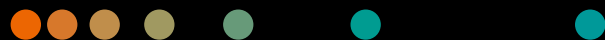
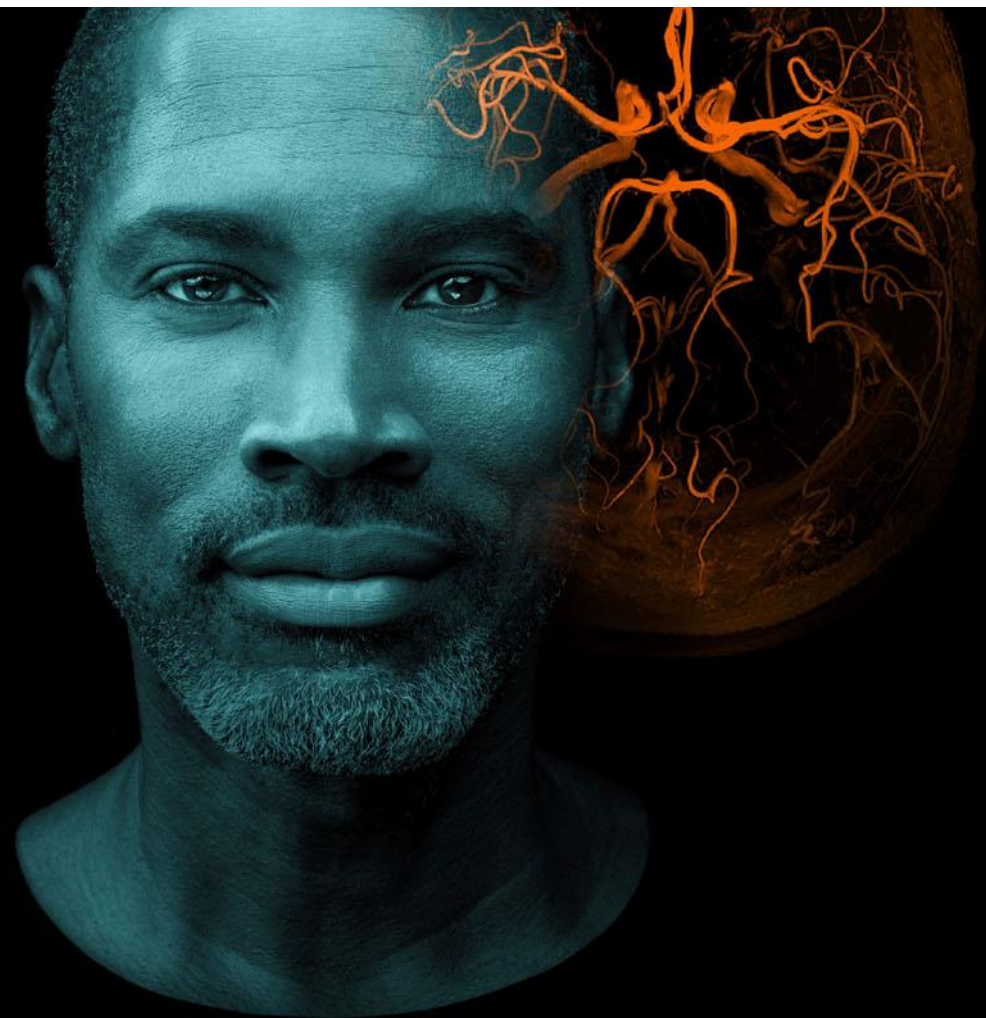
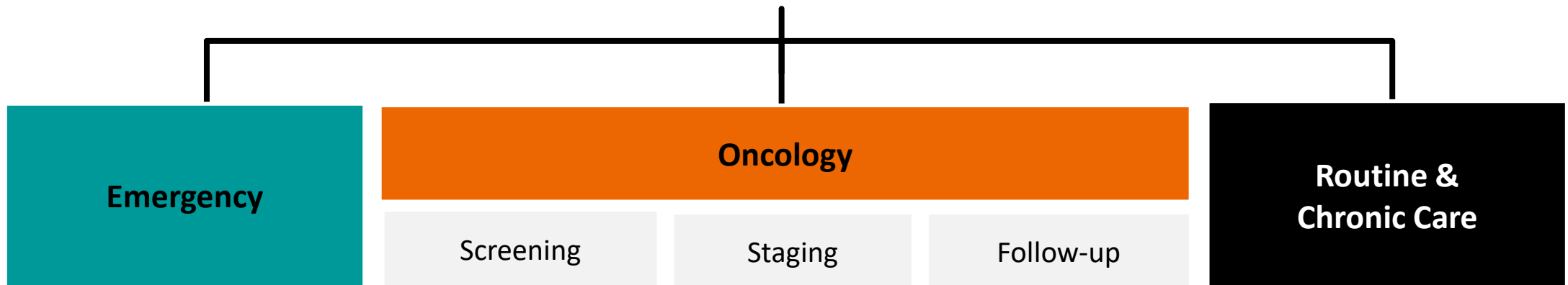
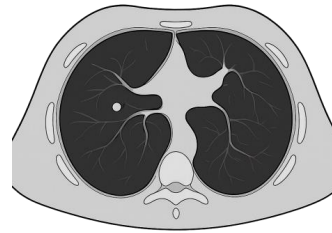


