Multidisciplinary Precision Imaging Research – Role of Academic / Industry relationships

André Hartung, President of Diagnostic Imaging, Siemens Healthineers

Please describe an important scientific or clinical gap in our capabilities for precision imaging that may be better overcome through an effective academic/industrial partnership.

15th Biennial Symposium of the International Society for Strategic Studies in Radiology

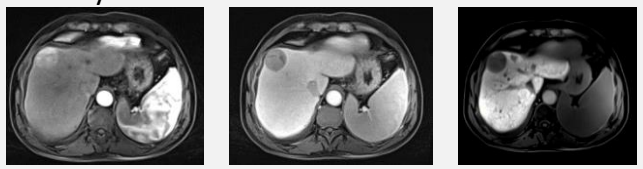
IS3R 2023

Berlin/Germany
August 24–26, 2023

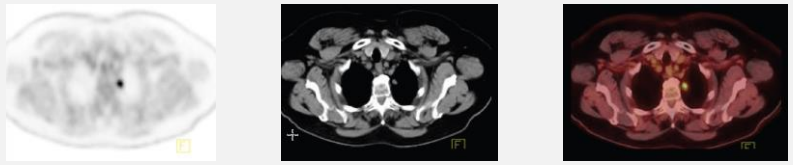
Collaboration enabling precision imaging: leveraging multiple data sources for personalized care

Achieve more personalized diagnosis…

Liver dynamic contrast-enhanced MR[1]

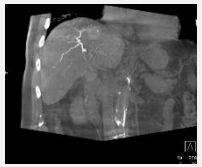


PET/CT imaging of small pulmonary nodule (<1cm)[2]

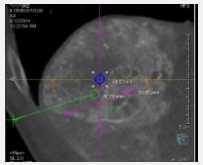


- **Expand imaging biomarker research** for a better **identification** and **characterization** of cancer
- Better understand the **value of functional/biological information** (PET/CT, spectral, etc.) **for therapy response prediction and monitoring**
- **Integrate other diagnostic information** (e.g., radiomics, genomics, pathology) for precision diagnosis

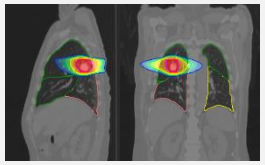
…for a more personalized treatment delivery



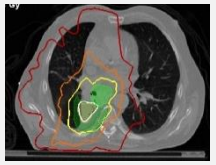
Intraprocedural imaging[3]



Needle positioning planning



Lung ventilation info. for functional RT planning[4]



PET/CT-based selective RT dose escalation to lung tumor[5]

- Deeper integration of **multimodal diagnostic information in therapeutic trials** (e.g, pharma, radiation/interventional therapies)
- **Personalized treatment plan** for improved patient outcome

Structured, integrated, unified, and smart patient management platform

Cross-stakeholder collaboration becomes critical to unleash full potential

1 University Hospital Tübingen, Germany
2 Courtesy of Stanford Medical Center, Stanford, California, USA
3 Courtesy: Bernhard Meyer, MD, Hannover Medical School, Germany
4 Courtesy of University Hospital Aarhus, Denmark
5 Data courtesy of MAASTRO Clinic, Maastricht, The Netherlands

Please discuss your experience with one example of a successful academic/industrial collaboration that resulted in an advance in precision imaging that neither partner could achieve as effectively alone.

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Collaboration driving innovation: NAEOTOM Alpha

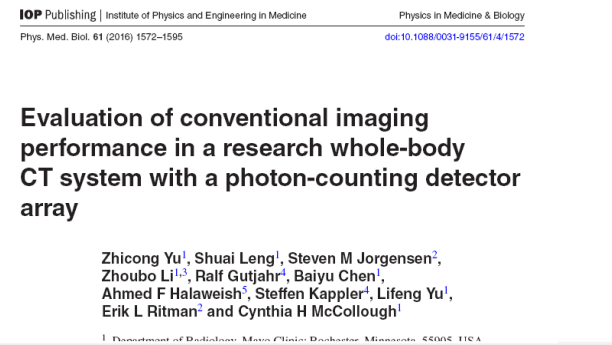
Expert meeting — 2014

Early prototypes — 2016

2nd gen prototypes — 2020

Clinical evidence — Today

Technical evaluation



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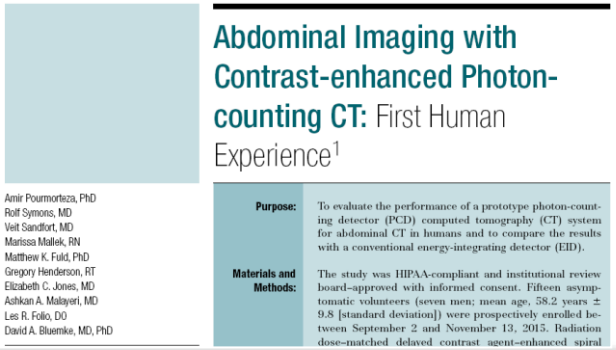
Phys. Med. Biol. 61 (2016) 1572–1595 — doi:10.1088/0031-9155/61/4/1572

