be still far away, but early signs of success are already here 📌

✅ **Philips** has recently gained FDA clearance for MRCAT, an application for generating synthetic CT images from MR scans, allowing physicians to plan radiotherapy in soft tissue tumors of the head and neck using one modality.

✅ A similar software is BoneMRI by **MRiguidance**, which also uses MR scans to reconstruct CT-like images of the spine and pelvis, allowing for accurate diagnosis of bone lesions without radiation.

Do you know of any similar products? and which modalities do you think are next?



Chuck Hatt · 1st 2d ...

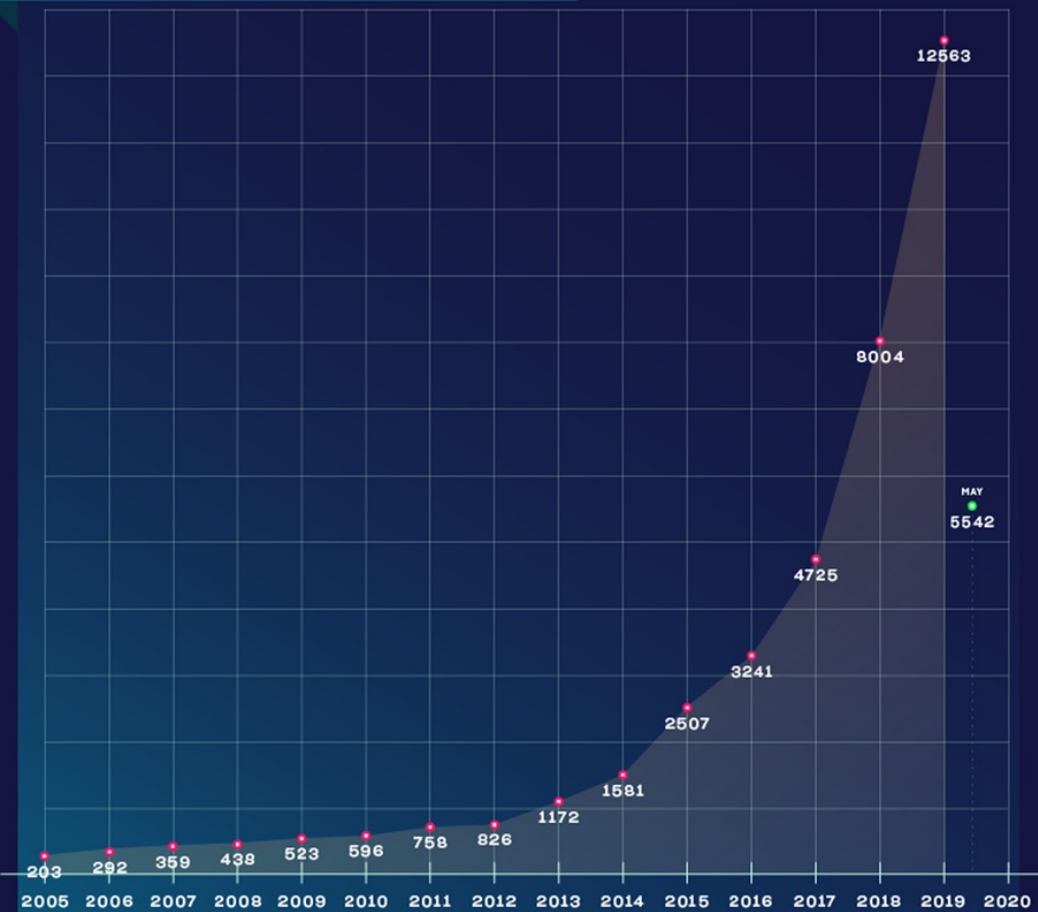
AI for automated medical imaging analysis and diagnosis

Someone is going to get really hurt by this. You can't fool physics forever.

