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Top 4 advantages of Low-field Open MRI systems over high-field alternatives

Magnetic resonance imaging is one of the fastest-growing diagnostic techniques that utilize magnetic field gradients to generate images. Currently, a 10.5 T system represents the world's strongest MRI scanner that has been used on humans. The high-field MRIs use superconductive magnets whose cost-intensiveness, higher maintenance, and physiological side-effects have paved the way for the reconsideration of the low-field MRI systems, which use permanent magnets.

There are multiple reasons why high-field magnets are not always the best option.

How can low-field open MRI systems be more advantageous than bigger units? In this article, we explore the new Hitachi MRP Plus series (made in Japan), which offers the next generation open MRI scanner with the "Synergy drive" technology.

"I have been working for more than 5 years with the APERTO Lucent and first of all one of my great concerns is to clear up with the prejudice that the open MRI is an add-on machine for only patients with claustrophobia. [...] I speak here for the majority of patients that don't need special needs, however, even if they have no special needs, they profit from the comfort of the open MRI.

If the patients have the choice between the normal and the open MRI, they choose the open one.

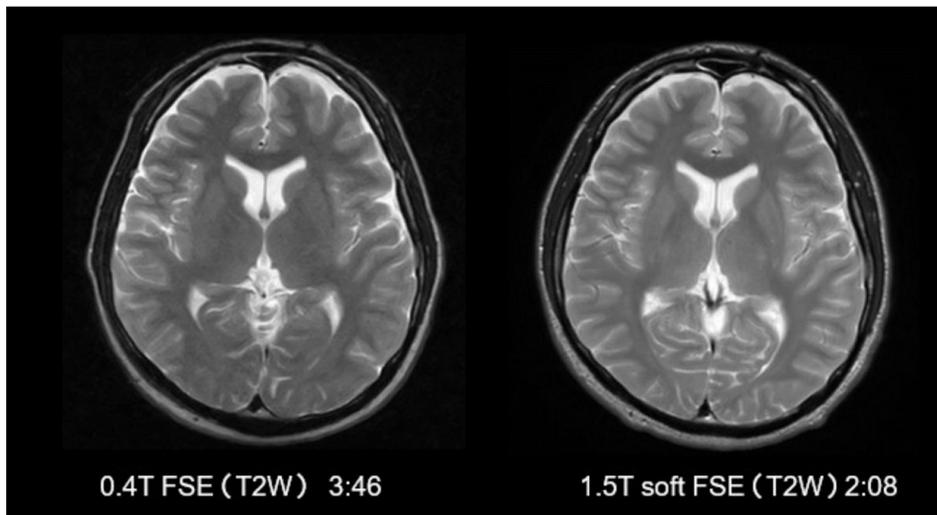
Dr. Liliana Rechmeier, Germany

After a careful analysis of both low and high-field systems, here are our results:

1. Accessibility and comfort: This open MRI system has a U-shaped patient-centric design with a 320° openness of the magnet, which has a calming effect on **claustrophobic patients and children** who otherwise need to be sedated. Also, it is not as loud as the higher strength machines (1.5 or 3T), so earplugs are not required



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0.4T FSE (T2W) 3:46

1.5T soft FSE (T2W) 2:08



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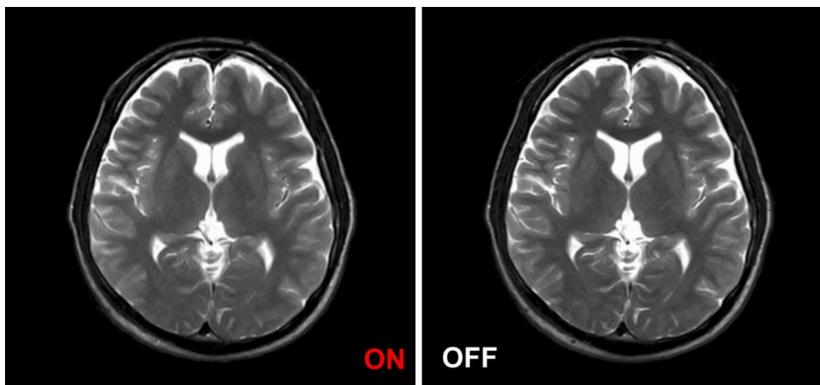
2. **Quality:** A stronger magnet has higher signal to noise ratio. Thus, in the past, low-field MRIs have been associated with poor quality images. However, this series introduces **new image reconstruction techniques** that have leveled the playfield with high-field MRI scanners.

