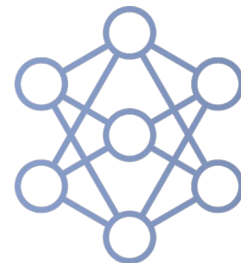




AI in radiation protection in diagnostic radiology



February 16th, 2026
EURADOS Annual Meeting
Helsinki, Finland



HELSINKI UNIVERSITY
DEPARTMENT OF PHYSICS

HUS Diagnostic Center

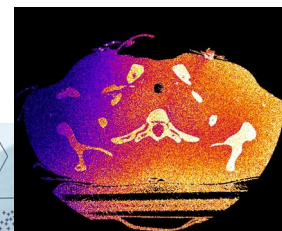
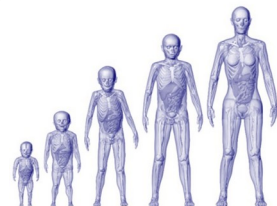
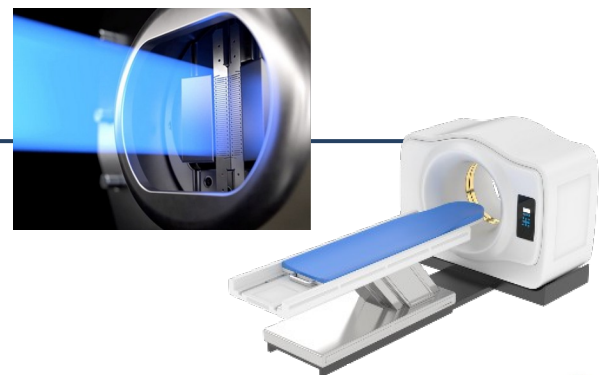
Mika Kortetniemi

Chief Medical Physicist, Adjunct Professor, PhD

HUS Diagnostic Center, Radiology, Medical Physics
Helsinki University Hospital, Finland
mika.kortetniemi@hus.fi