Evaluation of conventional imaging performance in a research whole-body CT system with a photon-counting detector array

Zhicong Yu[1], Shuai Leng[1], Steven M Jorgensen[2], Zhoubo Li[1,3], Ralf Gutjahr[4], Baiyu Chen[1], Ahmed F Halaweish[5], Steffen Kappler[4], Lifeng Yu[1], Erik L Ritman[2] and Cynthia H McCollough[1]

[1] Department of Radiology, Mayo Clinic, Rochester, Minnesota, 55905, USA

Feasibility studies



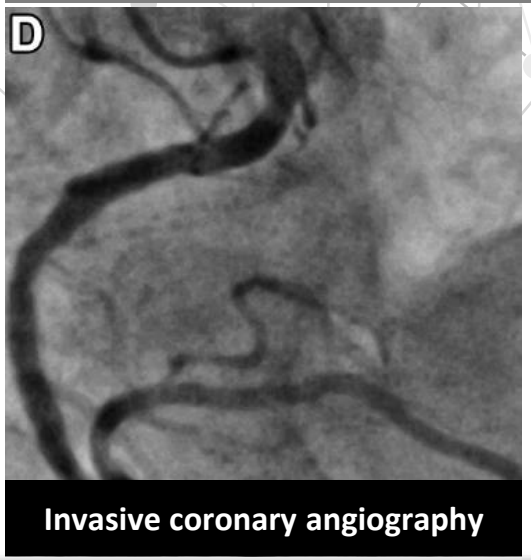
Abdominal Imaging with Contrast-enhanced Photon-counting CT: First Human Experience[1]

Amir Pourmorteza, PhD
Rolf Symons, MD
Veit Sandfort, MD
Marissa Mallek, RN
Matthew K. Fuld, PhD
Gregory Henderson, RT
Elizabeth C. Jones, MD
Ashkan A. Malayeri, MD
Les R. Folio, DO
David A. Bluemke, MD, PhD

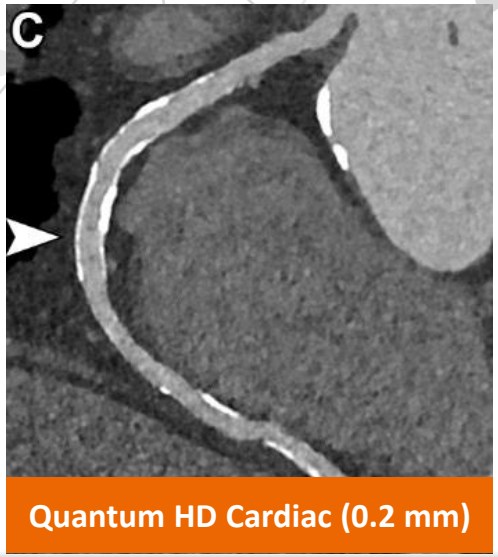
Purpose: To evaluate the performance of a prototype photon-counting detector (PCD) computed tomography (CT) system for abdominal CT in humans and to compare the results with a conventional energy-integrating detector (EID).

Materials and Methods: The study was HIPAA-compliant and institutional review board–approved with informed consent. Fifteen asymptomatic volunteers (seven men; mean age, 58.2 years ± 9.8 [standard deviation]) were prospectively enrolled between September 2 and November 13, 2015. Radiation dose–matched delayed contrast agent–enhanced spiral

Clinical evaluation[1]



Invasive coronary angiography



Quantum HD Cardiac (0.2 mm)

1 Hagar et al. (2023) https://pubs.rsna.org/doi/10.1148/radiol.223305

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Clinical evaluation[2]

3rd Gen. DSCT
DLP: 129.8 ± 1.7 mGy*cm

NAEOTOM Alpha
DLP: 88.5 ± 21 mGy*cm

2 Gaillandre et al. (2023). https://doi.org/10.1007/s00330-023-09616-x
Image: Courtesy of University Centre of Lille, France