

ZUKUNFT TELERADIOLOGIE

A woman with dark curly hair, wearing blue scrubs and a lanyard, is pointing her right hand towards a glowing blue skull X-ray on a screen. The background is dark with various medical and technological icons, including a brain scan and a network diagram.

What's new?

KI-Innovationen in der Radiologie

Donnerstag, der 23. März 2023

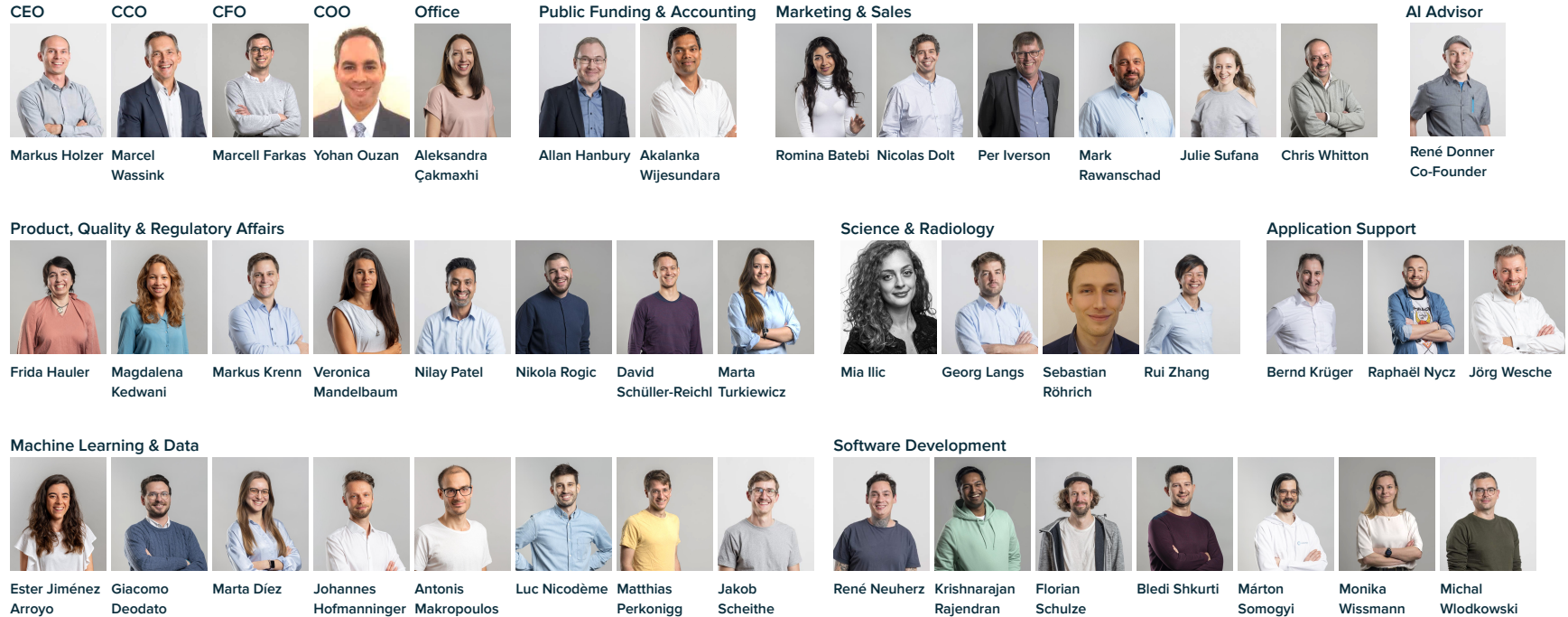


contextflow

See beyond a single case.

contextflow.com

Team



- Spin-off Med Uni Wien seid 2016
- 40+ Menschen aus 20 Ländern
- ADVANCE Chest CT is hat Zeichen CE (MDR)

- Wachstum in Europa
- Partnerschaften mit Marktplätzen / PACS / RIS Herstellern

Internationaler Beirat & Unterstützer



Prof. MD. Christian Herold
Leiter der Radiologie
Allgemeines Krankenhaus der
Stadt Wien
Ehemaliger Präsident ESR



Prof. MD. Lluís Donoso
Leiter der Radiologie
Universitätsklinik Barcelona
Präsident Int'l Gesellschaft für
Radiologie



Prof. MD. Boris Brkljajic
Leiter der Radiologie
Universitätsklinik Zagreb
Ehemaliger Präsident ESR



MD. Elmar Kotter
Stellvertretender Vorsitz &
Leiter der Bildgebenden
Informatik
Universitätsklinikum Freiburg



MD. Jacob Visser
Radiologe & Chief Medical
Information Officer
Erasmus Medical Center
Rotterdam



MD. Erik Ranschaert
Radiologe & Ehemaliger
Präsident European Society
of Medical Imaging
Informatics (EuSoMI)

Medizinische Experten

Assoc. Prof. MD. Helmut Prosch
Thorax-Radiologie
Allgemeines Krankenhaus der
Stadt Wien

MD. Philip Peloschek
Radiologe Radiologie Zentrum
Wien

MD. Sebastian Röhrich
Facharzt für Radiologie
Medizinische Universität Wien

MD. Anand Patel
Leiter der Interventionellen
Radiologie bei Providence Little
Company

Industrie Expert

Chris Wood
Co-Founder & Ehemaliger CEO Clario
Ehemaliger CTO Intelrad



Interobserver-Übereinstimmung Mäßig: UIP, mögliches UIP, inkonsistent mit UIP

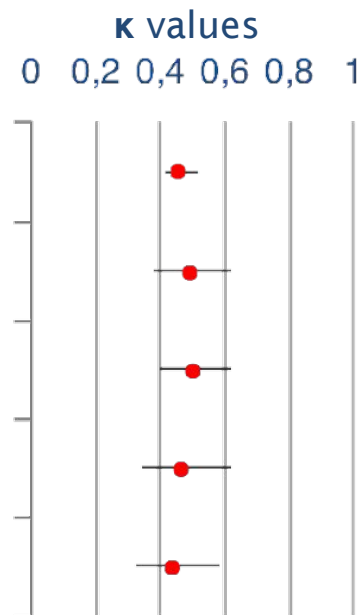
Thoracic radiologists (Fellows, n=5)

