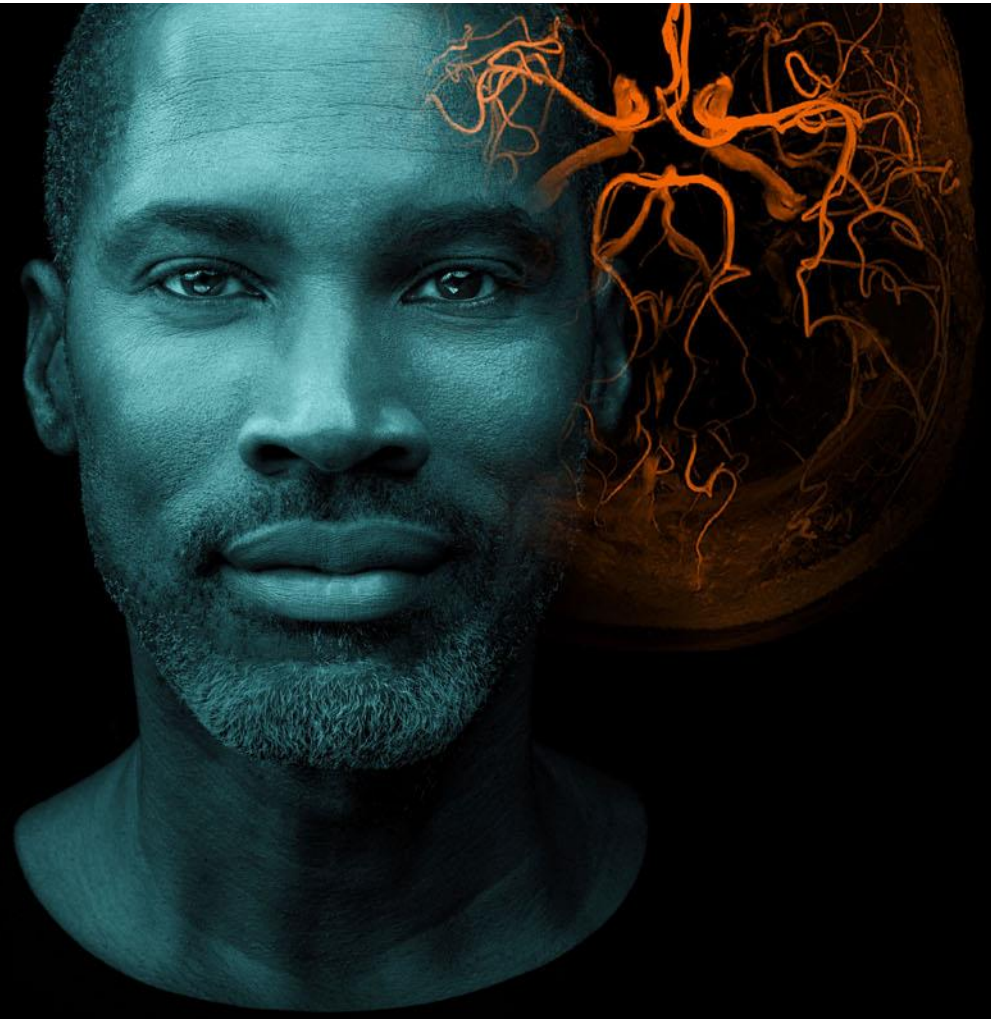
SIEMENS Healthineers

Boost your Workflow

25 Octobre 2022

Annemie Steegmans
Vincent Le Couls



Agenda of the day

Deep Resolve, c'est quoi ?
Annemie Steegmans et Vincent Le Couls, Siemens Healthineers

What's better than best? Boost?
Dr. Johan Dehem, Jan Yperman Ziekenhuis Ieper

Beat Sensor, Respiratory Sensor et Select&Go, retour d'une technologue en imagerie médicale
Jenna Midgley, ZOL Genk

Pauze

MAGNETOM Vida 3T et la technologie Deep Resolve : premières expériences au sein de GZA à Anvers
Vincent Denolin, Siemens Healthineers

Syngo Virtual Cockpit: Move knowledge, not staff – introduction
Maarten Clinckaert, Siemens Healthineers

Syngo Virtual Cockpit: Move knowledge, not staff – témoignage d'un utilisateur
Filip Deferme, Universitair Ziekenhuis Antwerpen