Possible Uses of AI Tools for Chest CT in Clinical Research Studies

Sasa Grbic
Siemens Healthineers

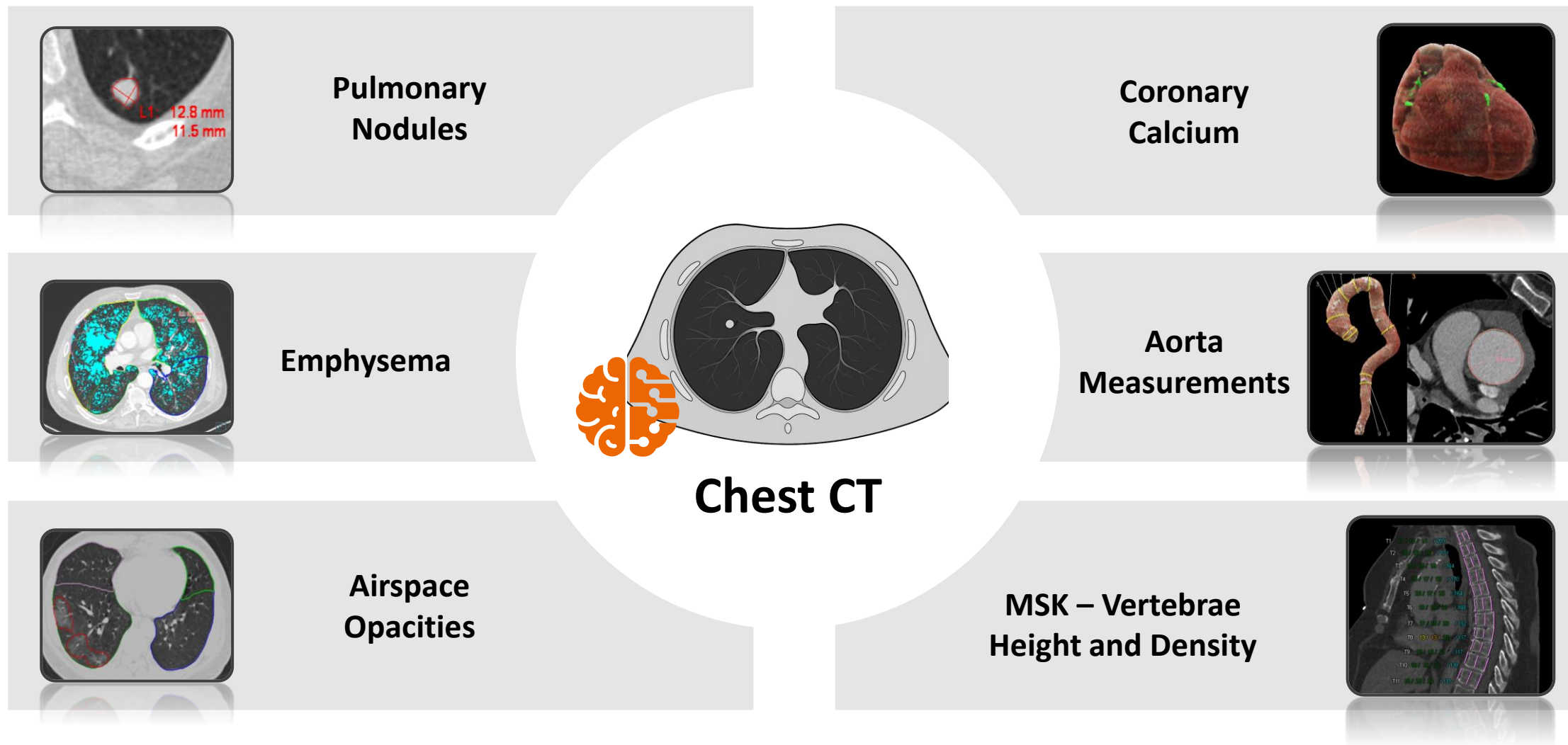


Chest CT is a versatile imaging used across multiple clinical domains, supporting rapid diagnosis, comprehensive assessment, and routine monitoring



AI Powered Applications for Chest CT

AI-Rad Companion





Patient Information

Examination Details

Findings Overview

Not for diagnostic use *



Results

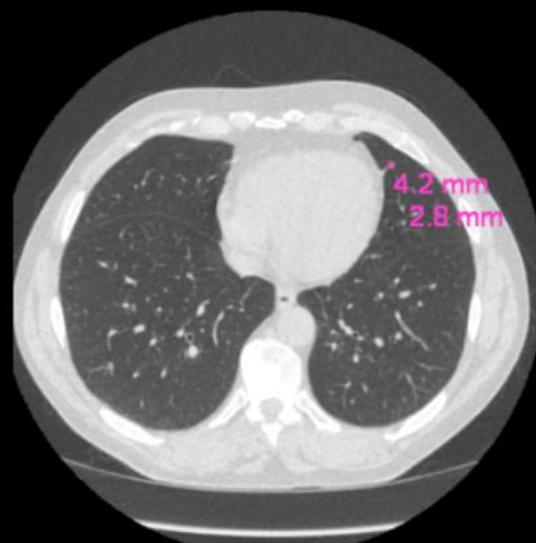
Lung Lesions

Lung Parenchyma

Pulmonary Density

Suspend

Send to PACS



L5 2020-01-21 Current

5 / 8



C
o..

Preset



C -600 W 1700 | Z 1740.0



Accept



Decline



Lesions 3D View

Lesions Overview

☒	Acc...	Lesi...	Lobe	Max. 2... [mm]	Mean 2... [mm]	Volume [mm³]
☒	:	L1	RL	7.3 +3%	5.5 +3%	61.7 -3%
☒	:	L2	LL	7.2 +11%	6.3 +14%	65.8 +27%
☒	:	L3	RU	5.5 -9%	5.1 -2%	55.0 -11%
☒	:	L4	LU	3.9 -13%	3.5 -6%	16.1 -16%
☒	:	L5	LU	4.2 / ---	3.5 / ---	32.7 / ---
☒	:	L6	RL	3.6 / ---	3.0 / ---	8.8 / ---
Sum:					34.8	
current / prior						

Lesion Details

L5 - Left Upper	Current	Prior
Max. 2D Ø [mm]	4.2	---
Min. 2D Ø [mm]	2.8	---
Mass 2D Ø [mm]	3.5	---