Thoracic radiologists (experience <10 years, n=42)

Thoracic radiologists (experience 10-20 years, n=27)

Thoracic radiologists (experience >20 years, n=22)

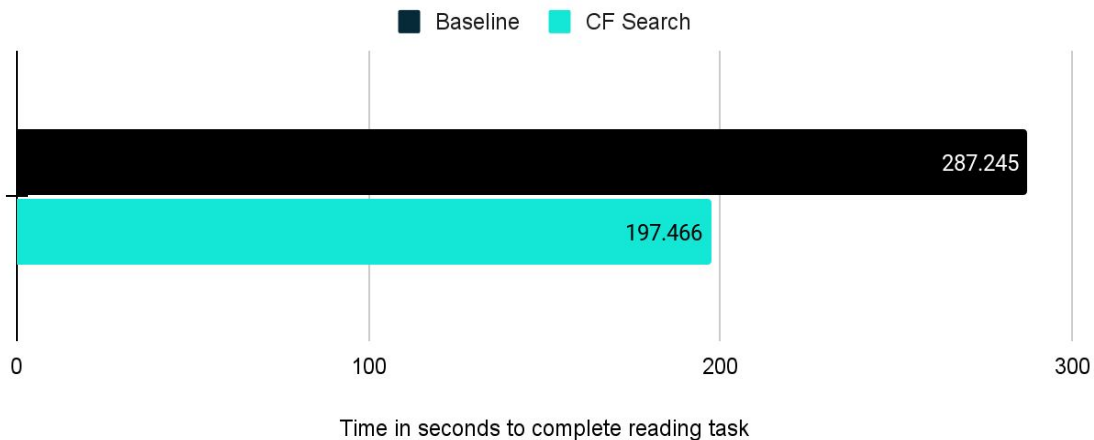
General radiologists (n=16)





Validierung des Nutzens in der klinischen Praxis

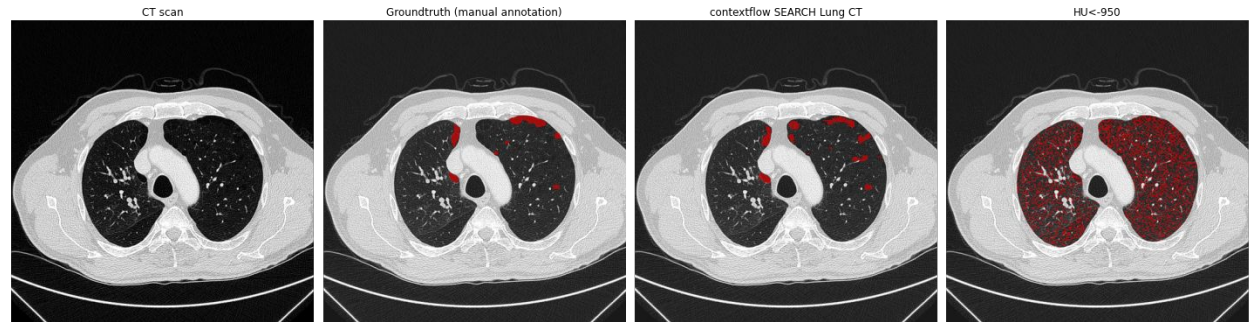
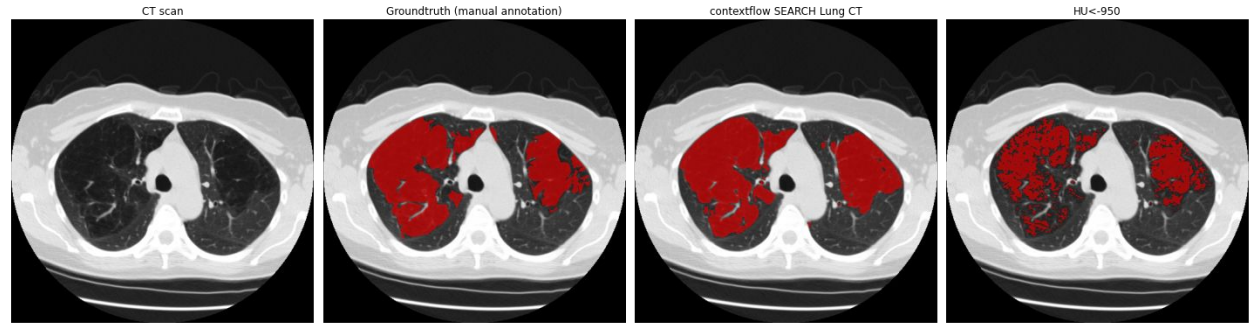
- Durchschnittliche Lesezeit ist **31% kürzer***, wenn contextflow SEARCH Lung CT verfügbar ist*
- Trend zu **besserer diagnostischer Qualität***
- **Zeitersparnis für Junior- und Senior-Radiologen**
- <https://rdcu.be/cRM8U>