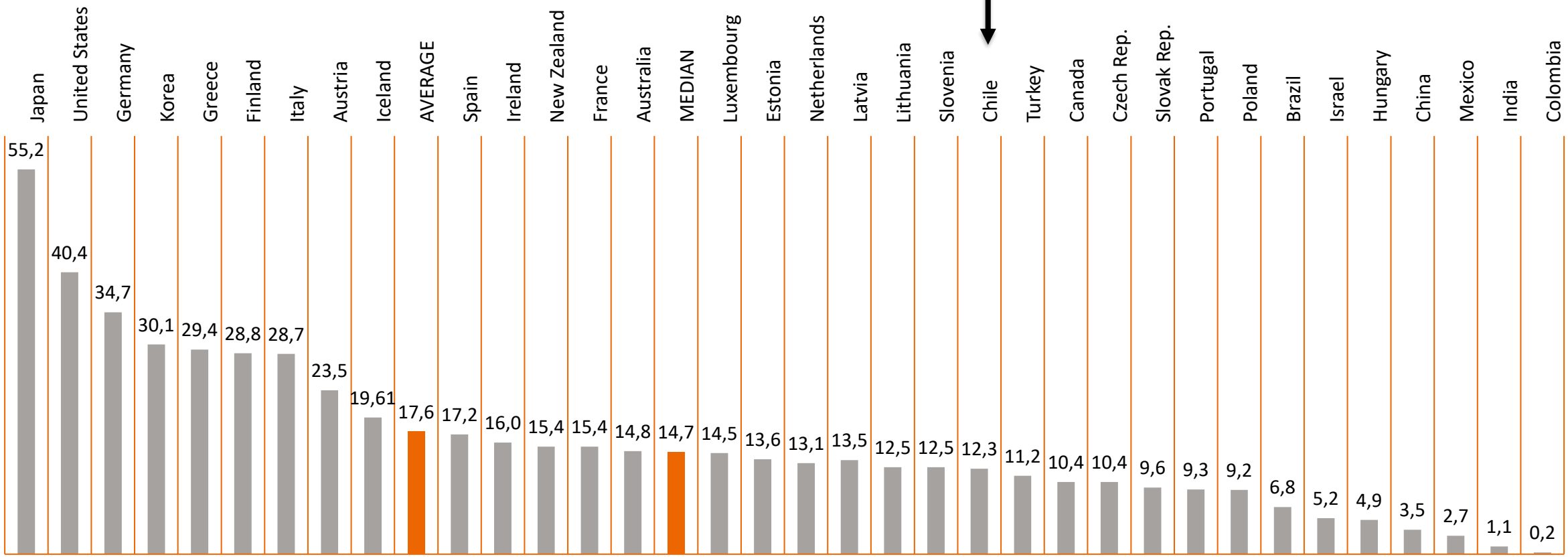
21:00 Apéro dînatoire & networking

MR units in OECD countries
Per one million population

SIEMENS Healthineers

Average 17.6 MR systems
Median 14.7 MR systems[1]

Belgium : 11,4 in 2021



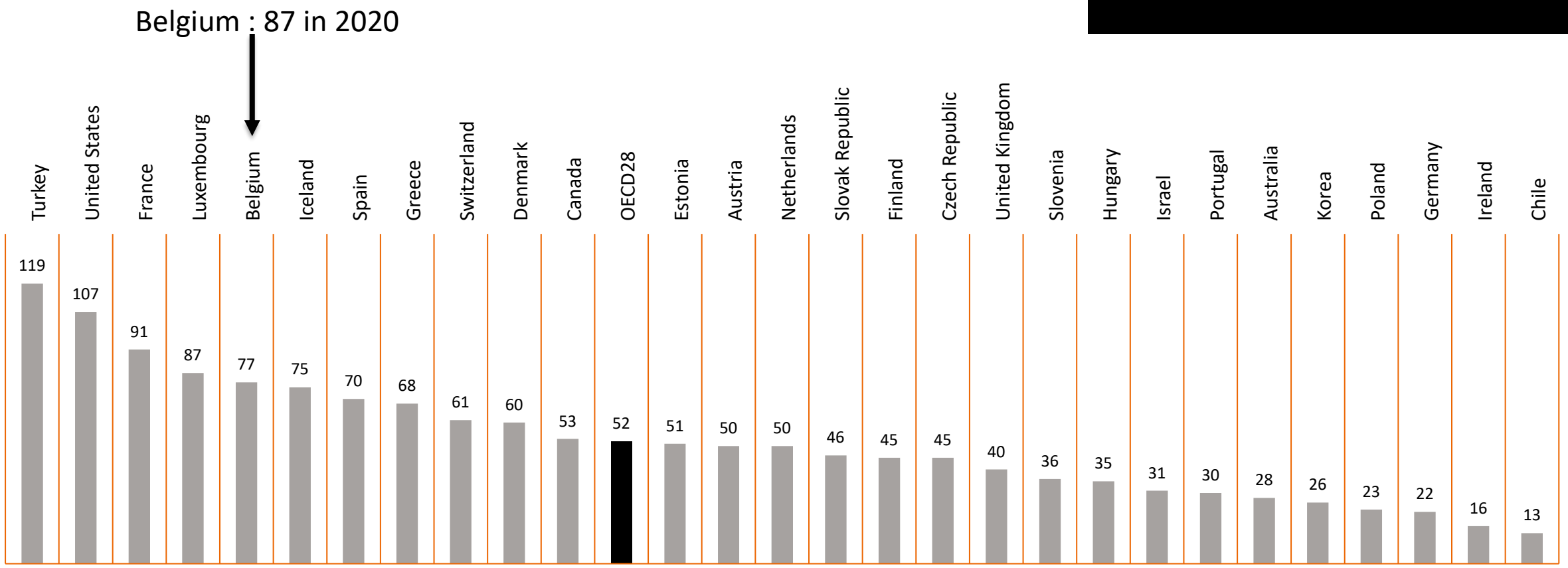
OECD Health Statistics 2020, Eurostat Database.
[1] OECD MRI units, 2019 or nearest.

Link OECD

Magnetic Resonance

MRI exams OECD countries per 1,000 population

OECD average
52 exams[1]



[1] OECD (2015), Health at a Glance 2015: OECD Indicators, p.103, OECD Publishing, Paris

The obvious conclusion …

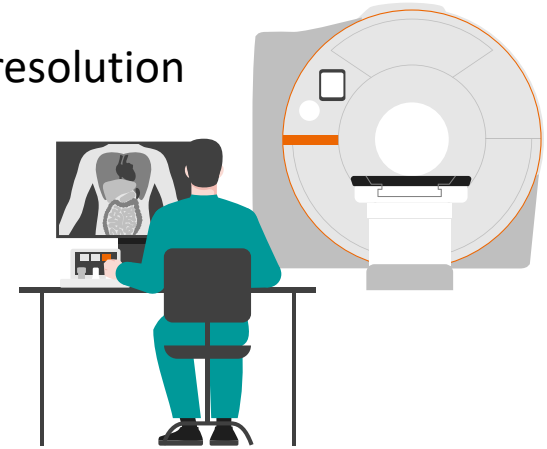
Fast image acquisition is crucial

Higher patient throughput possible
with motion artifacts less likely

… with a caveat

The challenge:
Don’t compromise on image quality

Precise diagnosis requires datasets
with high signal-to-noise ratio and high resolution