3. **Pricing and Return of Investment (ROI):** Another additional benefit includes a faster ROI. The high-field MRI scanners require expensive maintenance procedures, including special cooling devices compared to the low-field ones which essentially need much less maintenance.

Furthermore, the **SynergyDrive acceleration suite** of the low-field open MRI APERTO Lucent Plus enables to speed up the examination by simplifying the examination steps, the data storage, and by shortening the image reconstruction time while keeping the image quality on high level.

Basically, the SynergyDrive speeds up the whole examination process allowing the examination of a greater number of patients per hour.

Normal Scan vs IP-RAPID



IP-Rapid OFF

Scan time 3:46

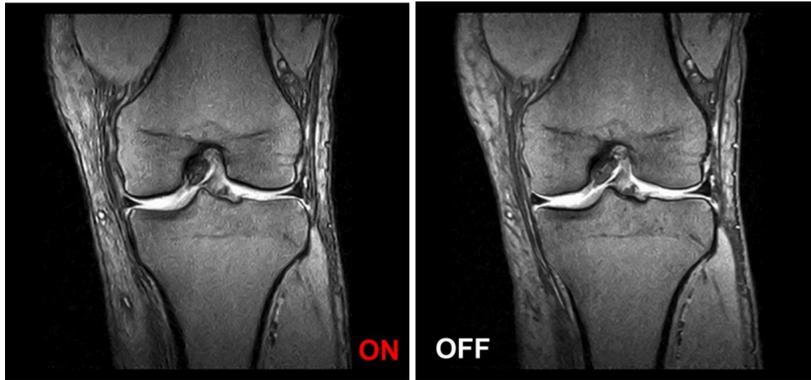
IP-Rapid ON

Scan time 1:44

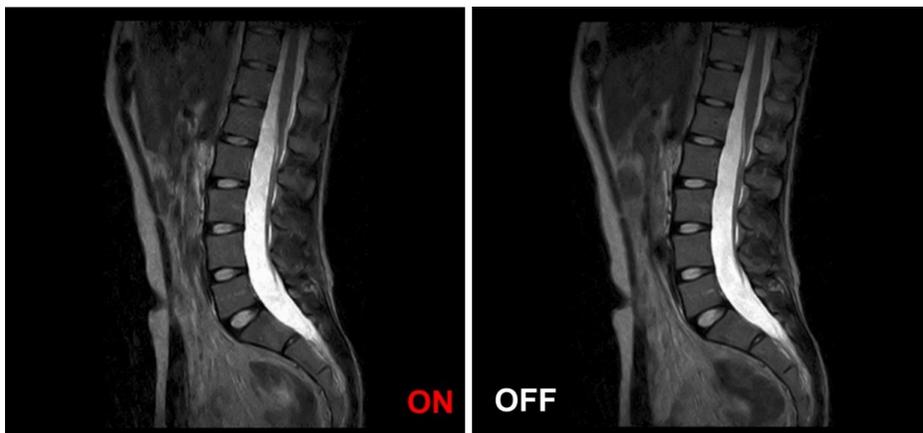
APERTO Lucent Plus – Brain, T2WI



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IP-Rapid OFF
Scan time 5:03
IP-Rapid ON
Scan time 1:49
APERTO Lucent Plus – L-Spine, T2WI



IP-Rapid OFF
Scan time 5:16
IP-Rapid ON
Scan time 2:40
APERTO Lucent Plus – Knee, T2WI



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4. Function-specific: Besides that, the low-field open MRI systems are best suited for imaging joints (shoulder, elbow, wrist, hips, knee, etc.), they can perform good quality examinations of the central nervous system (brain, spine) as well. Previous analysis has shown that **patients with metal implants** in their body exhibit artifacts on high-field MRI scanners. On the contrary, they have been shown to produce a relatively better image quality using low-field scanners.

To conclude, MRI scanners are vital diagnostic devices, which have become increasingly popular over time. Earlier the popularity was limited by the lack of a stable power source or the presence of local electrical disturbances. Overall, the low-field magnets offer excellent performance and a good alternative as they are easier to purchase, install, and maintain.

“We decided to have a low-field system while starting a private company. We wanted to have the best cost-effective machine available on the market and we thought that APERTO Lucent was the way to go for us. The last 7 years showed that we made a good decision because we still use this machine that made it possible for us to step forward.”

Dr. Mihaly Aradi, Hungary

Janos Esztergalyos

CT/MR Product Manager, FUJIFILM Healthcare Europe
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