Patient Information

Examination Details

Findings Overview

Not for diagnostic use *



Results

Lung Lesions

Lung Parenchyma

Pulmonary Density

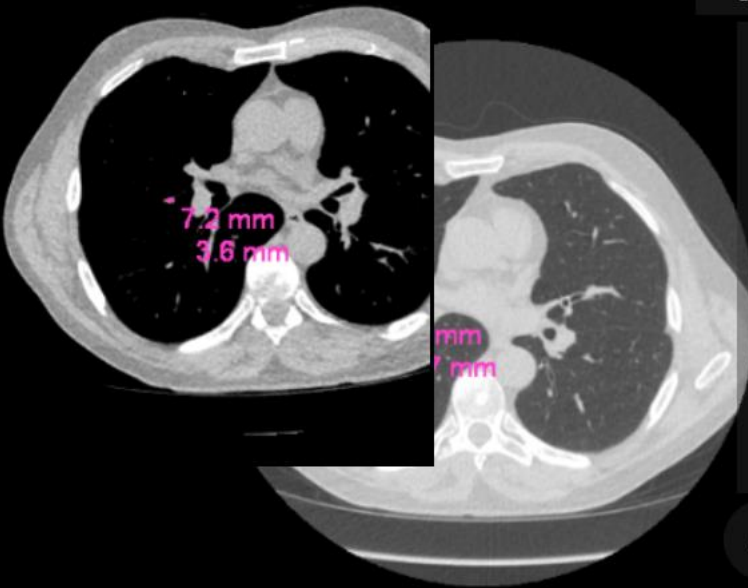
Suspend

Send to PACS

L1 2019-01-01 Prior

2020-01-21 Current

5 / 7



C

o..

Preset

C -567 W 1886 | Z 1791.0



Accept



Decline



Lesions 3D View

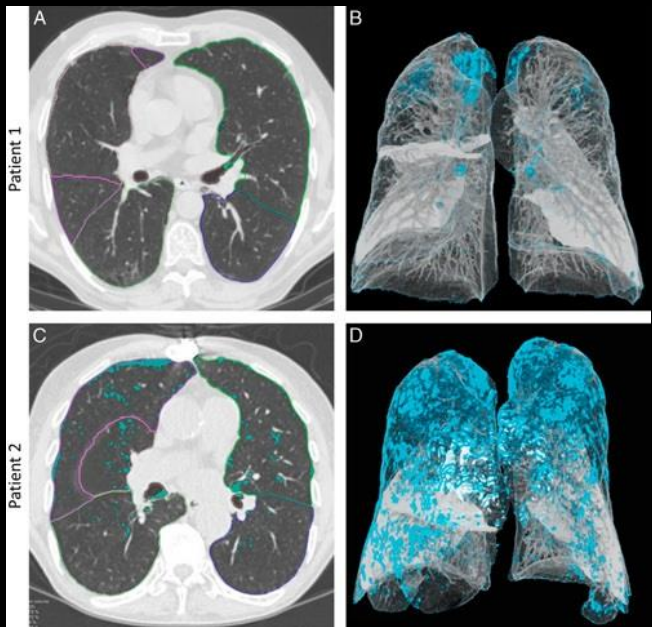
Lesions Overview

✓	Acc...	Lesi...	Lobe	Max. 2...	Mean 2...	Volume
				[mm]	[mm]	[mm³]
✓	⋮	L1	RL	7.3 +3%	5.5 +3%	61.7 -3%
✓	⋮	L2	LL	7.2 +11%	6.3 +14%	65.8 +27%
✓	⋮	L3	RU	5.5 -9%	5.1 -2%	55.0 -11%
✓	⋮	L4	LU	3.9 -13%	3.5 -6%	16.1 -16%
✓	⋮	L5	LU	4.2 / ---	3.5 / ---	32.7 / ---
✓	⋮	L6	RL	3.6 / ---	3.0 / ---	8.8 / ---
Sum:				34.8		
current / prior						

Lesion Details

L1 - Right Lower	Current	Prior
Max. 2D Ø [mm]	7.3 +3%	7.2
Min. 2D Ø [mm]	3.7 +3%	3.6
Mass 2D Ø [mm]	5.5 +3%	5.4