BioMatrix technology
Reducing unwarranted variations

SIEMENS Healthineers

Expanding Precision Medicine

Anticipate
motion for
high-quality results

BioMatrix Sensors

Adapt
to challenging anatomies
for reliable exams

BioMatrix Tuners

Accelerate
patient preparation
for increased efficiency

BioMatrix Interfaces

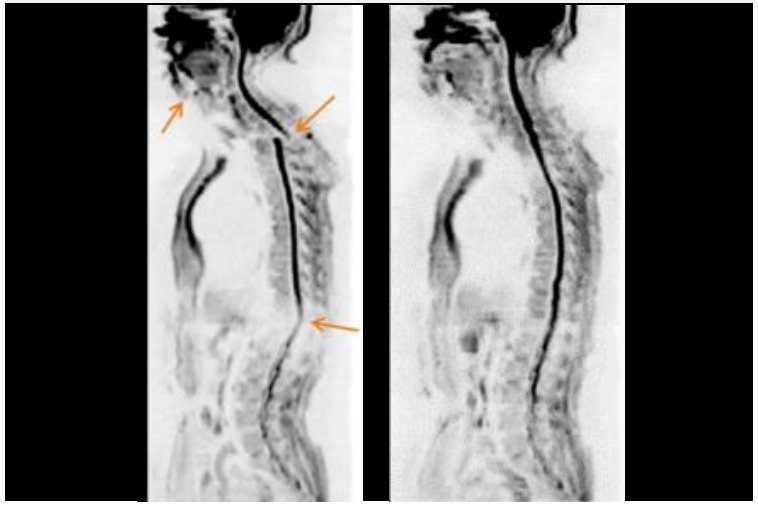
BioMatrix Technology
Reducing unwarranted variations

SIEMENS Healthineers

Anticipate
motion for high-quality results
BioMatrix Sensors

BioMatrix Respiratory Sensors
BioMatrix Beat Sensor[1]

Adapt
to challenging anatomies for reliable exams
BioMatrix Tuners



BioMatrix CoilShim
BioMatrix SliceAdjust

Accelerate
patient preparation for increased efficiency
BioMatrix Interfaces

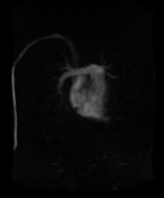
BioMatrix Select&GO
BioMatrix Dockable Table with eDrive

[1] Cardiac Triggering is still under development and not commercially available yet. Its future availability cannot be ensured.

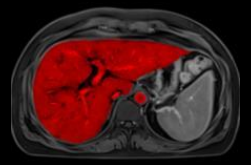
Innovation leadership with an industry leading MR acceleration portfolio to answer clinical questions

SIEMENS Healthineers

TWIST



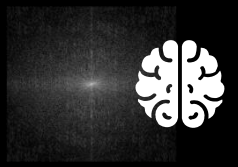
FREEZEit

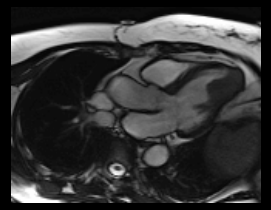


Compressed Sensing

Siemens Healthineers exclusive

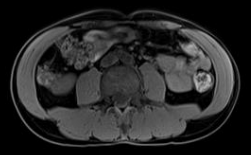
Deep Resolve





GRAPPA

Siemens Healthineers exclusive

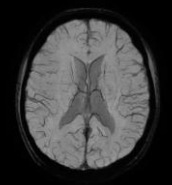


CAIPIRINHA

Siemens Healthineers exclusive

Simultaneous Multi-Slice

Siemens Healthineers exclusive



Wave-CAIPI

How many patients can you scan in 2 hours? Throughput test on MAGNETOM Altea

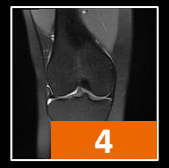
SIEMENS Healthineers

Exam workflow:

3 knee exams
T1 TSE sag, PD TSE fs cor, PD TSE fs sag, PD TSE fs tra
SMS & PAT – TA 4:43 min

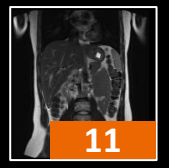
1 brain exam with TOF
T1 SE sag, T2 TSE tra, TS TSE darkfluid tra, Ep2d hemo tra, CS TOF
PAT – TA 8:32 min

1 c-spine exam
T2 TSE sag, T1 TSE sag, T2 TRIM cor, T2 me2d tra
PAT – TA 7:48 min



1 high resolution knee
T1 TSE sag, PD TSE fs cor, 2 x PD TSE fs sag, PD TSE fs tra, 3D PD SPACE sag
SMS, CAIPI, PAT – TA 17:41 min

1 c-spine exam
T2 TSE sag, T1 TSE sag, T2 TRIM cor, T2 me2d tra
PAT – TA 7:48 min



1 abdomen exam
T2 HASTE cor, T2 HASTE SPAIR tra, T1 VIBE Dixon tra pre/ arterial/ venous/ delayed/ post , CS 3D SPACE MRCP, CAIPI 3D SPACE MRCP
CS, CAIPI, PAT – TA 8:17 min

1 l-spine exam
T2 TSE sag, T1 TSE sag, T2 TRIM cor, T2 TSE tra
PAT – TA 6:44 min

1 brain exam
T1 SE sag, T2 TSE tra, TS TSE darkfluid tra, Ep2d hemo tra
PAT – TA 5:55 min

1 l-spine exam with whole-spine localizer
T2 TSE sag, T1 TSE sag, T2 TRIM cor, T2 TSE tra
PAT – TA 13:37 min

11 patients

Scan time:
1 hour 31 min[1]

Patient preparation and change-over:
29 min

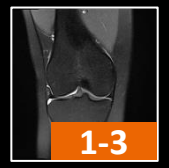
[1] Scan time represented as TA + Adjustments. (Time for adjustment 1-2 min per exam). Localizers included. User operating times not considered separately.
Scan conditions: volunteer scan following actual clinical protocol with changeover. Supported by 2 technologists. No contrast was applied.
Note that scan time reduction is not an exact factor of slice acceleration due to a fast reference scan required for slice separation.

