



How Should Imaging Industry and Academia Respond to the ESG Mandate, and What Potential Partnerships Should Be Explored?

Michael Fuchsjäger, Graz/AT

- What are the key ways a radiology department can save energy and reduce waste? What items can be recycled in Radiology departments today?
- Is remote working/teleradiology helpful for reducing energy use and waste in radiology? How do we measure impact? Are there any patient telehealth models that are applicable to radiology practice?
- The demand for digital data storage is rapidly expanding. Data centers now account for more than 2% of global carbon emissions, overtaking the footprint of the entire airline industry. Has sufficient attention been paid to the data volume generated by radiology and is there “waste data” that should be reduced?
- What is the potential to streamline and simplify radiology imaging protocols and use of contrast agents to reduce waste?

Baseline

- Energy Consumption
 - Healthcare sector – 3% of global consumption
 - Hospital – 65%+ consumption - due to HVAC (heating, ventilation, A/C)
 - MRI 1/3 cooling; CT 2/3 „idling state“

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- Example:

- 3T MRI

- „Scan“ 25 kWh's
 - „Ready-to-scan“ 8 kWh's
 - „Stand-by“ 4 kWh's

Reduction of Energy Consumption

- Newest scanner generation / workflow / protocols
- MRI at lower field strength (Less power, less helium, less cooling, less space.....)
- Decision support (*„getting it right the first time“*)
- Avoid duplicate / unnecessary exams (VBR!!!)
- Have adequate IT structure in place (internal & external)

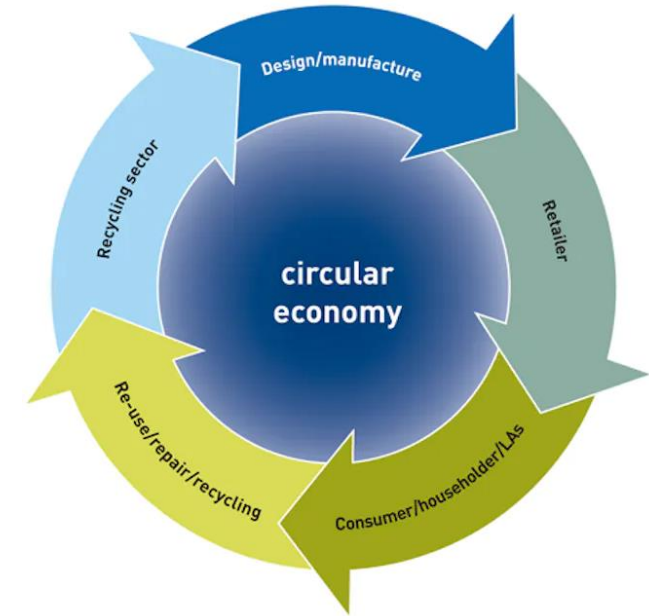
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- Have adequate IT structure in place (internal & external)
- Reporting workstations
 - n=30, idling 1 vs. 4 hrs/y



Reduction of Waste

- Circular economy
 - Paradigm Change
Instead of „take, make, dispose“,
„take, make, refurbish, reuse, recycle“
- Large equipment
 - sustainability due to refurbishment or re-use of 95% (!) of parts
- Recycling
 - packing, composites, glass, metal, E-scrap, x-ray images, **iodine CM**



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Teleradiology & ESG

- Centralised Teleradiology Services
- Work from home
 - No need for hospital clothing
 - Caveat – no duplication of infrastructure!
- Online communication tools for patient interaction
- Patients only physically present for examinations
 - Caveat – loss of human connection / touch (VBR, PCC!)



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- Wearable imaging devices?



MIT News



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Data Storage

- „Explosion“ of data volume in radiology
 - pay attention to imaging protocols
- Legal framework (!)
- „Waste data“
 - active role of radiologists & radiographers (!)
 - advance compression algorithms (AI?!)