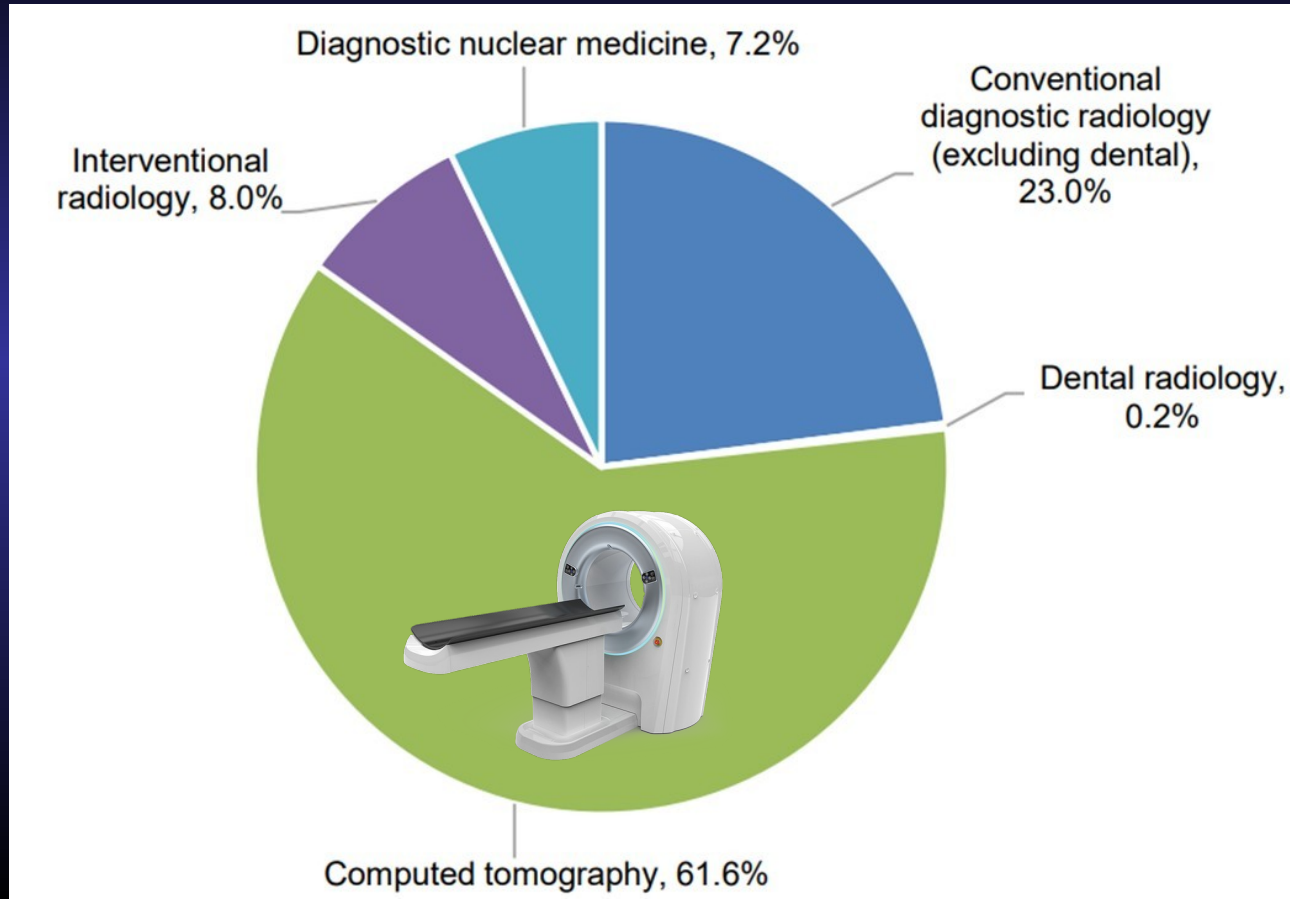
Contents

- Distribution of cumulative exposures
- Technical trends in radiology
- Focus towards image quality
- Vision of AI in radiological protection
- Data-driven interconnected system



Distribution of effective dose within medical imaging

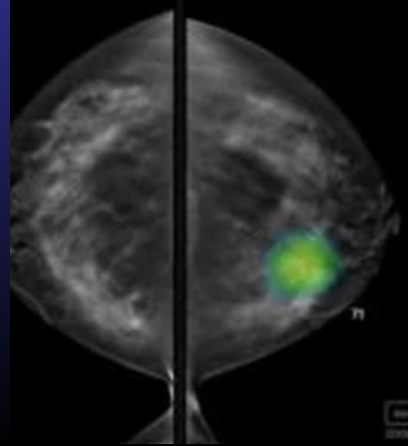
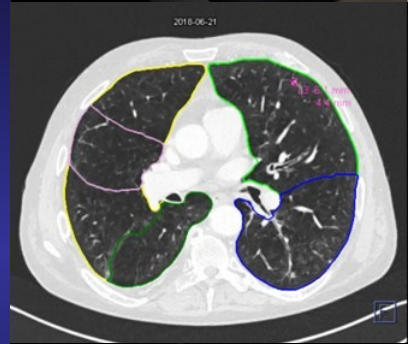
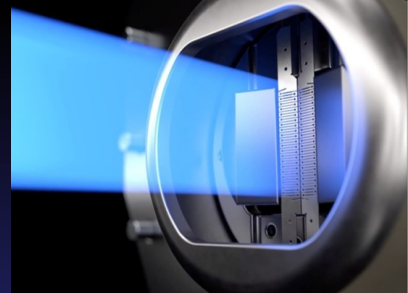
⇒ Relevance of CT



*UNSCEAR 2020-
2021 report*

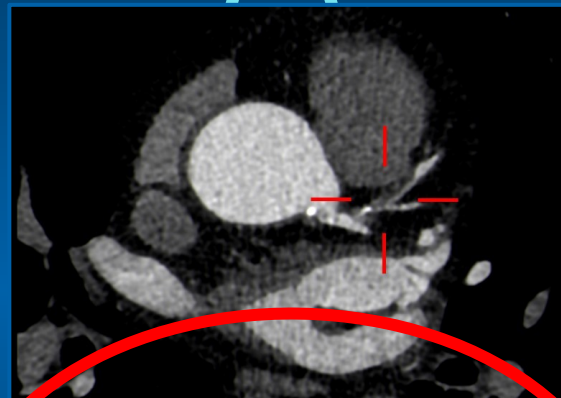
Overall technical trends in radiology

- **Enhanced sources:** Increased x-ray tube power, kV-range (CT) and new filtration options (*CT and mammo*)
- **Enhanced image detection techniques** (*e.g. photon counting and future dark-field/phase-contrast*)
- **Advanced image reconstruction and post-processing** (*e.g. deep-learning reconstruction in CT, virtual grids in DR*)
- **Increasing 3D imaging** modes in radiology and beyond (*CT w spectral, tomosynthesis~2.5D, CBCT & MRI in surgery*)
- **Patient-specific radiation dosimetry**
- **Data-driven monitoring methods:** radiation exposure monitoring and automated QA analyses
- **Rapid development of AI applications**