Magnetic Resonance

How many patients can you scan in 2 hours? Throughput test on MAGNETOM Lumina

SIEMENS Healthineers

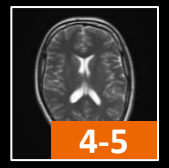
Exam workflow:



3 knee exams
T1 TSE sag, PD TSE fs cor,
PD TSE fs sag, PD TSE fs tra
SMS & PAT – TA 2:19 min

1 c-spine exam
T2 TSE sag, T1 TSE sag,
T2 TSE stir cor, T2 me2d tra
PAT – TA 5:42 min

2 knee exams
T1 TSE sag, PD TSE fs cor,
PD TSE fs sag, PD TSE fs tra
SMS & PAT – TA 2:19 min

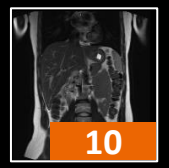


2 brain exams
T1 fl2d sag, T2 TSE tra, TS TSE darkfluid tra, Ep2d hemo tra, CS TOF
SMS, CS & PAT – TA 3:27 min

1 l-spine exam
T2 TSE sag, T1 TSE sag,
T2 TSE stir cor, T2 TSE tra
PAT – TA 5:20 min

1 ankle exam
PD TSE fs sag, T1 TSE sag,
PD TSE fs cor, PD TSE fs tra
SMS & PAT – TA 4:40 min

1 c-spine exam
T2 TSE sag, T1 TSE sag,
T2 TSE stir cor, T2 me2d tra
PAT – TA 5:42 min



1 abdomen exam
T2 HASTE cor, CS T2 SPACE MRCP, T1 VIBE Dixon tra pre/ arterial/ venous/ delayed/ post, Ep2d diff tra b50 800 incl ADC, T2 HASTE fs tra
CS & PAT – TA 4:23 min

1 l-spine exam
T2 TSE sag, T1 TSE sag,
T2 TSE stir cor, T2 TSE tra
PAT – TA 5:20 min

13 patients

Scan time:
1 hour 16 min[1]

Patient preparation and change-over:
44 min

[1] Scan time represented as TA + Adjustments. (Time for adjustment 1-2 min per exam). Localizers included. User operating times not considered separately.
Scan conditions: volunteer scan following actual clinical protocol with changeover. Supported by 2 technologists. No contrast was applied.
Note that scan time reduction is not an exact factor of slice acceleration due to a fast reference scan required for slice separation.

Magnetic Resonance

How many patients can you scan in 2 hours? Throughput test on MAGNETOM Vida Fit

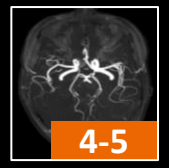
SIEMENS Healthineers

Exam workflow:

3 knee exams
T1 TSE sag, PD TSE fs cor,
PD TSE fs sag, PD TSE fs tra
SMS & PAT – TA 2:57 min

1 c-spine exam
T2 TSE sag, T1 TSE sag,
T2 TSE stir cor, T2 me2d tra
PAT – TA 7:24 min

2 knee exams
T1 TSE sag, PD TSE fs cor,
PD TSE fs sag, PD TSE fs tra
SMS & PAT – TA 2:20 min

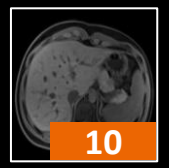


2 brain exams
T1 fl2d sag, T2 TSE tra, TS TSE darkfluid tra, Ep2d hemo tra, CS TOF
SMS, CS & PAT – TA 3:30 min

1 l-spine exam
T2 TSE sag, T1 TSE sag,
T2 TSE stir cor, T2 TSE tra
PAT – TA 5:39 min

1 ankle exam
PD TSE fs sag, T1 TSE sag,
PD TSE fs cor, PD TSE fs tra
SMS & PAT – TA 3:54 min

1 c-spine exam
T2 TSE sag, T1 TSE sag,
T2 TSE stir cor, T2 me2d tra
PAT – TA 6:48 min



1 abdomen exam
T2 HASTE cor, CS T2 SPACE MRCP, T1 VIBE Dixon tra pre/ arterial/ venous/ delayed/ post, Ep2d diff tra b50 800 incl ADC, T2 HASTE fs tra
CS & PAT – TA 4:29 min

1 l-spine exam
T2 TSE sag, T1 TSE sag,
T2 TSE stir cor, T2 TSE tra
PAT – TA 5:39 min

13 patients

Scan time:
1 hour 13 min[1]

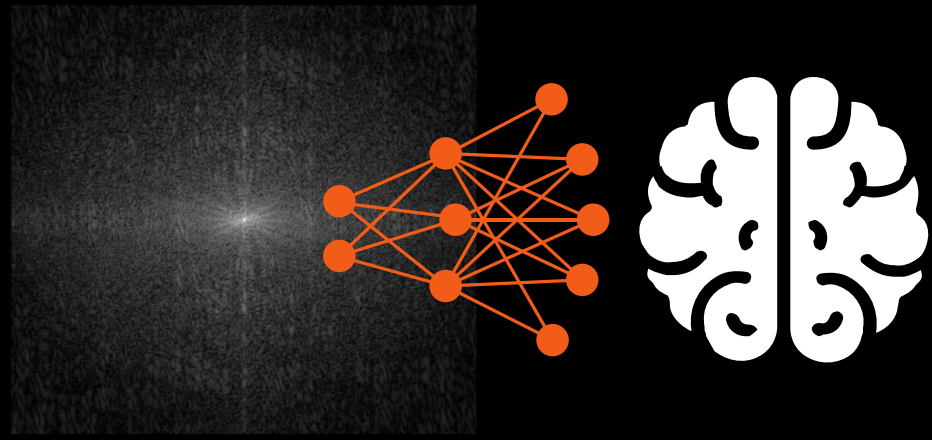
Patient preparation and change-over:
47 min

[1] Scan time represented as TA + Adjustments + User operating times.
Scan conditions: volunteer scan following actual clinical protocol with changeover. Supported by 2 technologists. No contrast was applied.
Note that scan time reduction is not an exact factor of slice acceleration due to a fast reference scan required for slice separation.

