

Sense performance of the 1.0T vertical field MRI

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The SNR and Sense performance of the newly presented Philips 1.0T vertical field (open) MRI has a different behavior as a horizontal field (cylindrical) system. Generally, in the vertical field system the SNR of the coils is more uniformly spread over the volume of interest and the optimal Sense direction might be different than in the horizontal field systems. A clear example is presented with comparing the performance of the coil geometry of the commercially available MRID Wrist coils. Similar comparisons are currently conducted with the head coil, the body coil and the breast coil.

Fig. 1 (right). Simulation of the SNR on central axis of the coil (in cm) of the 3 channel 1.0T vertical field Wrist coil compared with the SNR of the 4 channel 1.5T horizontal field Wrist coil. It can be seen that the SNR of the horizontal system is higher in the center but the SNR of the vertical system is more homogeneous. The mean SNR over a 10 cm FOV is in fact comparable in spite of the difference in field strength.

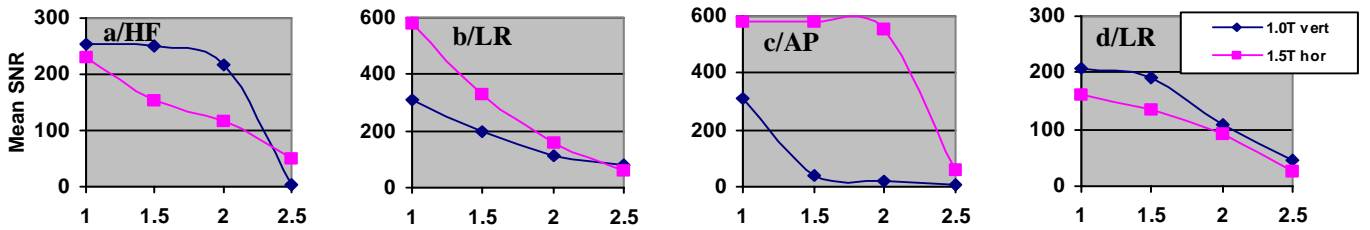
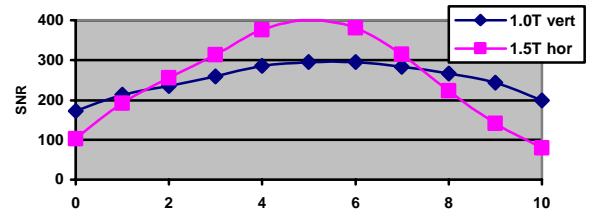


Fig. 2a. The mean SNR of the sagittal slice through the wrist with Sense 1-2.5 in HF direction (same scan time).

2b, same for central transversal slice with Sense in LR direction

2c, same for central transversal slice with Sense in AP direction

2d, same for transversal slice, 4 cm off-center with Sense in AP direction

In Fig. 2 it can be seen that the mean SNR for a 10 cm sagittal slice with the 1.0T vertical field Wrist coil is actually higher than a 1.5T horizontal field Wrist coil and that the Sense performance in HF direction is also better (a). On the central transversal slice the horizontal field has a much higher mean SNR (b) as also can be seen in Fig.1; the vertical field coil, however, has a better Sense performance in LR direction. For the central transversal slice with Sense in AP direction the horizontal field is clearly better (c) but the situation is reversed when taking that transversal slice 4 cm off-center (d).

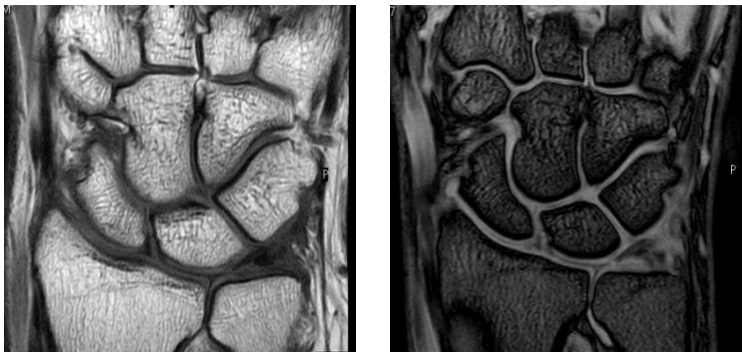
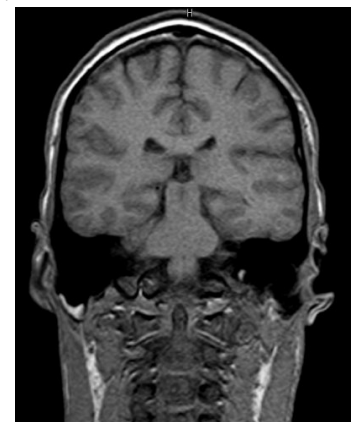


Fig. 3. Images taken with the 1.0T vertical field system: On the far left a T1W FFE with Sense 2, on the left a T2W SE with Sense 2. The Sense direction is chosen along the arm (HF), Scan time is 1:50, taken with the 3 channel Wrist coil.

Fig 4. Coronal image of the head, taken with the 4 channel Head coil, with Sense 2 in LR, whole-head coverage in just 17s.



In summary, the SNR and Sense performance on the 1.0T vertical field differs substantially from the horizontal field, which might lead to unexpected coil performance. In some cases 1.0T is actually better than 1.5T for both SNR and Sense, other cases worse. We expect that protocols will have to be optimized again taking the vertical field behavior into account, for all available coils.