as low
(radiation dose)
as reasonably
achievable



Adequate image
quality as a
fundamental
requirement

Overall vision of AI in radiological protection

*Merging the core components of
justification and optimisation
in medical imaging*

The role of AI in radiological protection for medical imaging

Referrals (justification): advanced clinical decision support (CDS) utilising large scale HIS and RIS data and equipment access

Automated protocolling: selection of optimised imaging protocol for the selected (optimal) modality and device model

Patient positioning and scan area selection: correct centering/geometry for the exposure and appropriate scan region selection/collimation

Image reconstruction and enhancement: noise and artefact reduction, motion compensation, scatter correction (e.g. virtual grids), improved contrast and resolution

Image analysis and review: image measurements (localisation, segmentation, radiomic features, quantitative parameters), worklist triage, diagnostic reporting aid or autonomous reader

Clinical predictions and care decision support: prognostic estimates, care decision aid, further diagnostic procedure recommendations, evidence based individualised medicine support

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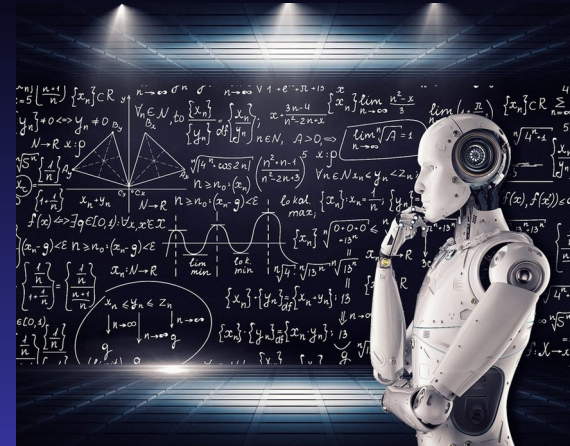


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ESR[®] IGUIDE
EUROPEAN SOCIETY OF RADIOLOGY

Logged in as esmembers

25 year old Female [Edit](#) Service: Not Selected [Edit](#) Indication(s): Hepatitis [Edit](#)

Appropriateness rankings for a 25 year old Female

Appropriateness	Service	Cost	RRL	Display Evidence...
6	MR, MRCP, abdomen, wo/w iv contrast	€€€€		Select this service
6	US, abdomen	€€		Select this service
7	CT, abdomen, w iv contrast	€€€	⚠⚠⚠	Select this service
6	CT, abdomen, wo/w iv contrast	€€€	⚠⚠⚠⚠	Select this service
6	MR, MRCP, abdomen, wo iv contrast	€€€		Select this service
5	CT, abdomen, wo iv contrast	€€	⚠⚠⚠	Select this service
3	END, ERCP, abdomen	€	⚠⚠⚠	Select this service
3	US, endoscopic, abdomen	€		Select this service

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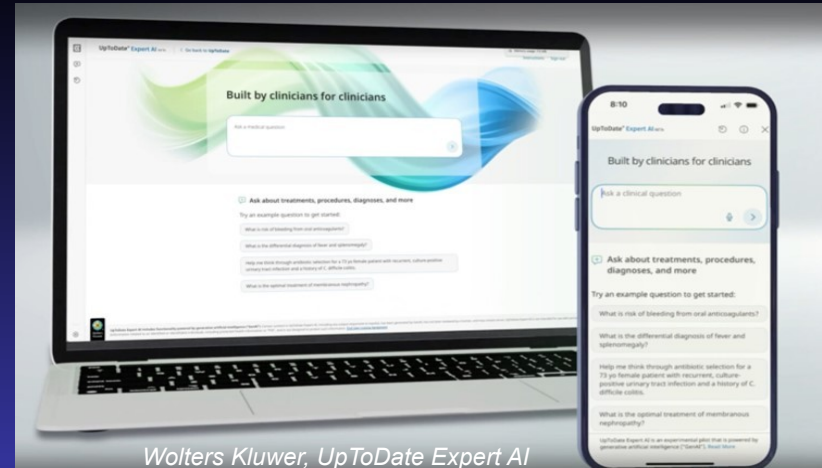