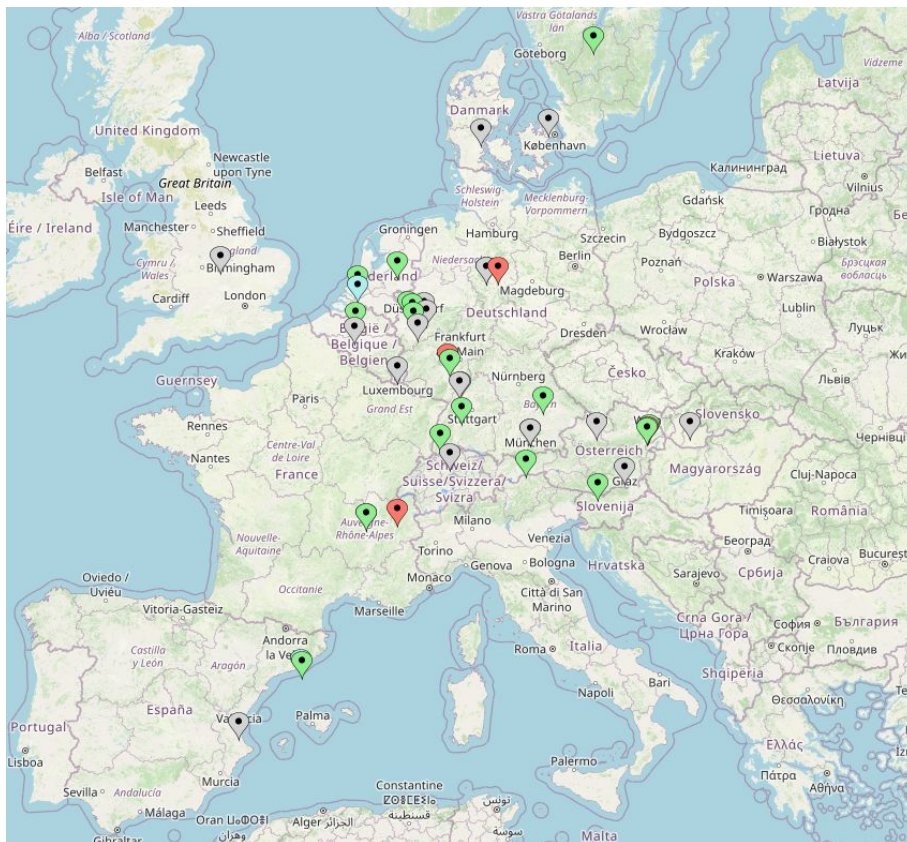
Insights Screen - Emphysem

- (1) Hounsfield basierende Erkennung kennen Radiologen heute.
- (2) Fortschritt in AI!
- (3) Messung von Emphysem Akturater \Rightarrow Scanner unabhängig!
- (4) CF erkennt noch andere Muster
- (5) Kombination wichtig für die COPD Erkennung
- (6) Behandlungserfolge!





Installationen in Europa



17 aktive Kunden (in 7 Ländern)



20+ Kunden in der Implementierung
(+5 Länder: DK, SK, CH, LU, UK)



2 systems at partners

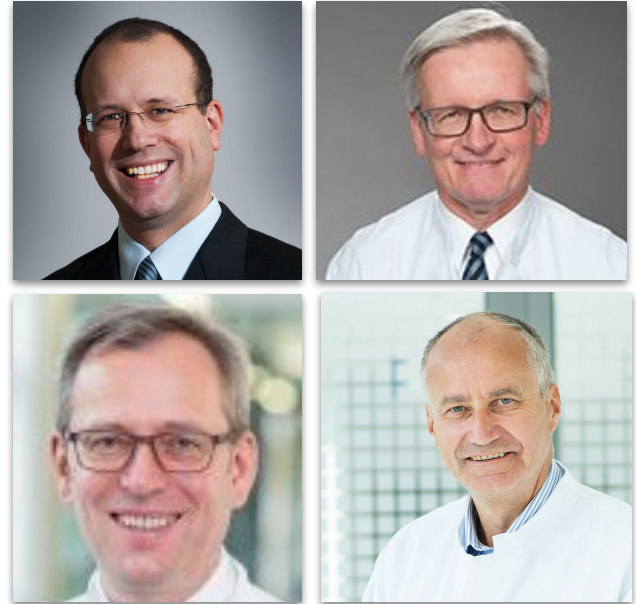


Customer Service & Support Mitarbeiter



Referenzen in D/A/CH

- **Prof. Dr. med Helmut Prosch**
 - Klinische Abteilung für Allgemeine Radiologie und Kinderradiologie, Universitätsklinikum AKH **Wien**
 - helmut.prosch@meduniwien.ac.at
- **Prof. Dr. med. Peter Mildenerger**
 - Klinik und Poliklinik für Diagnostische und Interventionelle Radiologie, Universitätsmedizin Mainz
 - peter.mildenerger@unimedizin-mainz.de
- **Prof. Dr. med. Elmar Kotter**
 - Klinik für Diagnostische und Interventionelle Radiologie, Universitätsklinikum **Freiburg**
 - elmar.kotter@uniklinik-freiburg.de
- **Prof. Dr. med. Jörg Neuerburg**
 - Zentrale Abteilung für Diagnostische und Interventionelle Radiologie, Evangelisches Krankenhaus Niederrhein in Duisburg
 - joerg.neuerburg@evkln.de

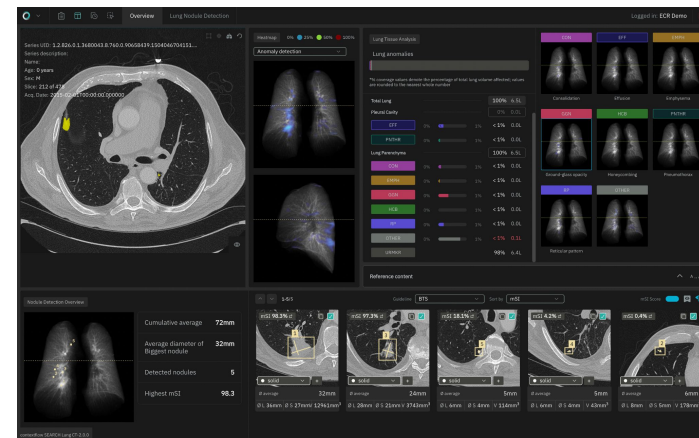




Verwendungszweck

contextflow SEARCH Lung CT bietet Radiologen ergänzende Informationen zur Identifizierung und Interpretation von Lungen spezifischen Bild Mustern in Computertomographien (CT-Scans). Zu diesem Zweck bietet das System die folgenden Funktionalitäten:

- **Quantitative Bildanalyse:** Automatisierte Erkennung, Quantifizierung und Visualisierung von Lungenanomalien und spezifischen Bildmustern
- **Qualitative Analyse:** Basierend auf den ausgewählten Bildregionen wird sowohl die visuelle Bildsuche aus einer Wissensbasis von durch Experten beschrifteten retrospektiven Fällen als auch die Musterklassifikation dargestellt.
- **Referenzinformationen für Bildmuster:** Links zu Literatur, Artikeln oder Richtlinien, Tipps und Fallstricke sowie mögliche Differentialdiagnosen