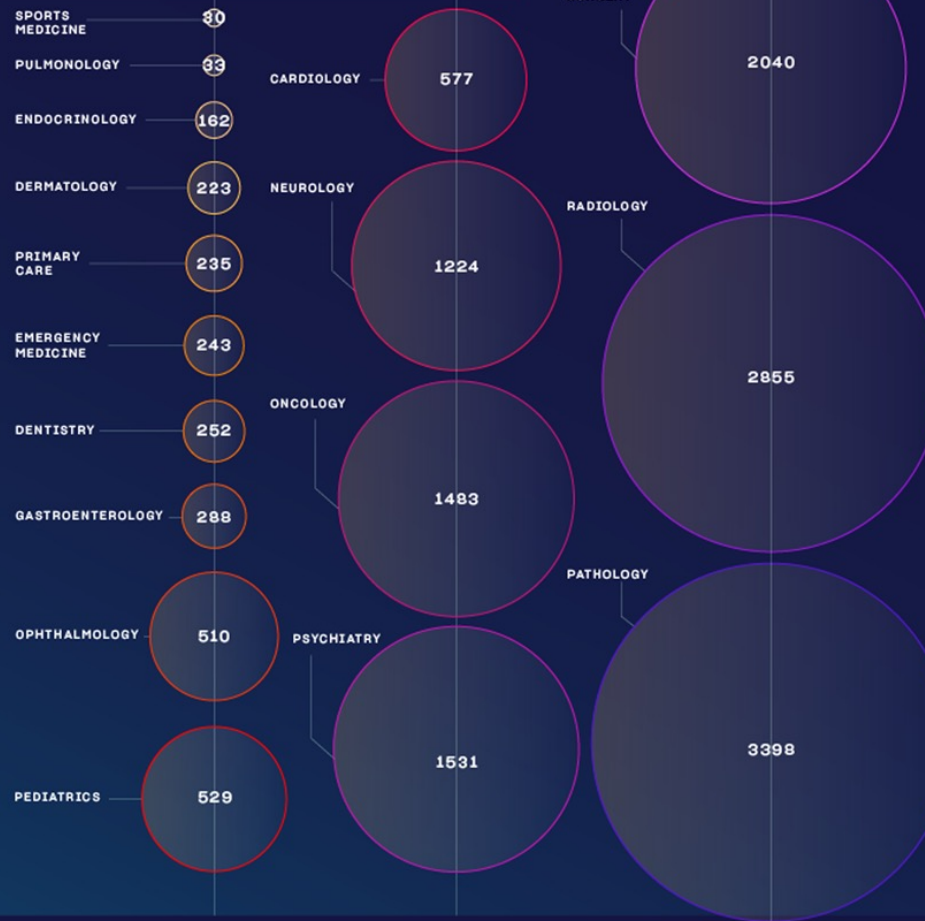
Like ·  3 | Reply · 3 Replies

a MACHINE AND DEEP LEARNING STUDIES ON PUBMED.COM

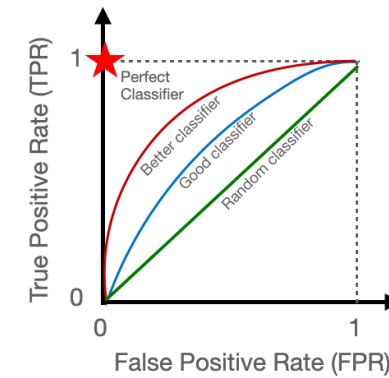
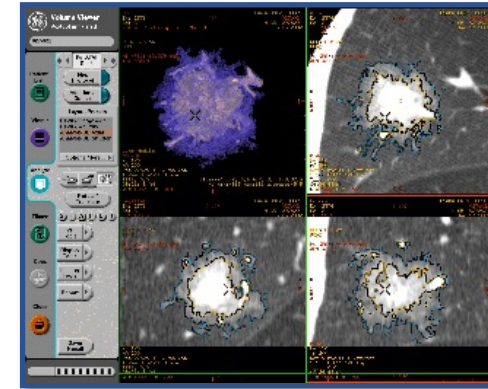
TOTAL NUMBER OF STUDIES