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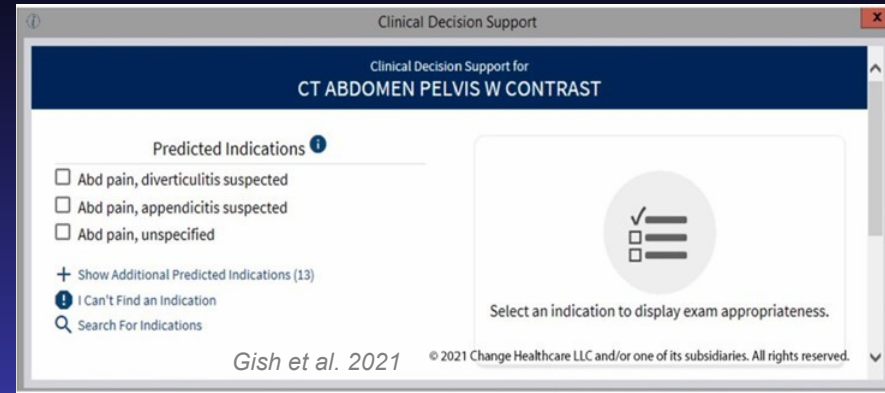


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Model output top 1		Adopt this protocol
Model output top 2		Adopt this protocol
Choose by yourself		Adopt this protocol
Hepatic mass Liver donor Acute abdomen Stent graft CT angiography Routine Urinary tract Renal mass Pancreas/biliary Colorectal CT pulmonary angiography Bronchial artery		<i>Kanemaru et al. 2025</i>

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Radiology

ORIGINAL RESEARCH • COMPUTER APPLICATIONS

Optimizing Large Language Models for Automated Protocolling of Abdominal and Pelvic CT Scans: The Power of Context

Bryan W. Buckley, MB BCH BAO^{*1} • Adriano B. Dias, MD^{*1} • Yangqing Deng, PhD² • Heidi Schmidt, MD¹ • Ania Kielar, MD¹ • Satheesh Krishna, MD^{*1} • Rajesh Bhargava, MD^{*1}

^{*} B.W.B. and A.B.D. contributed equally to this work.

^{**} S.K. and R.B. are co-senior authors.

Author affiliations, funding, and conflicts of interest are listed at the end of this article.

Radiology 2026; 318(1):e252105 • <https://doi.org/10.1148/radiol.252105> • Content codes:  

Buckley et al. 2026

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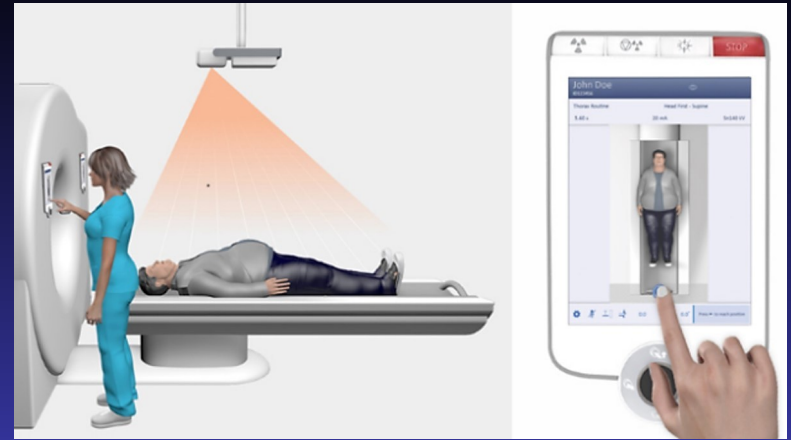