AI based Emphysema Quantification



65M
Weak emphysema

62M
COPD GOLD Stage III

	Healthy (n = 34)	GOLD I (n = 25)	GOLD II (n = 36)	GOLD III (n = 25)	GOLD IV (n = 17)	Spearman Correlation Coefficient (ρ); Healthy, GOLD-Stage I to IV $\leftrightarrow$ LAV Per Lobe
LAV (%)						
WL	1.18	1.06	5.98	14.55	30.42	$\rho = 0.88, P < 0.0001$
RUL	1.48	1.6	9.28	17.02	39.05	$\rho = 0.81, P < 0.0001$
RML	1.81	1.3	5.25	11.16	25.83	$\rho = 0.72, P < 0.0001$
RLL	0.56	0.55	2.7	11.27	21.02	$\rho = 0.78, P < 0.0001$
LUL	1.59	1.34	6.63	16.2	32.11	$\rho = 0.85, P < 0.0001$
LLL	1.16	0.59	2.97	9.26	22.17	$\rho = 0.72, P < 0.0001$

Fischer A.M et al., J Thoracic Imaging, 2020.
The concepts and information presented here are based on research results that are not commercially available.
Future commercial availability cannot be guaranteed

Clinical problem

Evaluate AI-based automatic emphysema quantification and localization from non-enhanced Chest CT imaging

Population:

N = 142 patients with non-gated unenhanced Chest CT with spirometry measurements within 6 months

Results

“AI-based algorithm is able to quantify the emphysema independently as a function of LAV, which demonstrates a significant correlation to the GOLD stages of COPD severity in a patient population of current and former smokers”

High diagnostic accuracy of CAC Quantification

Comparison of AI-determined CAC vs Manual assessment

Expert		None	Mild	Moderate	Severe
	None	60	6	0	0
	Mild	7	44	0	0
	Moderate	0	6	14	5
	Severe	0	0	4	20

Comparison of AI-determined CAC vs Agatston score on gated CT scan

Agatston Score		0	1-10	11-100	101-400	>400
	0	36	1	2	0	0
	1-10	3	0	3	1	0
	11-100	2	0	7	1	0
	101-400	0	0	7	9	1
	>400	0	0	0	5	15

Clinical Problem

Evaluate AI-based CAC quantification on non-gated, non-contrast Chest CT against expert evaluation, and traditional Agatston score

Study Population

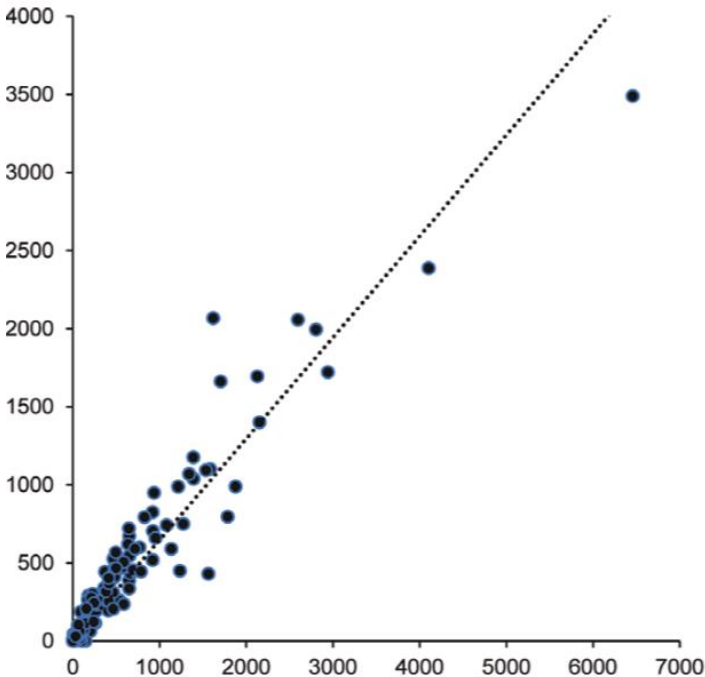
- 95 patients who underwent both Agatston scoring and non-gated Chest CT
- Qualitative expert assessment of 168 patients with Chest CT only