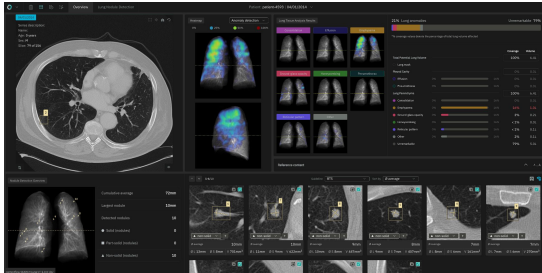
contextflow ADVANCE Chest CT



Ein KI-basiertes, **computergestütztes Erkennungssystem** (CADE) für **medizinische 3D-Bilddaten**, das qualitative und quantitative Analyseergebnisse und entsprechende Referenzinformationen liefert.

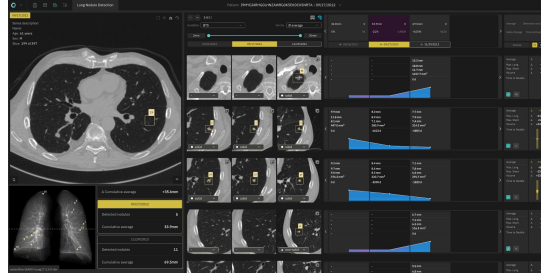
INSIGHTS

- Erkennung, Quantifizierung und Visualisierung
- Lungenanomalien, spezifische Bildmuster und Lungenknötchen



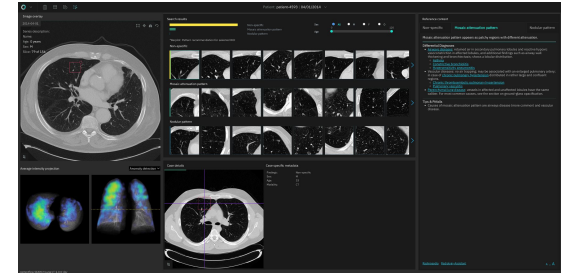
TIMELINE

- Analyse von Lungenknötchen
- Visualisierungen für Progression oder Regression



SEARCH

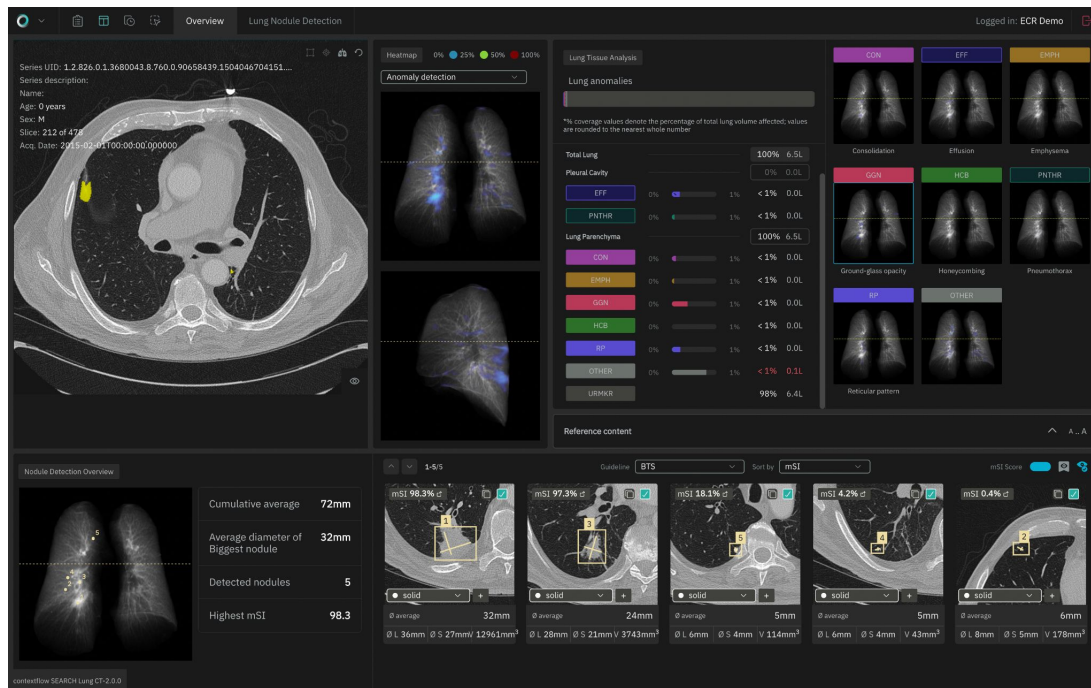
- Visuelles Abrufen von Bildern
- Klassifizierung von Mustern
- Referenzliteratur



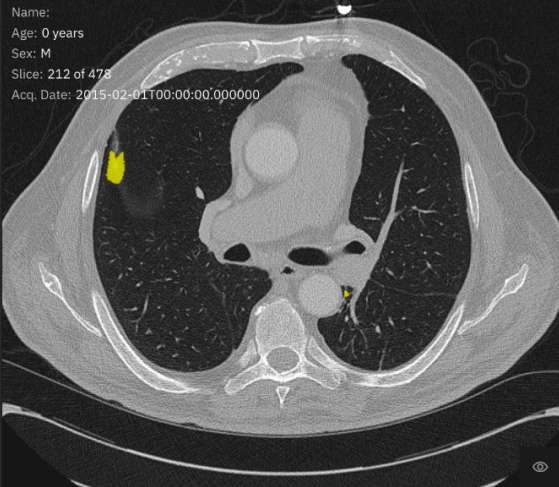


Insights Screen

- (1) Visualisierung von Bildregionen mit erkannten Lungen Anomalien
- (2) Lungen Abdeckung für diese Lungen spezifischen Bildmuster
 - Erguss
 - Emphysem
 - Milchglasmuster
 - Honeycombing
 - Pneumothorax
 - Retikuläres Muster
- (3) Visualisierung und Messungen von detektierten Lungenknötchen
- (4) Entsprechende Referenzinformationen zur Differenzialdiagnose