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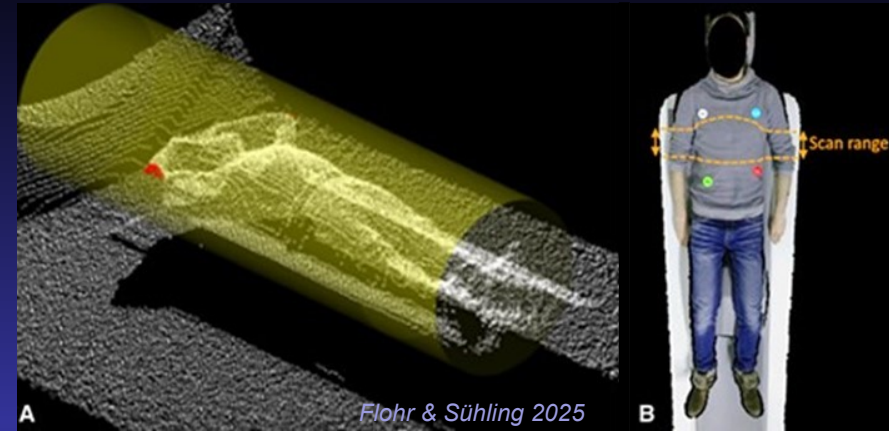


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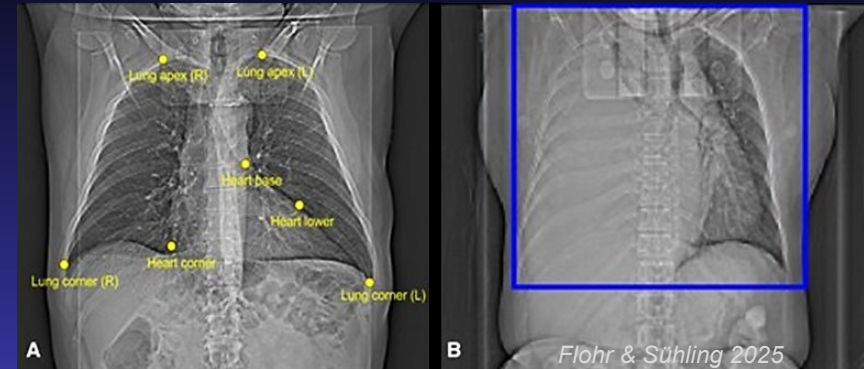


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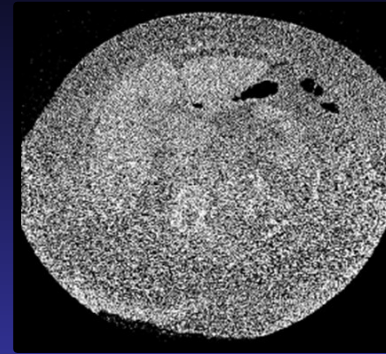
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Koetzier et al. 2023, Chen et al. 2024, Zhang et al. 2024, and many other