STUDIES PER SPECIALTY



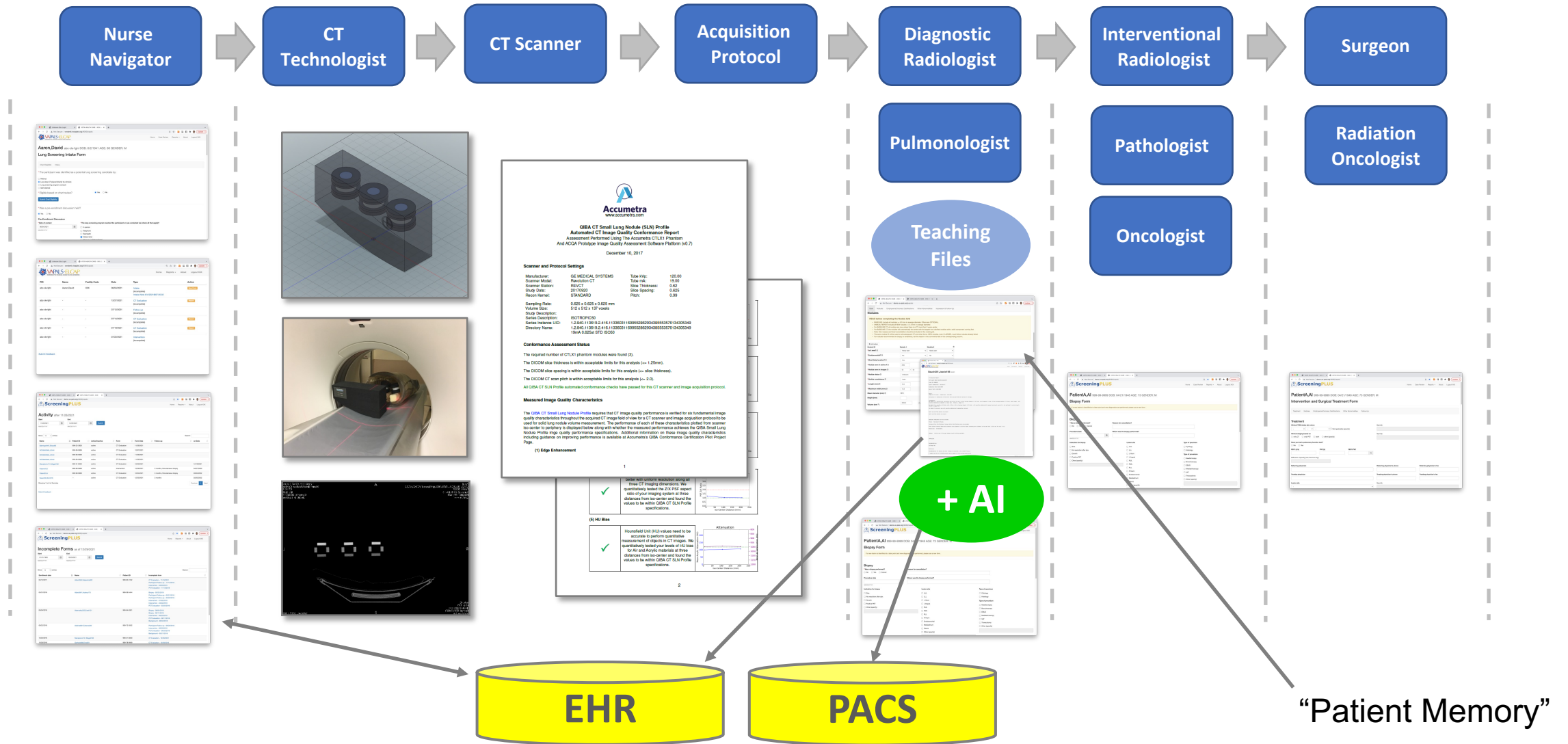
Artificial Intelligence For CT Lung Cancer Screening



Traditional Role: 2nd Reader, Place Lung Nodule Detection Markers on CT Images

VAPALS-ELCAP / ScreeningPLUS

Running At The
Phoenix VAMC &
Nashville VAMC



CT Evaluation Form

VISTA HEALTH CARE - XXX: C x VISTA HEALTH CARE - XXX: C x +

Not Secure | vendev6.vistaplex.org:9080/vapals

Scan Nodules Emphysema/Coronary Calcifications Other Abnormalities Impression & Follow-Up

Nodules

READ before completing the Nodule Grid

- BASELINE: Include all nodules ≥ 6.0 mm in average diameter. Others are OPTIONAL.
- ANNUAL REPEAT: Include all NEW nodules ≥ 3.0 mm in average diameter.
- For BASELINE CT, all nodules are new unless there is a CT more than 3 years earlier.
- For BASELINE CT, the nodules will automatically be sorted with the largest non-calcified nodules with a solid component coming first.
- Note: hilar masses and focal consolidation should be included in the nodule grid.
- The same nodule ID will be used on all subsequent CT and other forms. NEW nodules, even if LARGER, must follow nodules already listed.
- For nodules recommended for biopsy or antibiotics, list the reason in the comments field in the corresponding column.