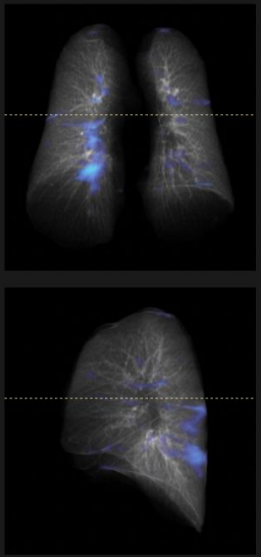


Series UID: 1.2.826.0.1.3680043.8.760.0.90658439.1504046704151....
 Series description:
 Name:
 Age: 0 years
 Sex: M
 Slice: 212 of 478
 Acq. Date: 2015-02-01T00:00:00.000000



Heatmap 0% 25% 50% 100%

Anomaly detection



Lung Tissue Analysis

Lung anomalies

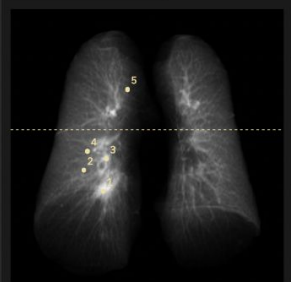
*% coverage values denote the percentage of total lung volume affected; values are rounded to the nearest whole number

Total Lung	100%	6.5L
Pleural Cavity	0%	0.0L
EFF	0%	< 1% 0.0L
PNTHR	0%	< 1% 0.0L
Lung Parenchyma	100%	6.5L
CON	0%	< 1% 0.0L
EMPH	0%	< 1% 0.0L
GGN	0%	< 1% 0.0L
HCB	0%	< 1% 0.0L
RP	0%	< 1% 0.0L
OTHER	0%	< 1% 0.1L
URMKR	98%	6.4L

CON	EFF	EMPH
Consolidation	Effusion	Emphysema
GGN	HCB	PNTHR
Ground-glass opacity	Honeycombing	Pneumothorax
RP	OTHER	
Reticular pattern		

Reference content

Nodule Detection Overview



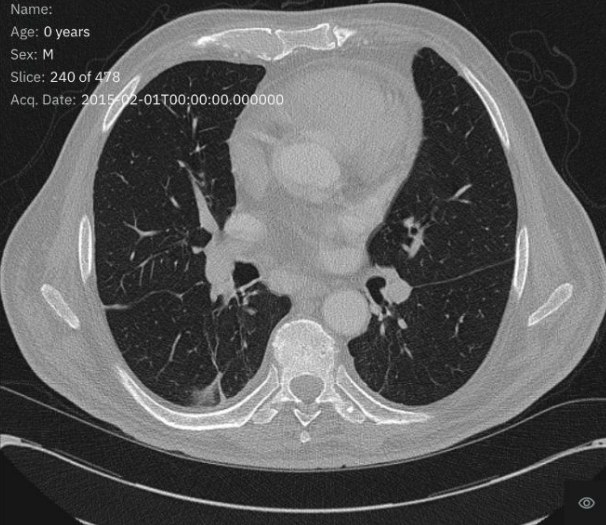
Cumulative average	72mm
Average diameter of Biggest nodule	32mm
Detected nodules	5
Highest mSI	98.3

1-5/5 Guideline: BTS Sort by: mSI mSI Score

mSI 98.3% 1 solid Ø average 32mm Ø L 36mm Ø S 27mm V 12961mm ³	mSI 97.3% 3 solid Ø average 24mm Ø L 28mm Ø S 21mm V 3743mm ³	mSI 18.1% 5 solid Ø average 5mm Ø L 6mm Ø S 4mm V 114mm ³	mSI 4.2% 4 solid Ø average 5mm Ø L 6mm Ø S 4mm V 43mm ³	mSI 0.4% 2 solid Ø average 6mm Ø L 8mm Ø S 5mm V 178mm ³
---	--	--	--	---



Series UID: 1.2.826.0.1.3680043.8.760.0.90658439.1504046704151...
 Series description:
 Name:
 Age: 0 years
 Sex: M
 Slice: 240 of 478
 Acq. Date: 2015-02-01T00:00:00.000000



Quicklinks

[British Thoracic Society guidelines for the investigation and management of pulmonary nodules](#)

[International Early Lung Cancer Action Program: Screening Protocol, 2021](#)

[European Union Position Statement on Lung Cancer Screening](#)

[Lung-RADS Version 1.1.2019](#)

[Fleischner Society Guidelines 2017](#)

[Response Evaluation Criteria in Solid Tumors \(RECIST\)](#)

1-5/5

Guideline: BTS

mSI Score

mSI

● solid +

Ø average **32mm**

Ø L 36mm Ø S 27mm V 12961mm³

mSI

● solid +

Ø average **24mm**

Ø L 28mm Ø S 21mm V 3743mm³

mSI

● solid +

Ø average **6mm**

Ø L 8mm Ø S 5mm V 178mm³

mSI

● solid +

Ø average **5mm**

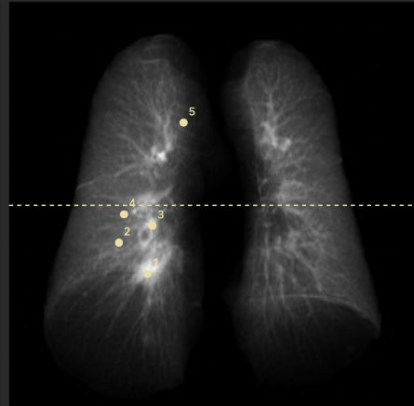
Ø L 6mm Ø S 4mm V 114mm³

mSI

● solid +

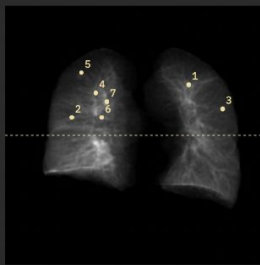
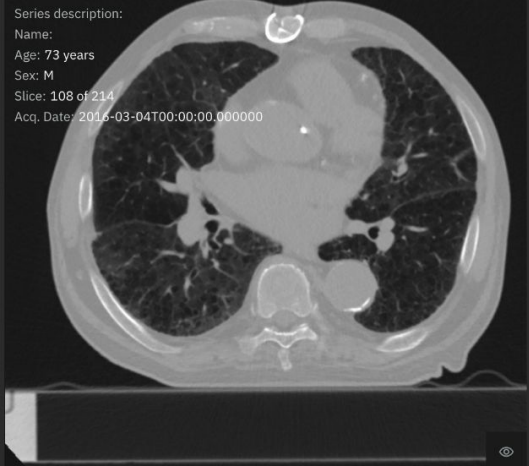
Ø average **5mm**