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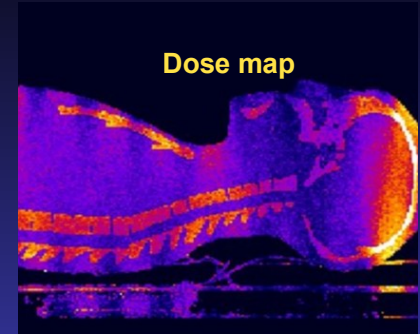
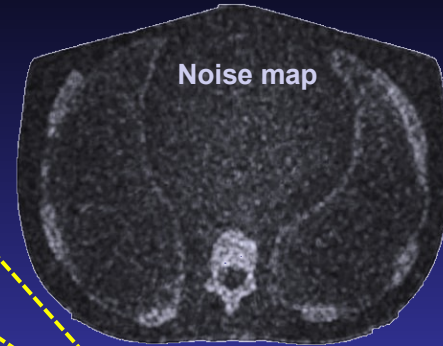
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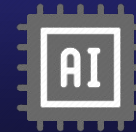
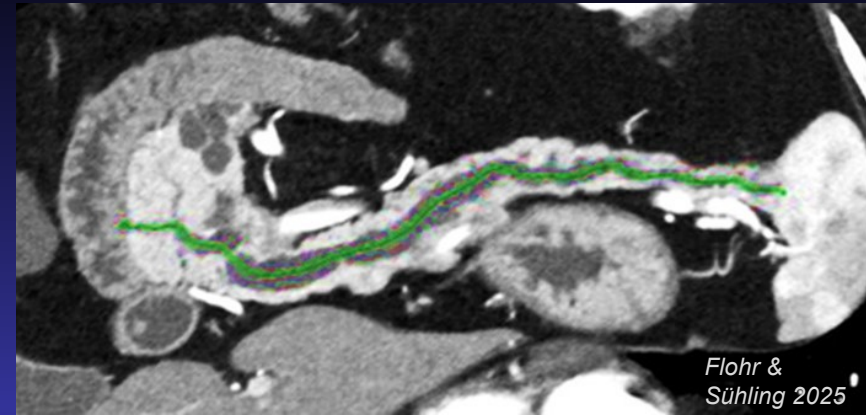
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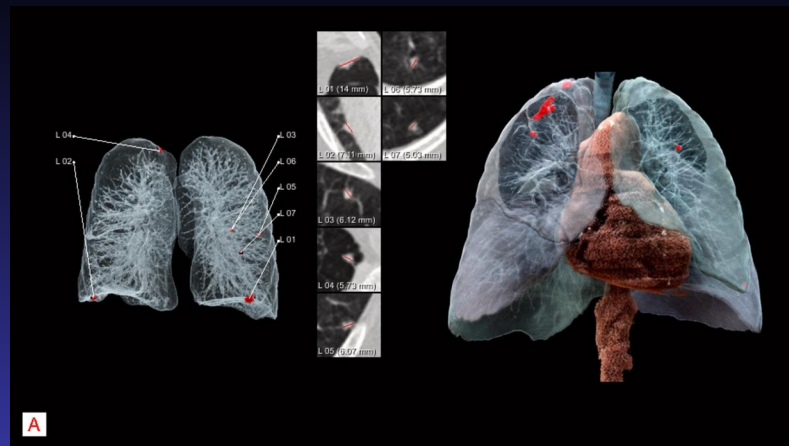
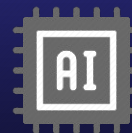


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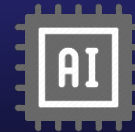
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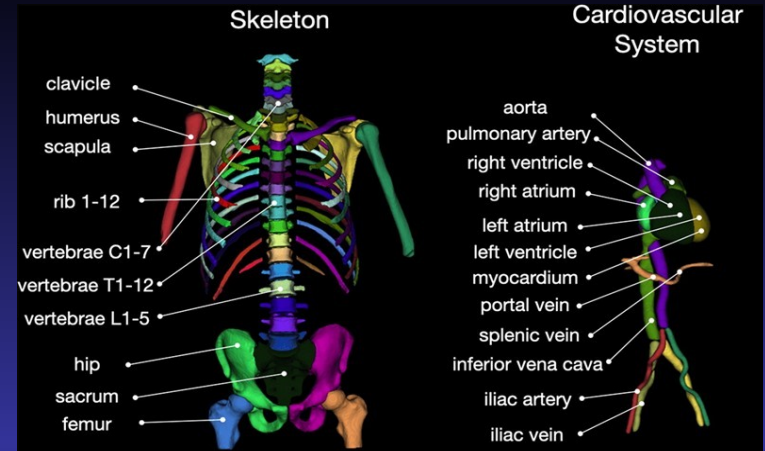
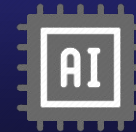


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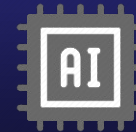
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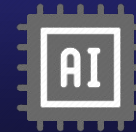
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Foundation models in radiology

Input

Images



X-ray



CT



MRI

Other Health Data



Radiology report



Clinical notes



EHR



Omics



Signals

Medical Domain Knowledge



Textbooks

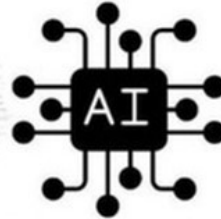


Literature



Online sources

Foundation Model



Training

Adaptation

- Large model pre-trained on broad data
- Highly adaptable & fine-tunable
- Capable of handling multiple tasks

Output

Image Interpretation

- Detection
- Segmentation
- Classification
- Quantification
- Differential diagnosis