+ Add nodule

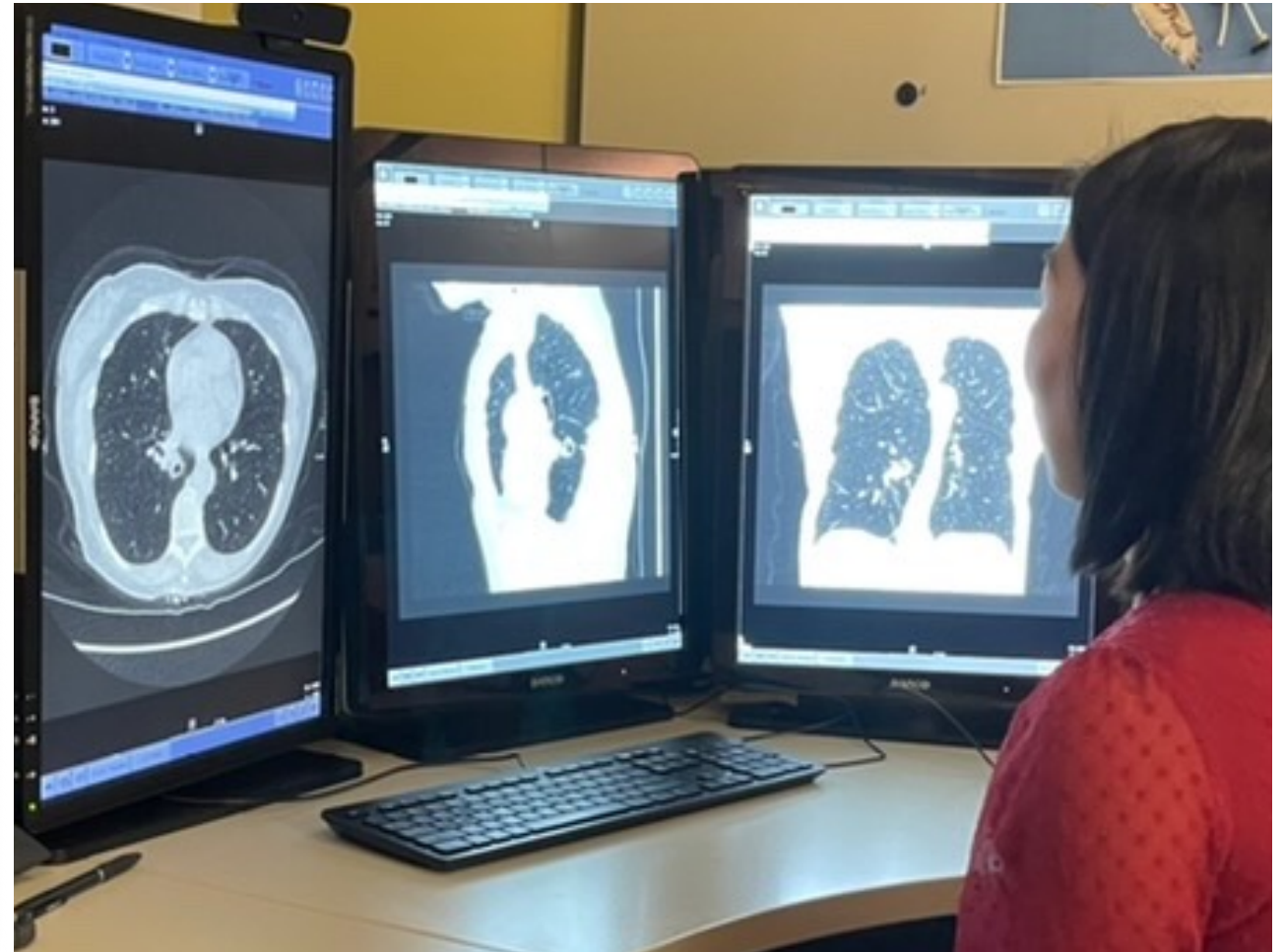
Nodule ID	Nodule 1
*Is it new? [Ⓢ]	Newly seen [Ⓢ]
*Endobronchial? [Ⓢ]	No [Ⓢ]
*Most likely location? [Ⓢ]	LUL [Ⓢ]
*Nodule seen in series [Ⓢ]	1 [Ⓢ]
*Nodule seen in images [Ⓢ]	100 - 107 [Ⓢ]
*Nodule status [Ⓢ]	Unknown [Ⓢ]
*Nodule consistency [Ⓢ]	Solid [Ⓢ]
*Length (mm) [Ⓢ]	9.0 [Ⓢ]
*Maximum width (mm) [Ⓢ]	9.0 [Ⓢ]
Mean diameter (mm) [Ⓢ]	9.0 [Ⓢ]
Height (mm) [Ⓢ]	9.0 [Ⓢ]
Volume (mm ³) [Ⓢ]	381.7 [Ⓢ] Calculate
*Solid comp. of part-solid [Ⓢ]	length x width [Ⓢ]
Solid mean diameter(mm) [Ⓢ]	- [Ⓢ]
Smooth edges [Ⓢ]	<input type="checkbox"/> Yes [Ⓢ]
Spiculated [Ⓢ]	<input type="checkbox"/> Yes [Ⓢ]
Calcifications [Ⓢ]	<input type="checkbox"/> Yes [Ⓢ]
Index Nodule [Ⓢ]	<input type="checkbox"/> [Ⓢ]
Distance from the costal pleura (mm)? [Ⓢ]	<input type="text"/> [Ⓢ]
Action [Ⓢ]	- [Ⓢ]
Comment [Ⓢ]	<input type="text"/> [Ⓢ]
Pathologic diagnosis [Ⓢ]	-For Pathology Use Only- [Ⓢ]