Ø L 6mm Ø S 4mm V 43mm³



Nodule detection summary	
Cumulative average	72mm
Average diameter of Biggest nodule	32mm
Detected nodules	5
Nodule detection summary	
solid (nodules)	5
part solid (nodules)	0
ground glass (nodules)	0

Series UID: 1.2.826.0.1.3680043.10.470.0.3254904464.1589678...
 Series description:
 Name:
 Age: 73 years
 Sex: M
 Slice: 108 of 214
 Acq. Date: 2016-03-04T00:00:00.000000



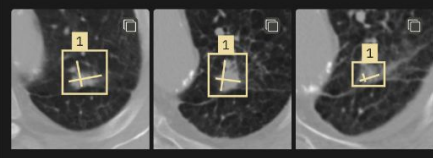
Δ Cumulative volume	-619.5mm³
2016-03-04	
Detected nodules	5
Cumulative volume	2329.8mm³
2016-04-04	
Detected nodules	5
Cumulative volume	1710.3mm³

1-1/7 mSI Score

Guideline: **BTS** Sort by: **volume**

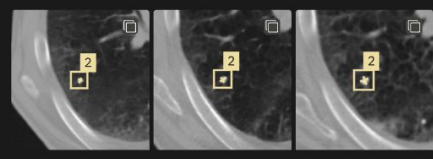
30mm 100mm

07.10.14 04.03.16 04.04.16

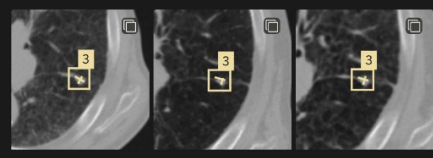


4515.9 mm ³	5	4999.9 mm ³	4	4473.7 mm ³	5	212:	Volume	Detected nodules
-26%	-246d	+11%	136d	-11%	-449d	-53r	Delta Change	Time to Double
21.04.15	11.05.15	22.07.15	Nodule 11 12					

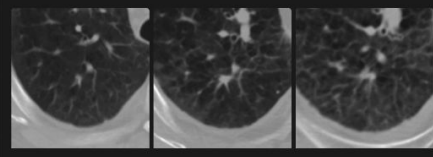
2389.3 mm ³	2886.7 mm ³	2405.4 mm ³	139r	Volume	Δ -77 %
21.3 mm	20.4 mm	22.3 mm	17.3	Average	Δ -54 %
22.7 mm	26.0 mm	23.2 mm	18.3	Max. Long	Δ -41 %
19.9 mm	14.8 mm	21.3 mm	16.3	Max. Short	Δ -70 %
-104 d	73 d	-274 d	-155	Time to Double	<input type="checkbox"/>



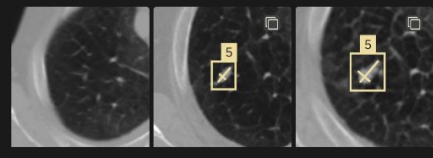
67.3 mm ³	49.9 mm ³	82.6 mm ³	90.1	Volume	Δ +35 %
4.6 mm	4.2 mm	4.6 mm	4.7 r	Average	Δ +15 %
4.9 mm	4.5 mm	5.1 mm	5.2 r	Max. Long	Δ +6 %
4.2 mm	3.9 mm	4.2 mm	4.3 r	Max. Short	Δ +25 %
-255 d	-46 d	99 d	957	Time to Double	<input type="checkbox"/>



233.3 mm ³	228.4 mm ³	194.3 mm ³	213.	Volume	Δ -10 %
6.8 mm	7.5 mm	6.8 mm	6.7 r	Average	Δ +1 %
8.1 mm	8.7 mm	8.3 mm	8.0 r	Max. Long	Δ -11 %
5.4 mm	5.3 mm	5.3 mm	5.4 r	Max. Short	Δ +20 %
1357 d	-653 d	-309 d	896	Time to Double	<input type="checkbox"/>



1807.3 mm ³	1832.9 mm ³	1766.2 mm ³	-	Volume	Δ -5 %
15.1 mm	15.7 mm	16.1 mm	-	Average	Δ +5 %
17.8 mm	19.0 mm	21.3 mm	-	Max. Long	Δ +5 %
12.3 mm	12.5 mm	11.0 mm	-	Max. Short	Δ +5 %
111 d	986 d	-1346 d	-	Time to Double	<input type="checkbox"/>



-	-	-	76.5	Volume	Δ +110 %
-	-	-	4.5 r	Average	Δ +43 %
-	-	-	5.0 r	Max. Long	Δ +34 %
-	-	-	3.9 r	Max. Short	Δ +62 %
-	-	-	0 d	Time to Double	<input type="checkbox"/>

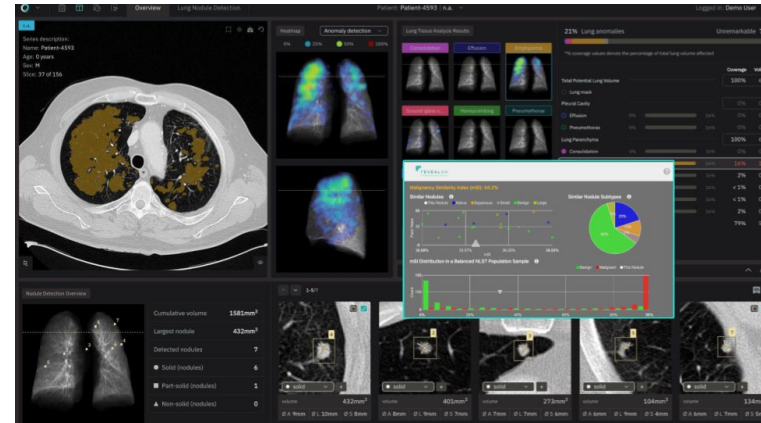
COMING SOON - Inzidentelle Lungenembolie