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Protocols & Contrast Media

- Shortening protocols
 - Compressed sensing
 - AI

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- Shortening protocols
 - Compressed sensing
 - AI
- Reduction of CM use
 - Low tube voltage (70kV)

	New / Alternative kV								
	70 kV	80 kV	90 kV	100 kV	110 kV	120 kV	130 kV	140 kV	150 kV
70 kV	0.0%	+18.2%	+37.2%	+57.7%	+77.0%	+96.9%	+113.7%	+135.5%	+153.8%
80 kV	-15.4%	0.0%	+16.0%	+33.3%	+49.7%	+66.7%	+80.8%	+98.8%	+114.6%
90 kV	-27.1%	-13.8%	0.0%	+14.9%	+29.0%	+43.7%	+56.0%	+71.5%	+85.2%
100 kV	-36.6%	-25.0%	-13.0%	0.0%	+12.2%	+25.0%	+35.5%	+49.3%	+61.0%
110 kV	-43.5%	-33.2%	-22.5%	-10.9%	0.0%	+11.4%	+20.8%	+33.0%	+43.5%
120 kV	-49.2%	-40.0%	-30.4%	-19.9%	-10.2%	0.0%	+8.5%	+19.3%	+28.9%
130 kV	-53.2%	-44.7%	-35.9%	-26.3%	-17.2%	-7.8%	0.0%	+10.0%	+18.8%
140 kV	-57.5%	-49.7%	-41.7%	-33.0%	-24.8%	-16.2%	-9.1%	0.0%	+7.9%
150 kV	-60.6%	-53.4%	-46.0%	-37.9%	-30.3%	-22.4%	-15.8%	-7.3%	0.0%

Protocols & Contrast Media

- Shortening protocols
 - Compressed sensing
 - AI
- Reduction of CM use
 - Low tube voltage (70kV)
 - Spectral CT / PCD-CT
 - Non-contrast protocols

RSNA

CT Angiography of the Aorta Using Photon-counting Detector CT with Reduced Contrast Media Volume

Key Result

Photon-counting detector CT (PCD CT) angiography of the thoracoabdominal aorta at 50 keV and reduced contrast media volume (CM) had comparable image quality to energy-integrating detector CT (EID CT).

Participants:

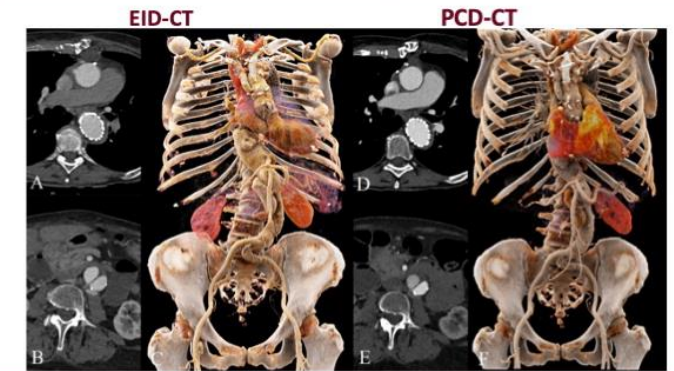
- 100 adults with clinically indicated CTA of the thoracoabdominal aorta and previous EID CT at equal radiation doses

Methods:

- In PCD CT, virtual monoenergetic images (VMI) were reconstructed in 5 keV intervals from 40 to 60 keV.
- Objective and subjective image quality were compared between PCD CT and EID CT.
- The same CM protocol was used for both scans in 40 participants, and CNR gain for PCD CT served as reference for CM volume reduction in the final 60 participants.

Results:

- PCD CT VMI at 50 keV provided the best trade-off between objective and subjective image quality compared with EID CT at matched CM volume, leading to 25% CNR gain and CM volume reduction.
- Mean differences in CNR and subjective image quality between EID CT and PCD CT at 50 keV with reduced CM volume were above the predefined boundaries of noninferiority.



Higashigaito K et al. Published Online: January 26, 2023
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Radiology: Cardiothoracic Imaging

ESG - Potential Industry-Academia Partnerships?



- One-year women's leadership program
- SCARD & GE Healthcare
- Cohort of 20 female leaders from Radiology & GEHC
- Goals
 - increase number of women in chair positions
 - build community of women across Industry & Radiology



Thank You!

- Andrea Rockall

„The green and sustainable radiology department“ (in press)

- James Brink

„The enviromental, social, governance movement in radiology: opportunities and strategies“ (in press)



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