+ Add nodule

Small non-calcified nodules are present

Small calcified nodules are present

Emphysema/Coronary Calcifications



CT Evaluation Form

Automated Radiology Report

ScreeningPLUS Home Case Review Reports About Logout XXX

DOE9000004,JOHN 999-99-9999 DOB: 03/02/2000 AGE: 21 GENDER: F

CT Evaluation Form

Scan Nodules Emphysema/Coronary Calcifications Other Abnormalities Impression & Follow-Up

Scan information

*CT study date
01/01/2000

Signing radiologist Radiologist

Clinical Information

Type of exam
Baseline Annual repeat Follow-up (not annual repeat)

Nodules

READ before completing the Nodule Grid

- BASELINE: Include all nodules ≥ 6.0 mm in average diameter. Others are OPTIONAL.
- ANNUAL REPEAT: Include all NEW nodules ≥ 3.0 mm in average diameter.
- For BASELINE CT, all nodules are new unless there is a CT more than 3 years earlier.
- For BASELINE CT, the nodules will automatically be sorted with the largest non-calcified nodules with a solid component coming first.
- Note: hilar masses and focal consolidation should be included in the nodule grid.
- The same nodule ID will be used on all subsequent CT and other forms. NEW nodules, even if LARGER, must follow nodules already listed.
- For nodules recommended for biopsy or antibiotics, list the reason in the comments field in the corresponding column.

Nodule ID	Nodule 1	Nodule 2
*Is it new? ②	-	-
*Endobronchial? ②	-	-
*Most likely location? ②	RML	LUL
*Nodule seen in series ②		
*Nodule seen in images ②		
*Nodule status ②	-	-
*Nodule consistency ②	Solid	Solid
*Length (mm) ②	18.3	9.9
*Maximum width (mm) ②	13.3	4.9
Mean diameter (mm) ②		



ScreeningPLUS Home Case Review Reports About Logout XXX

DOE9000004,JOHN 999-99-9999 DOB: 03/02/2000 AGE: 21 GENDER: F

CT Evaluation Report

Participant Name: DOE9000004,JOHN
Study ID: XXX9000004
Type of Examination: Baseline low-dose CT
Examination Date: 01/01/2000
Date of Birth: 03/02/2000

Report:
Comparison CT Scans: None

Description: CT examination of the entire thorax was performed at low-dose CT settings. Images were obtained at 0.5 mm slice thickness. Multiplanar reconstructions were performed.