Magnetic Resonance

Our synergistic MR acceleration portfolio
Complimentary capabilities, ultimate performance

SIEMENS Healthineers



Conventional MR acceleration

Utilizes the unique capabilities of the MR system

+

Deep learning acceleration

Even faster, synergistic with existing techniques

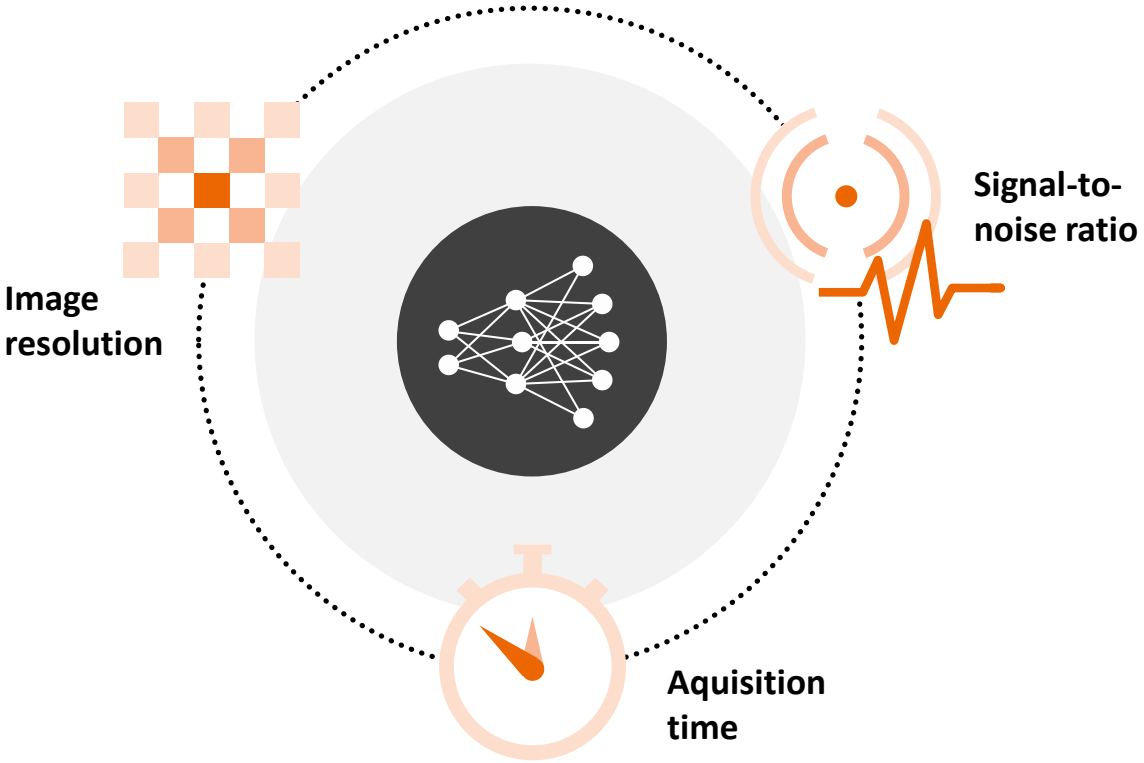
SIEMENS Healthineers

Deep Resolve

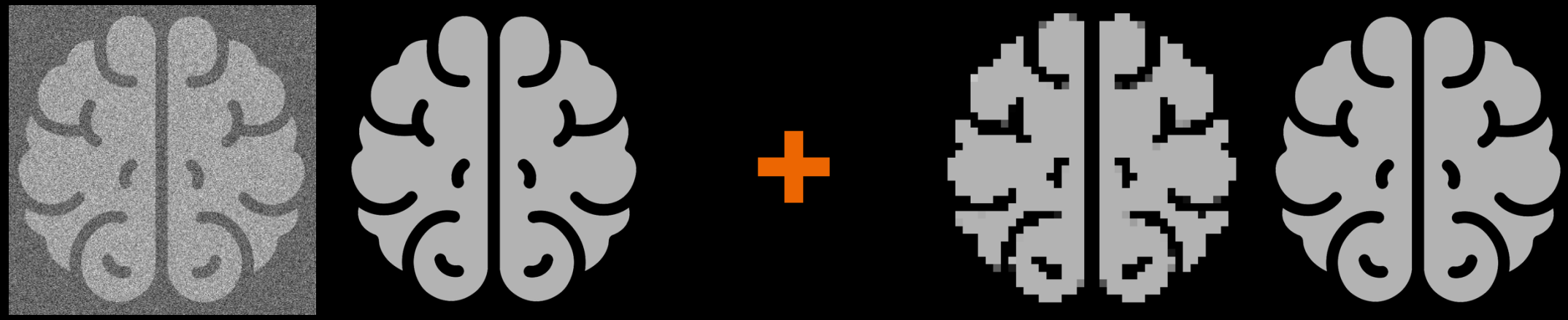
Mobilizing the power of networks

Today’s challenges in acquisition and reconstruction

Deep learning reconstruction
simultaneously improves:



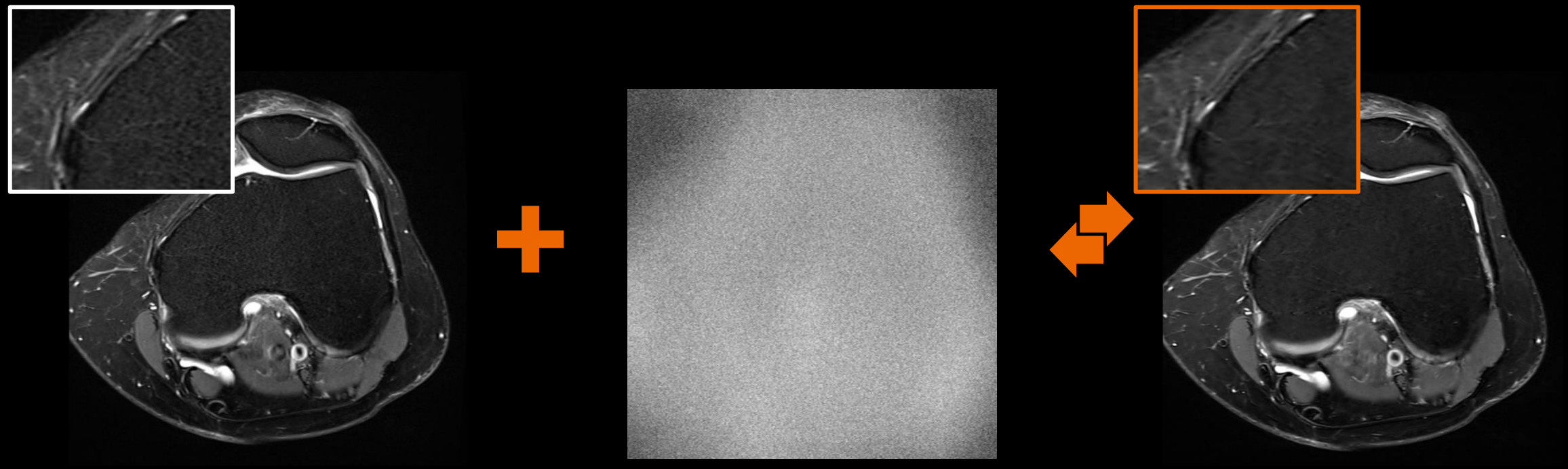
Deep Resolve[1] includes Deep Resolve Gain and Deep Resolve Sharp