Results

High correlation ($\rho = 0.921$) between AI-determined Calcium volume and Agatston score

High correlation ($\rho = 0.923$) and agreement ($\kappa = 0.74$) between AI and expert on Chest CTs

Comparing AIRC CAC volume to Agatston Score



	0	I*	II	III	IV	total
0-1	101	0	0	0	0	101
1-10	12	9	6	0	0	27
10-100	3	5	59	3	0	70
100-400	2	0	5	50	0	57
> 400	0	0	0	24	36	60
total	118	14	70	77	36	315

All CV-AI categories were divided according to the coronary calcification volume.

(*) 0: 0-1 mm³, I*: 1-10 mm³, II: 10-100 mm³, III: 100-500 mm³, and IV: > 500 mm³.

Clinical Problem

Compare AI-Rad Companion coronary volume output to manual measurement, as well as Agatston scoring

Study Population

- 344 patients who underwent both Agatston scoring and non-gated Chest CT

Results

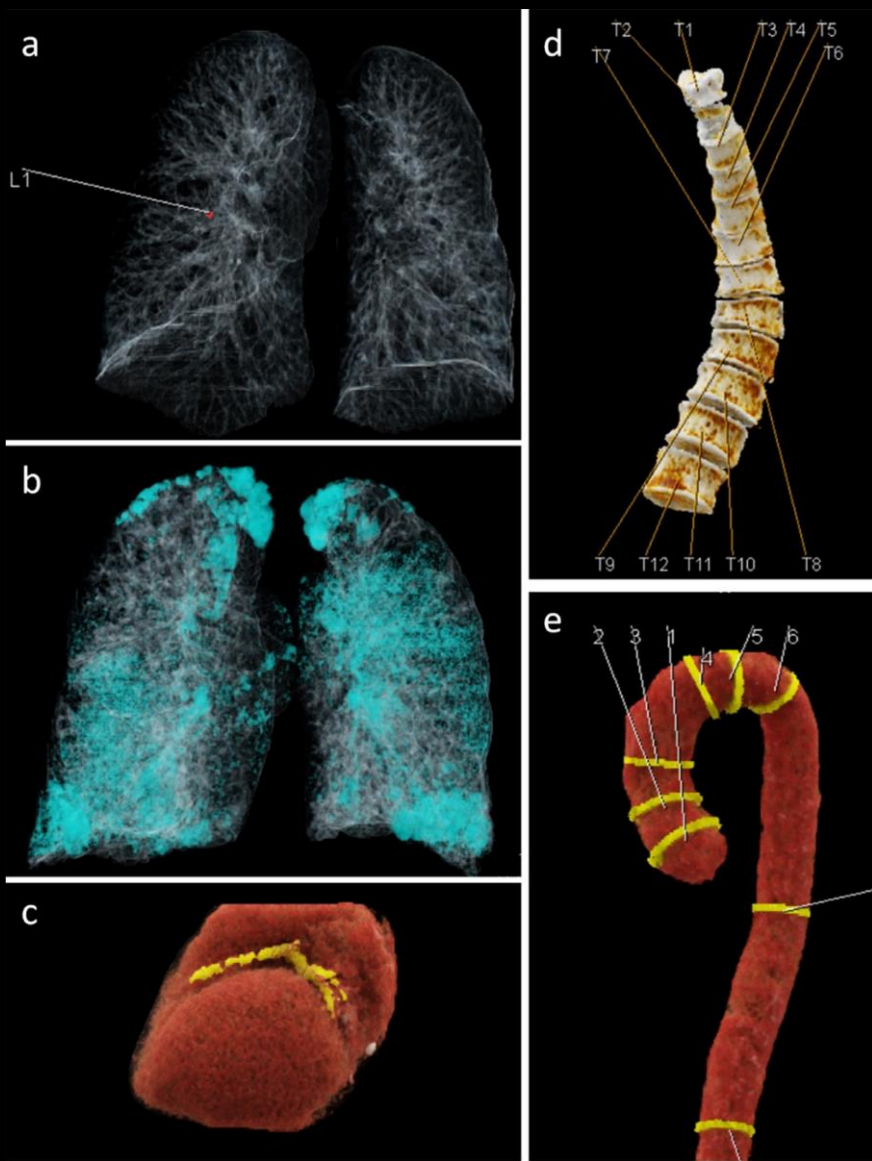
Correlation (manual-AIRC): 0.964

Correlation (Agatston-AIRC): 0.960

With Agatston scoring as “gold standard”:

Accuracy	0.946
Sensitivity	0.921
Specificity	1.0

Improved reporting of secondary findings