- Radiologen sagen uns, dass IPE häufiger als erwartet übersehen wird
- Für Kliniken mit längerem “Reporting Backlog” ist es entscheidend, dass PE erkannt wird, damit diese Fälle zuerst befundet und behandelt werden können.
- Die Folgen können tödlich sein

COMING SOON - Malignancy Score

- Entwickelt und validiert in den USA und Kanada in Kliniken und im Lungen Screening.
- Bis zu 30 % weniger falsch-positive
 - Patienten werden also nicht unnötig beunruhigt
 - Gesundheitssystem spart Geld (kein PET/CT, keine Biopsy)
- 45 % weniger falsch-negative Ergebnisse
 - Patienten Sicherheit:
#AWorldWithoutMedicalErrors
- Veröffentlichung in JACR:

<https://pubmed.ncbi.nlm.nih.gov/36064040/>



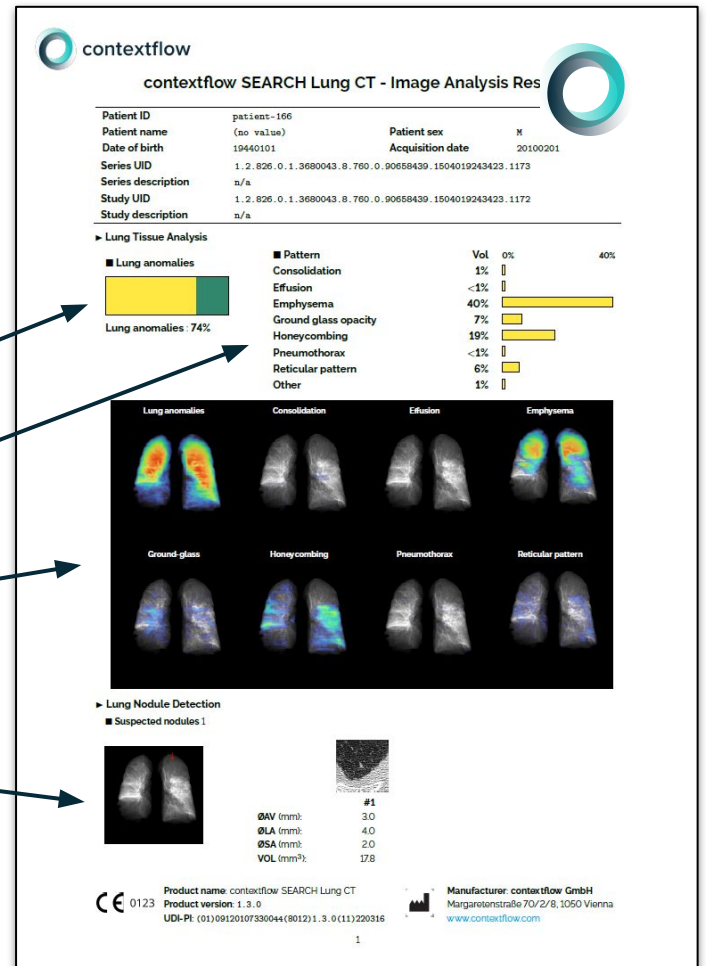
“Interoperabilität”

DICOM Encapsulated PDF Report

contextflow SEARCH Lung CT provides quantitative image analysis results in form of a **DICOM Encapsulated PDF report**.

The report is automatically sent to your PACS, available as an additional series within the original image study and contains the following information

- Coverage values for lung anomalies
- Coverage values for individual image patterns
- Spatial distribution maps for image patterns
- Nodule detection results



DICOM Secondary Capture Image Series



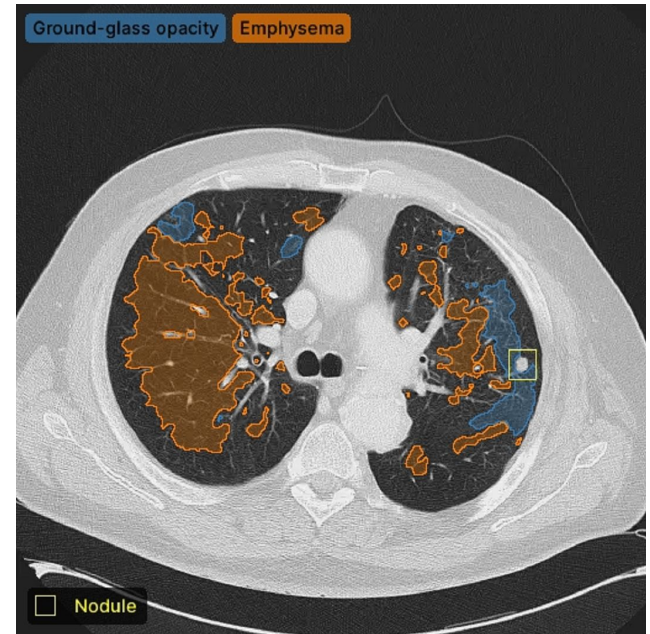
contextflow SEARCH Lung CT provides visualizations of pattern segmentation results and detected nodules in form of a **DICOM image series** of **secondary capture objects**.

The resulting image series is automatically sent to your PACS and available as an additional series within the original image study.