Clinical Support

- Decision support
- Outcome prediction

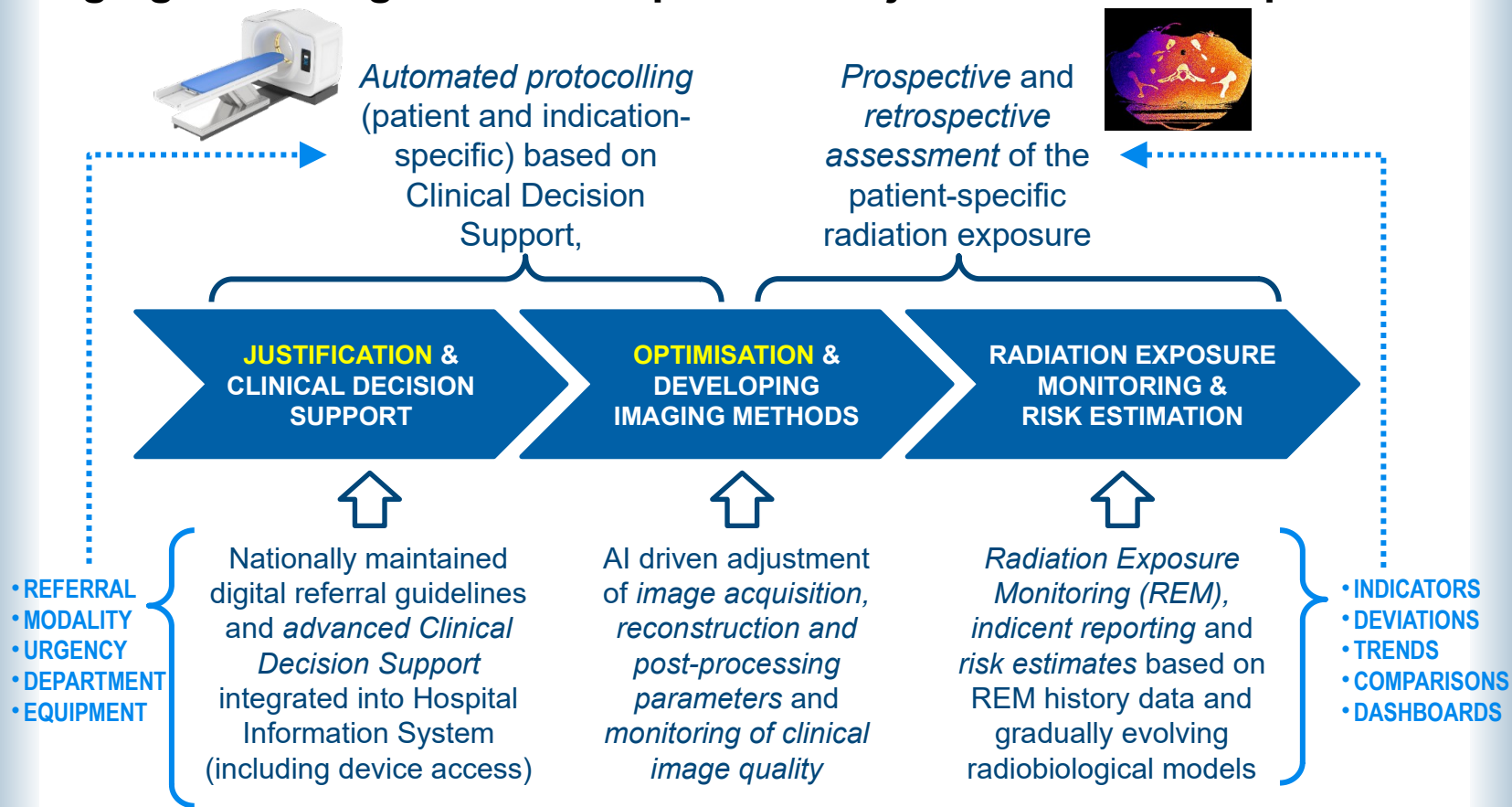
Report Generation

- Automated report generation
- Structured reporting
- Multi-lingual translation
- Text-image alignment

Workflow Support

- Triage
- Error detection
- Protocol selection
- Scheduling optimization

Data-driven interconnected system of radiological protection in medical imaging with merged core components of justification and optimisation



**Our future is
data-driven**



Thank you!