Deep Resolve Gain

Deep Resolve Sharp

Deep Resolve Gain[1] – intelligent denoising using individual noise maps



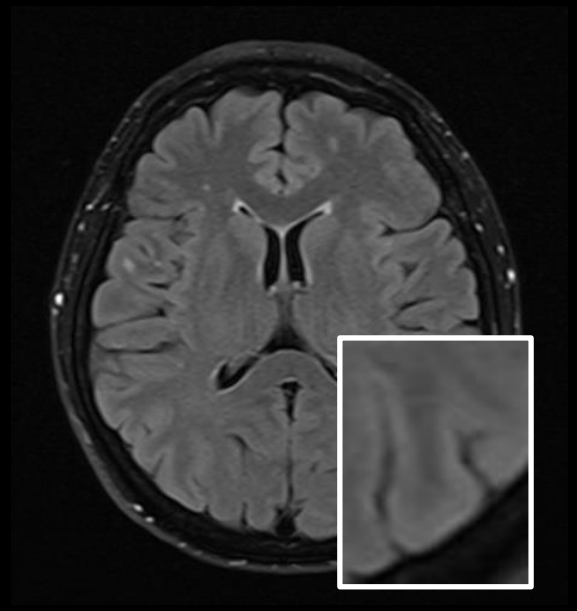
Low SNR
input data

Individual
noise map

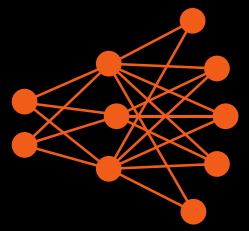
High SNR
output data

Deep Resolve Sharp[1] – enhancing image sharpness and resolution with deep learning

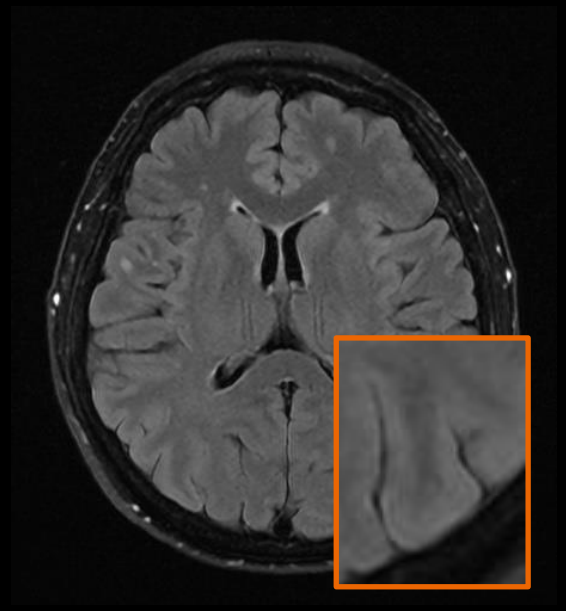
SIEMENS Healthineers



Low resolution input data

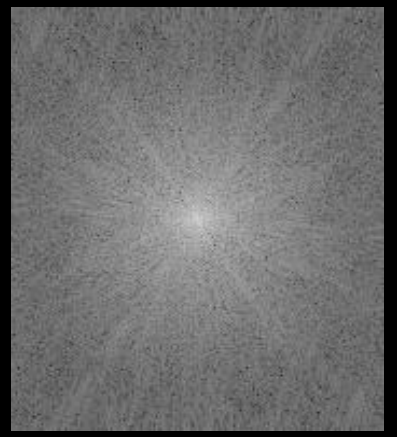


Deep neural network



High resolution reconstruction

Cross-check with acquired data



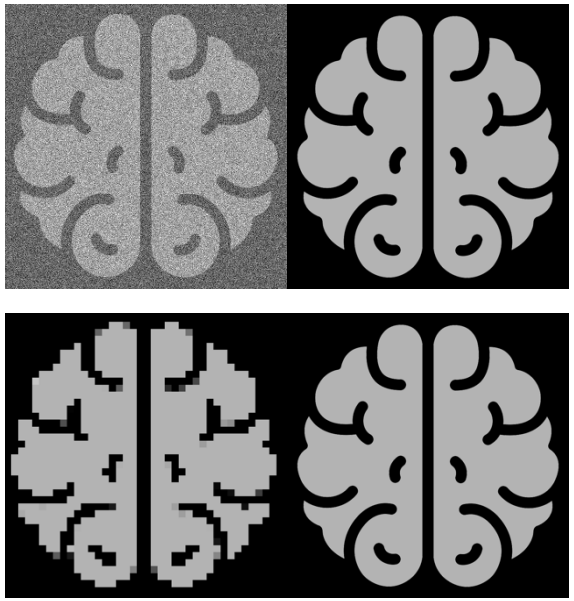
Raw data input

Deep Resolve Gain & Sharp

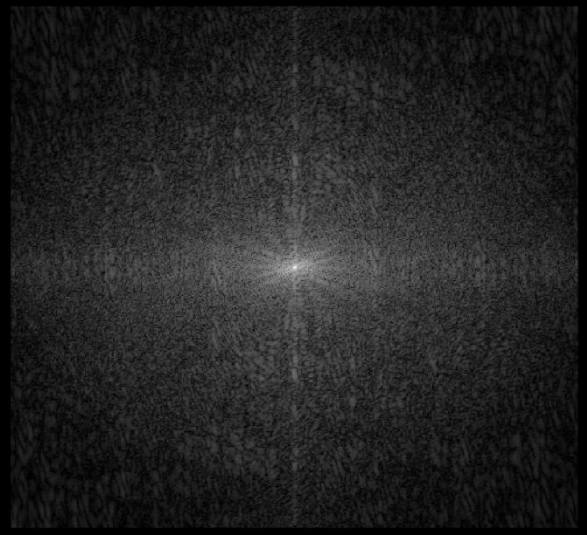
- **Deep Resolve Gain & Sharp are now available for more sequences:**
  - TSE
  - SE
  - DIXON

