Blood-pressure dependent T2*-mapping

C. Kiefer[1], G. Schroth[1], R. Wiest[1], C. Ozdoba[1], J. Slotboom[1], L. Remonda[1], and M. ElKoussy[1]
[1]Neuroradiology, University Hospital, Bern, Bern, Switzerland

Purpose

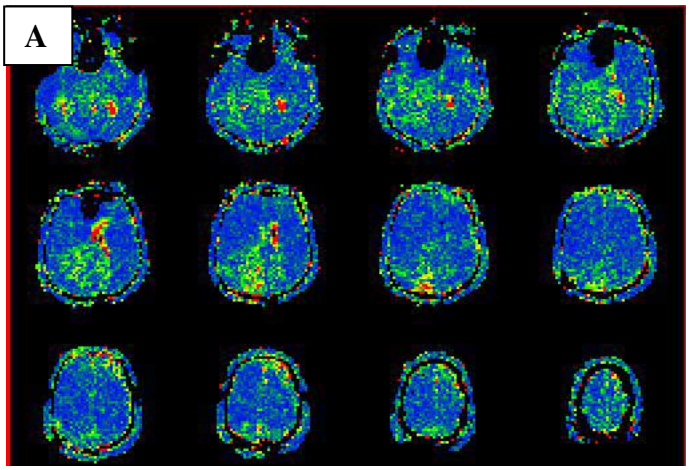
The concept of blood-pressure dependent T2*-mapping is introduced to examine its usefulness for tumor classification and stroke related penumbra-core-differentiation.

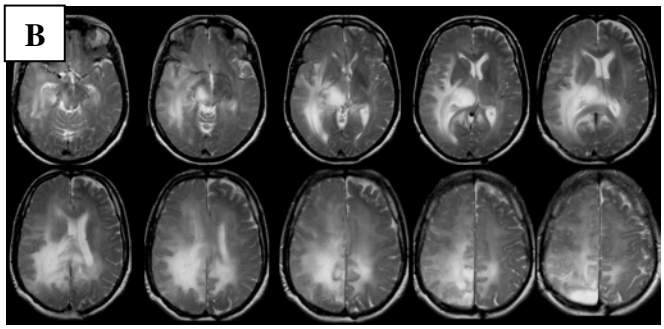
Subjects and Methods

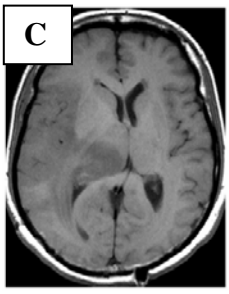
A pulse triggered single-shot multi-echo EPI sequence [1] was performed on a 1.5T clinical scanner for two different trigger delays dt = 0,300ms after R-peak. The two fitted T2*-maps representing the different physiological states were subtracted afterwards (dT2*-Maps). The sequence parameters were as follows: 1.sequence: M=64, 12 slices, TR =1780ms, Acquisition window 2080ms, pulse trigger delay 300ms, delay in TR 0ms, TE = 15,46,77,108 ms, BW=1735 Hz/Px, N=9 averages. 2.sequence: M=64, 12 slices, TR =2080ms, Acquisition window 2080ms, pulse trigger delay 0, delay in TR 300ms, TE = 15,46,77,108 ms, BW=1735 Hz/Px, N=9 averages - total measurement time 46sec. In this way the effective TR in both sequences is the same, so there are no saturation or T2 effects to be expected in the difference maps, except liquor pulsation effects.

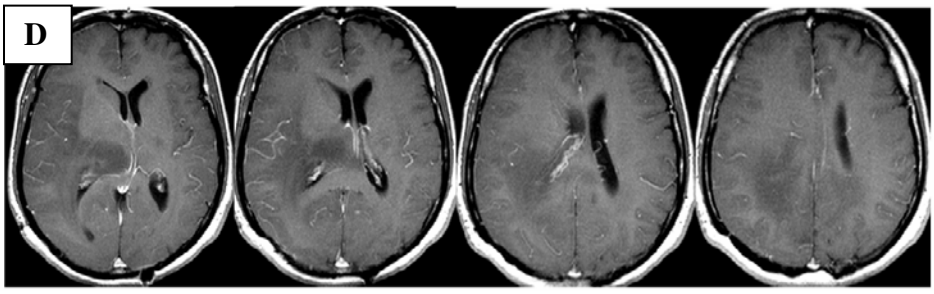
Results

dT2*-Maps for an Astrocytoma WHO grade II (fig.A) reveal tumor-related signal abnormalities, which have a different extent from the changes seen on the T2-weighted images (fig.B). The neoplasm is hypointense on T1-weighted images (fig.C) and reveals no significant post-contrast enhancement (fig.D)









Conclusion

Blood-pressure dependent T2*-Mapping (dT2*) accentuates the subtle changes of intra-lesional blood oxygenation state in pathological brain regions whereas undesirable T2- and field inhomogeneity effects are eliminated. The dT2*-maps of healthy volunteers did not show any significant regional differences. This method thus gives insight into further functional aspects of the underlying pathophysiology. The short measurement time makes this modality also suitable for acute stroke.

References

[1] Speck.O. MRM 40:243-248 (1998)