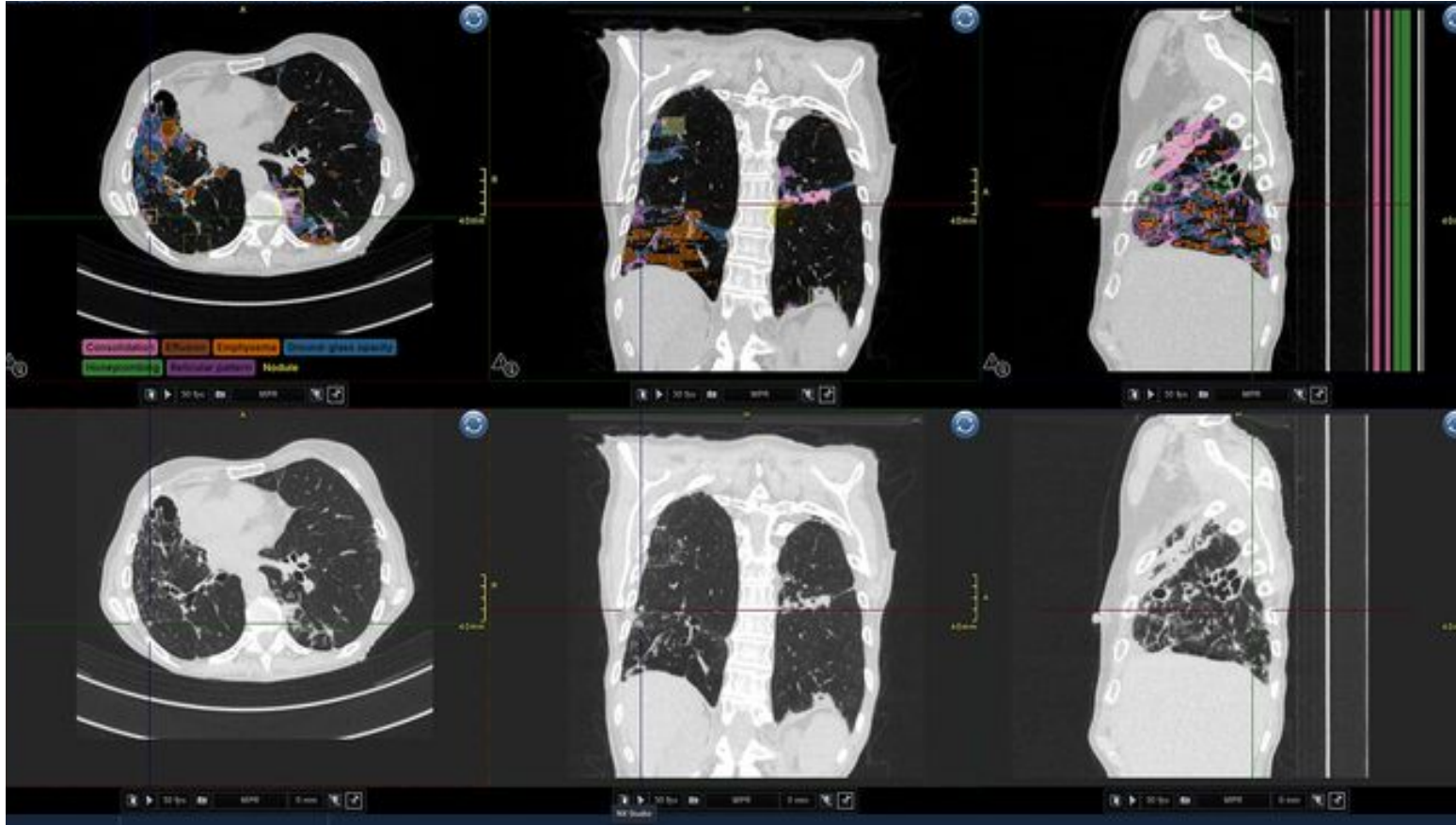
For each slice of the original series, a secondary capture that contains the source image overlaid with color-coded analysis results is rendered.

Overlay rendering can be configured on a multiple choice basis for the following patterns:

- Nodules (bounding box)
- Consolidation (segmentation)
- Effusion (segmentation)
- Emphysema (segmentation)
- Ground-glass opacities (segmentation)
- Honeycombing (segmentation)
- Pneumothorax (segmentation)
- Reticular pattern (segmentation)



Screenshot PACS



DICOM SCs created by contextflow rendered as MPR

Original CT Lung Scan rendered as MPR

⇒ all images linked

DICOM Enhanced Structured Report - Nodule Detection



contextflow SEARCH Lung CT provides nodule detection results in form of a **DICOM Enhanced Structured Report** object that follows DICOM Structured Reporting template **TID1500**.

The DICOM SR object lists all detected pulmonary nodules and provides the following information for those:

- Location reference
- Long-axis diameter
- Short-axis diameter
- Average diameter
- Volume

The object is intended to be sent to and parsed by **structured reporting systems** or **PACS** for **seamless integration of nodule detection results into the radiologists' reporting workflow**.

Series:	contextflow SEARCH Lung CT - Nodule Detection SR (#11333)
Completion Flag:	COMPLETE
Verification Flag:	UNVERIFIED
Content Date/Time:	2022-02-10 09:51:06

Nodule Detection Report

Observation Context: Observer Type = Device (121007, DCM)
Observation Context: Device Observer Manufacturer = "contextflow GmbH"
Observation Context: Device Observer Model Name = "contextflow SEARCH Lung CT"

Imaging Measurements

Concept Modifier: Algorithm Name = "contextflow SEARCH Lung CT"
Concept Modifier: Algorithm Version = "contextflow SEARCH Lung CT-1.3.0"
Concept Modifier: Algorithm Parameters = "90"

Measurement Group

Observation Context: Tracking Identifier = "29"
Observation Context: Tracking Unique Identifier = 2.25.162977078080639861312526214906631494279

Finding:
Nodule (27925004, SCT)

Image Region:
Point

Selected from: Source = [CT Image](#)

Long Axis:
4 mm

Concept Modifier: Measurement Orientation = Axial (24422004, SCT)

Short Axis:
2 mm

Concept Modifier: Measurement Orientation = Axial (24422004, SCT)

Diameter:
3 mm

Concept Modifier: Derivation = Mean (373098007, SCT)

Volume from Voxel Summation:
17.8 mm³



contextflow

See beyond a single case.

Kontakt:



Mark Rawanschad
Business Development Manager
mark@contextflow.com
+49 151 7231 8628



contextflow_rad



contextflow



contextflow.com