- **Deep Resolve Gain & Sharp are now combinable with SMS**

- **This was a key wish from our customers**

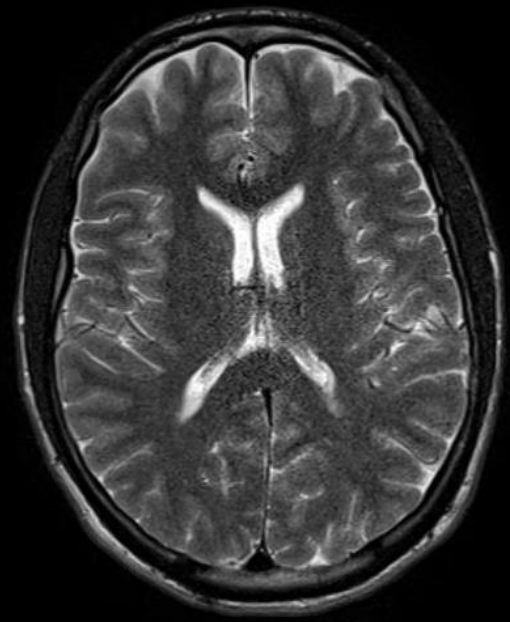


Deep Resolve Boost – strong acceleration with raw data to image Deep Learning reconstruction



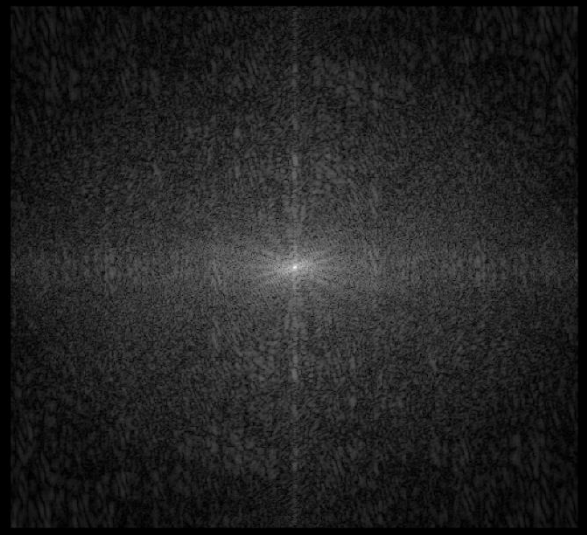
Raw data from highly accelerated scan

Conventional reconstruction

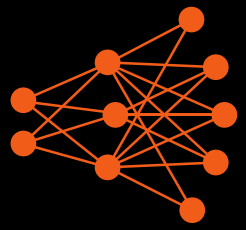


Strong noise contamination

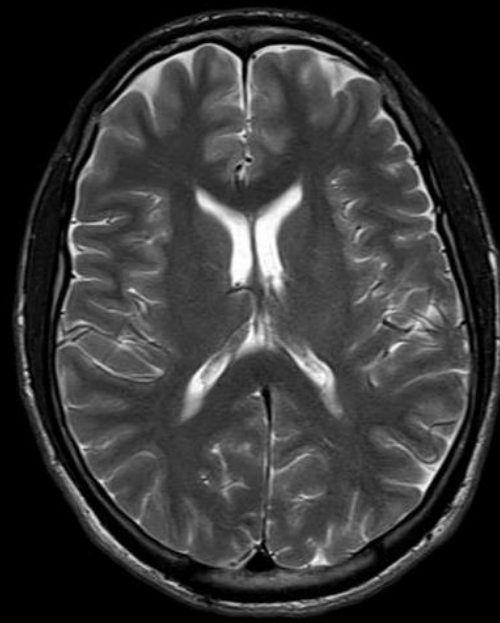
Deep Resolve Boost – strong acceleration with raw data to image Deep Learning reconstruction



Raw data from highly accelerated scan



Deep Resolve Boost

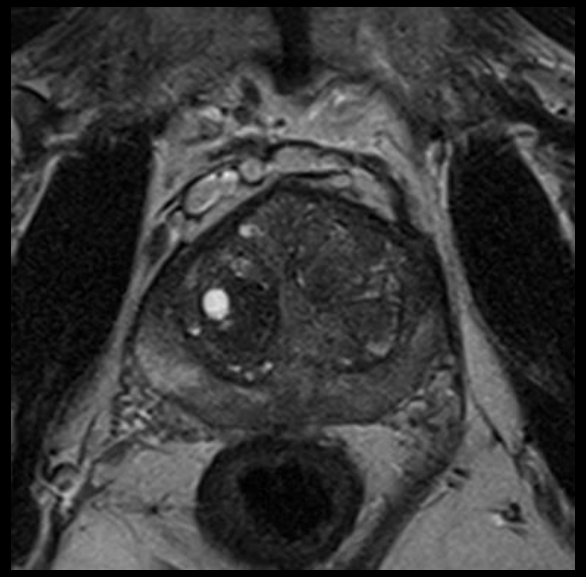


High SNR reconstruction

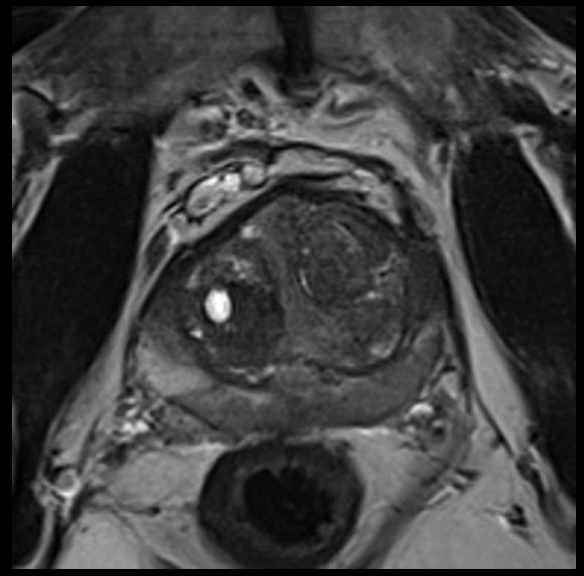
Deep Resolve Boost – raw data to image DL reconstruction