Clinical Problem

How does an AI platform compare with clinical reports in evaluating non-contrast Chest CT scans

Study Population

- 100 consecutive patients who underwent non-contrast Chest CT

Results

	Report	AIRC
Coronary Artery Calcification		
Sensitivity	75.4	89.8
Specificity	94.9	100.0
Aortic Dilatation		
Sensitivity	25.9	96.3
Specificity	100.0	81.4

Bone Mineral Density Quantification



Clinical Problem

Can AI algorithm stratify patients based on low bone mineral density

Study Population

- 65 patients who underwent both DEXA and chest CT

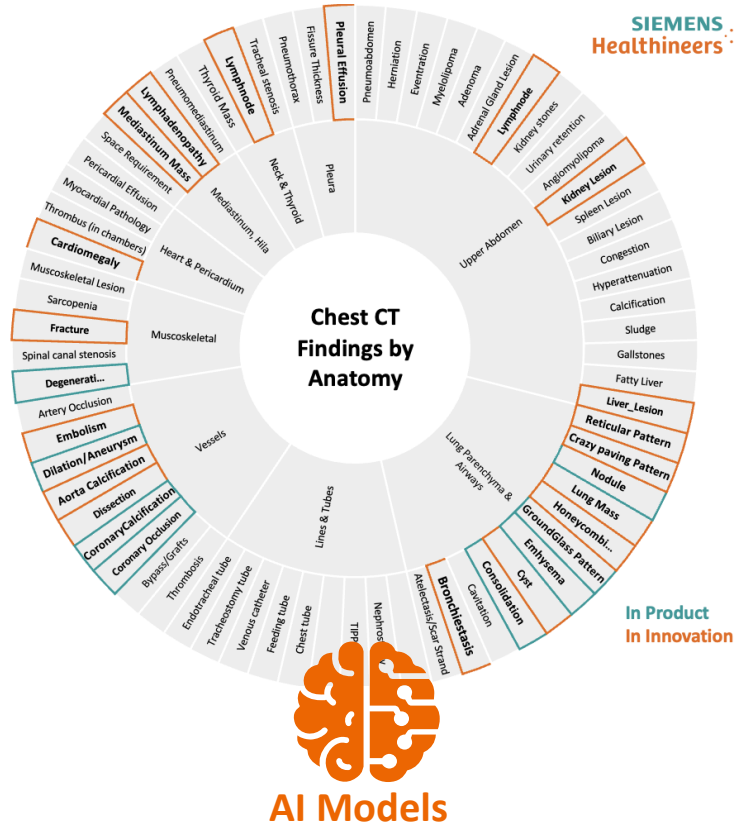
Results

Using these AI-derived HU values, a significant difference was found between the normal control patients and osteoporotic group ($P=0.045$).



clinical history, patient
demographics,
diagnoses, medications,
treatments, allergies,
physician notes

Clinical Context



MACE Risk Score
Heart Failure Risk Score

Osteoporosis and Fracture Risk Score

Breast Cancer Risk Score

Overall Mortality Risk Score

Thank you!
Questions?