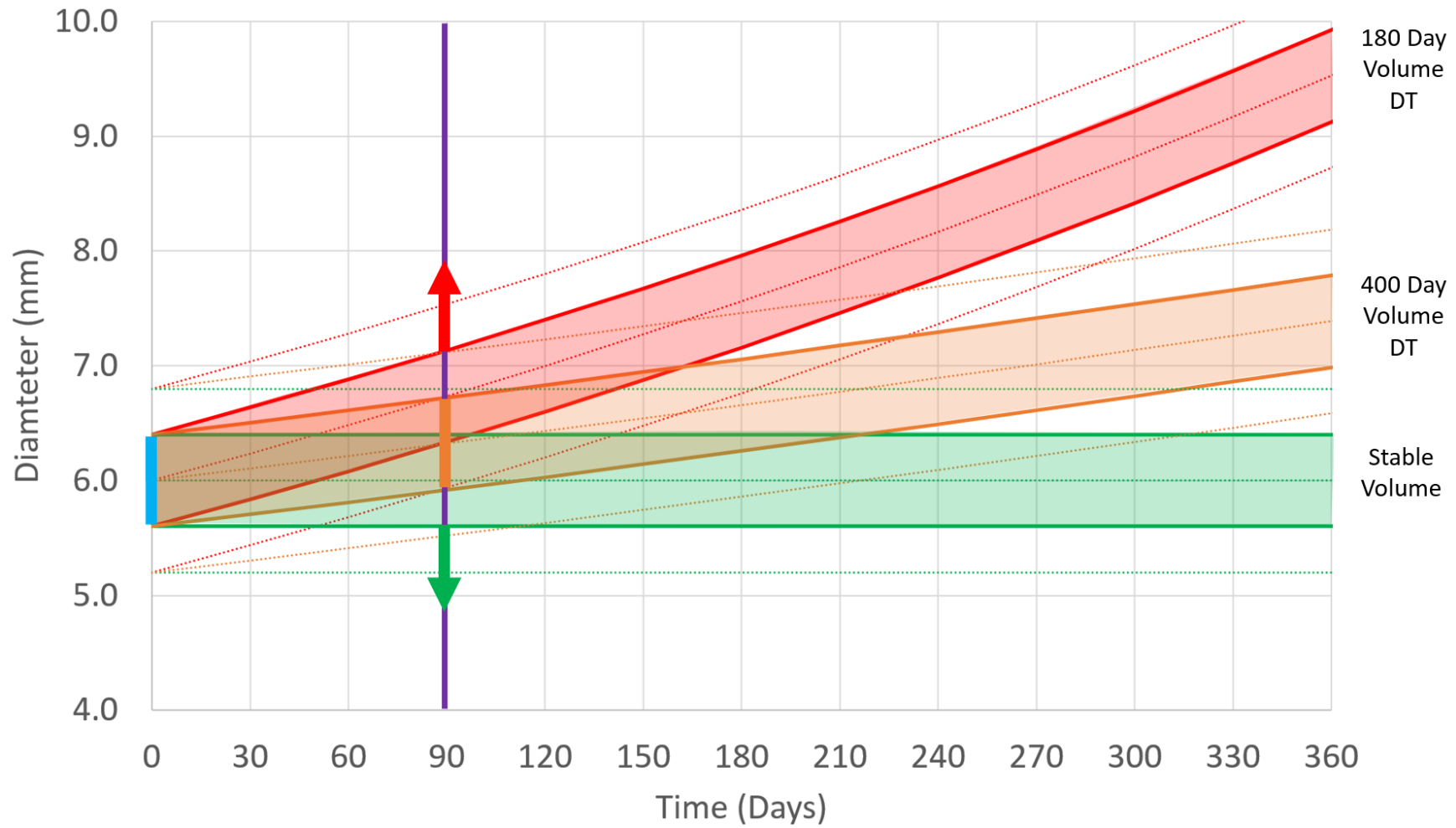
Lung Nodules:
RML Nodule 1 is noncalcified, solid, 18.3 mm x 13.3 mm (average diameter of 15.8 mm), smooth edges, (Series 1, image 100-102).
LUL Nodule 2 is noncalcified, solid, 9.9 mm x 4.9 mm (average diameter of 7.4 mm), smooth edges, (Series 1, image 200-202).

Emphysema: None.
Pleura: No pleural effusion.
Coronary Artery Calcifications: none in left main, none in left anterior descending, none in circumflex, and none in right coronary.
Other Cardiac Findings: None.

Structured Report Form Is Auto Filled In By Siemens AI-Rad Companion

Editable Report That Is Automatically Sent To The EHR and PACS Via HL7

Precision Follow-up Time



AI Observations After 22 Years

- CT Lung Nodule CAD/AI Is Growing In Acceptance And Use
- A “Shocking” Failure is the Achilles Heal of Mission Critical AI
- AI In Support of Radiologists Is The Best Approach
- Lack Of Large High Quality Databases Remains A Major Challenge
- There are Serious Ethical Concerns Regarding Training Databases
- Integration With The Clinical Workflow (EHR, PACS) Is Critical

Questions For The Panel

1. How successful has AI been in improving detection of early lung cancer in the community hospital setting?
2. What barriers remain in adoption and is anything needed to achieve wider success?
3. What are the best opportunities to add AI into the CT lung screening clinical workflow?
 - Improve productivity
 - Improve detection accuracy
 - Improve risk assessment
 - Improve malignancy characterization
 - facilitate communication across caregivers

Thank You