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Heavily T2W 3D-SPACE images for evaluation of cerebrospinal fluid containing spaces

Dear Sir,

We read with great interest the review paper written by Hingwala *et al*. entitled "Applications of 3D CISS sequence for problem solving in neuroimaging".[1] While we agree with all the statements made by Hingwala *et al*. about the three-dimensional constructive interference in steady state (3D-CISS) sequence usage, we want to also emphasize the usefulness of a recently developed sequence three-dimensional sampling perfection with application-optimized contrasts using different flip angle evolution (3D-SPACE) that deserves to be comprehensively evaluated.

Recently, with the introduction of 3 T MRI scanners, there has been a significant increase in the quality and spatial

resolution of images.[2] 3D-SPACE images are obtained with a different flip-angle (FA) mode technique. It allows volumetric acquisition of the whole brain with thin slices and isotropic voxels within a reasonable time period.[3] Using 3D-SPACE, which is a turbo spin-echo variant, one can obtain heavily T2W images as well as T1W, T2W, or FLAIR images.[4,5] The most important advantage of this sequence is that it can provide very thin and high-resolution three planes or oblique reformatted slices (such as 0.7 × 0.7 × 0.7 mm) with the help of isotropic acquisition.[3]

In our department, over the last 2 years, we have preferred to obtain heavily T2W 3D-SPACE images for the indications mentioned by Hingwala *et al*.[1] An important feature of this sequence is that unlike other heavily T2W sequences, it does not create a significant artifact (such as the banding artifact) and, moreover, it enables scanning of the whole brain or the spinal canal with a single acquisition. This is very useful for proper evaluation of the images and helps the radiologist assess the brain and spine comprehensively.

For a better understanding of this technique, we present heavily T2W 3D-SPACE images and the acquisition parameters of the T2W 3D-SPACE images of two patients in Figure 1 and Table 1, respectively.

In conclusion, in departments that have 3 T MRI scanners, we recommend that heavily T2W isotropic images be obtained by using a different FA-mode technique (such as 3D-SPACE) for the evaluation of cerebrospinal fluid (CSF) containing spaces. There is a need for comprehensive studies to compare the 3D-SPACE technique described above with the other heavily T2W sequences.

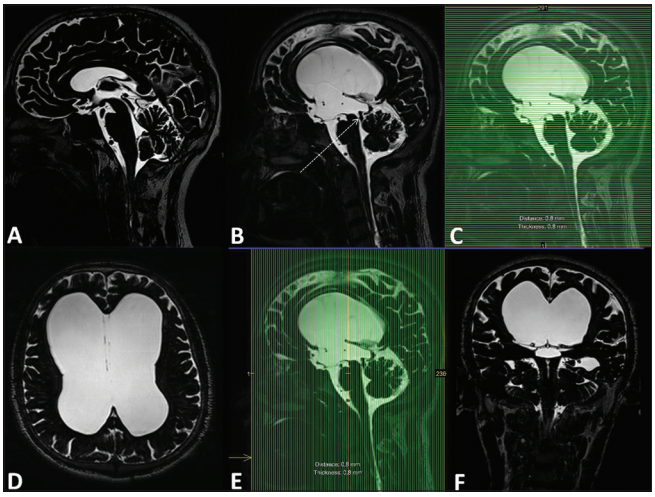

Figure 1: (A–F) Heavily T2W 3D-SPACE images of a 43-year-old man (normal volunteer; A) and 30-year-old man (patient with hydrocephalus and aqueductal stenosis; B–F). Sagittal image of the patient with hydrocephalus demonstrates complete aqueductal stenosis and an aqueductal web (arrow in B). Axial (D) and coronal (F) thin-section (0.8 mm) reformatted images obtained from the sagittal 3D-SPACE images (C and E, respectively) show ventriculomegaly

Table 1: Acquisition parameters of heavily T2W 3D-SPACE images in our department

Machine	Siemens Trio 3T (Erlangen, Germany)
TR	3000
TE	526
Voxel size (mm)	0.7 × 0.7 × 0.7
FOV read (mm)	240
Slice thickness (mm)	0.7
Slice number	240
Average (NEX)	2
Parallel acquisition factor	2
Parallel acquisition mode	Grappa
Orientation	Sagittal
Fat saturation	None
Flip angle	100°

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