SIEMENS Healthineers

- Raw data to image Deep Learning reconstruction (denoising)
- Stronger Denoising than DR Gain
  → Better acceleration potential
- Three denoising strengths
- Applicable head-to-toe
- Combinable with SMS + DR Sharp
  - Gain + sharp + sms = yes
  - Boost + sharp + sms = yes
  - Gain + sharp + dixon = yes
  - Gain + sharp + sms + Dixon = yes



Conventional
PAT: 3, Averages: 3
Matrix size: 384
TA=4:37min



Deep Resolve Boost
PAT: 3, Averages: 1
Matrix size: 384
TA=1:38min

Our portfolio optimizes the productivity along the entire workflow with BioMatrix and Deep Learning-based solutions

SIEMENS Healthineers

Patient preparation

Select&GO

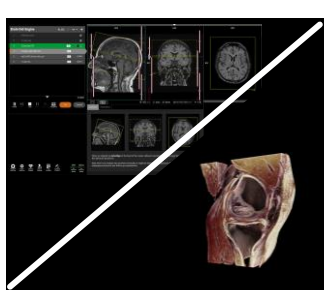
30 % faster[2] patient positioning

Dockable Table

Fast & effortless patient transport

Image acquisition

myExam Companion[1]



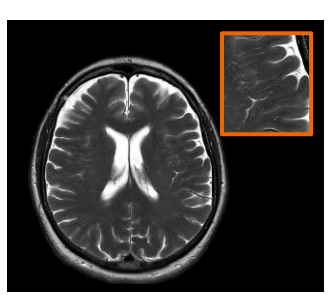
Push-button planning & scanning powered by myExam Assist & myExam Cockpit[1]

Turbo Suite

Up to 50 % time savings[2] with SMS and CS

Deep Resolve

New



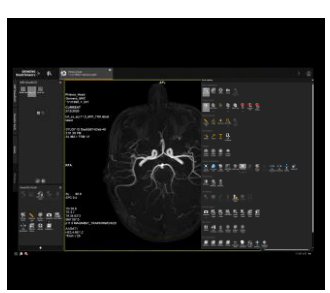
Sharper images, faster with deep learning based recon

Post-processing

Recon&GO

Zero click fully automated inline processing

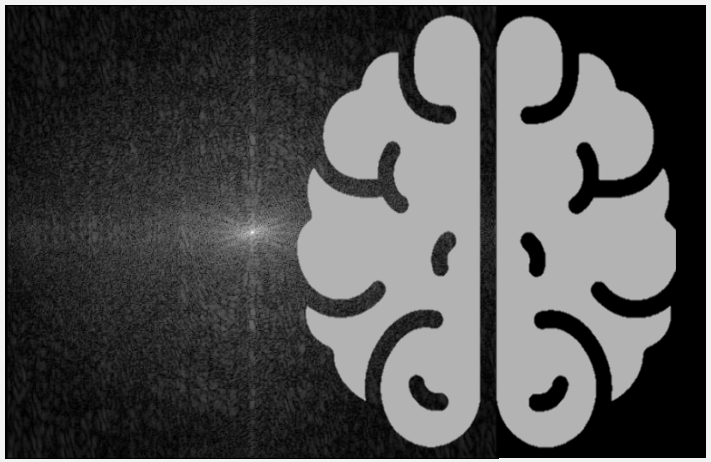
View&GO



Ready-to-read results with post-processing at the scanner & auto-distribution

Based on robust image quality with BioMatrix Tuners and Sensors
Sharper images faster with **deep learning based** solutions

Deep Resolve at a glance



The **Deep Resolve** family is growing even more powerful.

Our **Deep Resolve** applications enable MR acquisitions faster than ever before, from head to toe. The combinability with other acceleration techniques brings MR productivity to a new level.

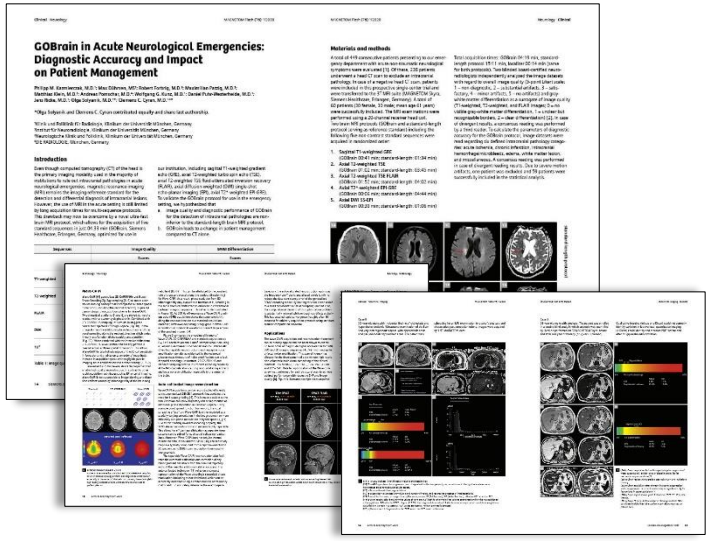
1) Deep Resolve Boost and Swift Brain for MAGNETOM Vida are pending 510(k) clearance and is not yet commercially available in the United States. Its future availability cannot be guaranteed.

MAGNETOM World

The Siemens Healthineers MR User Community

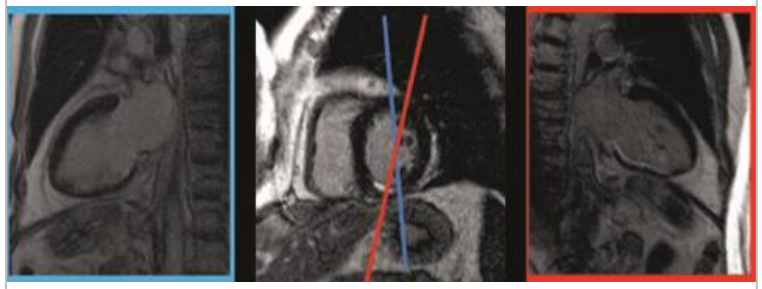
www.magnetomworld.siemens-healthineers.com

MAGNETOM Flash articles



Lectures on all aspects of MRI

Application Tips and Protocols



.edx .exar1

SIEMENS Healthineers

Thank you.