

Neuro 3D – A Clinical Exam

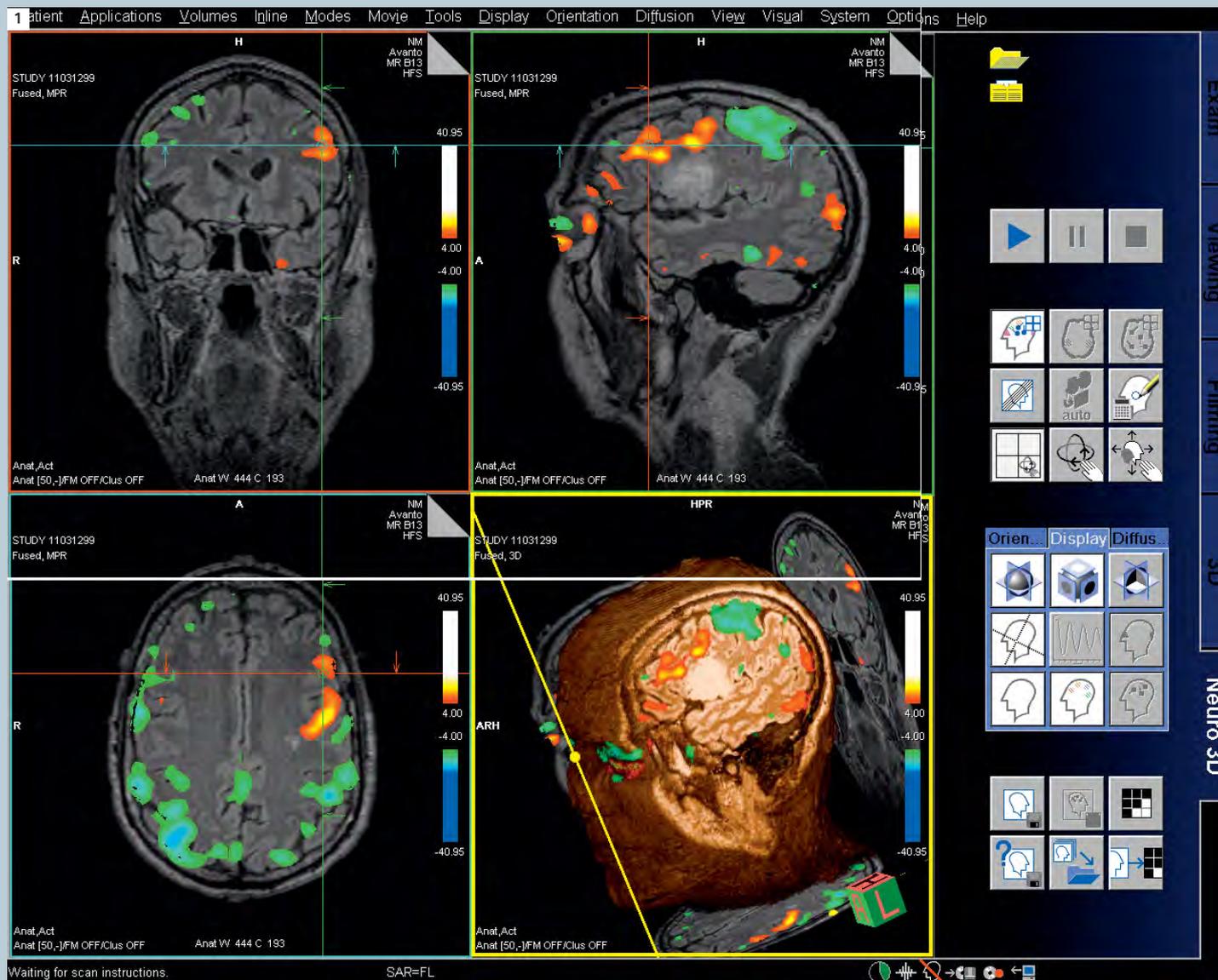
Jeff Zimmers, BSRT(R) (MR) ARRT

Advanced Clinical Education Specialist, Siemens Medical Solutions, USA

Many new tools are available for imaging the brain for surgical planning. Neuro 3D in the latest syngo MR B15 software provides a comprehensive diagnostic tool

that utilizes cutting-edge imaging techniques such as BOLD (Blood Oxygen Level Dependent) and Diffusion Tensor Imaging (DTI). These imaging techniques have

been mostly research in the past, but now they are clinical reality with new imaging techniques and post processing BOLD imaging with DTI was performed

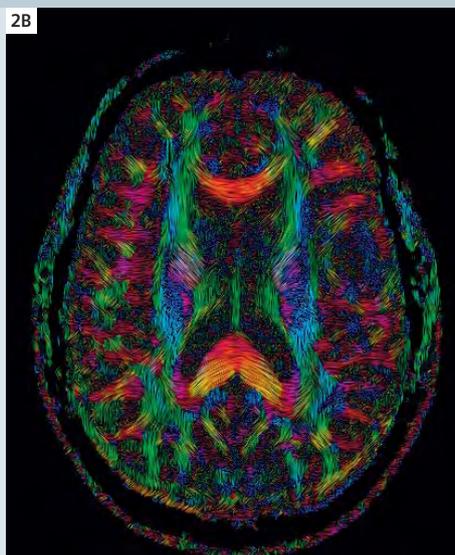
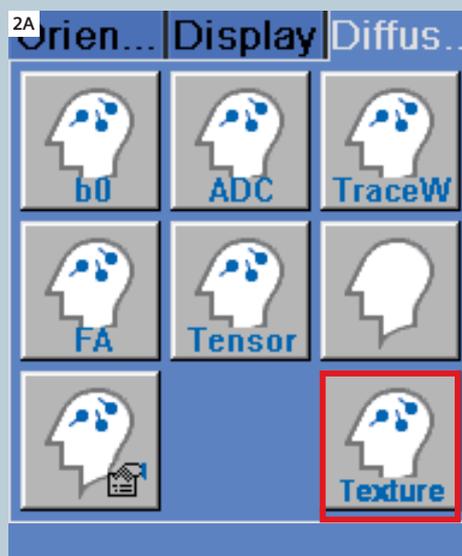


1 These images were reviewed by the neurosurgeon and radiologist in a matter of minutes. Surgical planning was changed dramatically due to the BOLD activation superiorly to the lesion. More advanced post processing was then done to take a look at fractional anisotropy (FA) and tractography. New for syngo MR B15 is the texture FA. This involves a simple click of the texture icon (Fig. 2A).

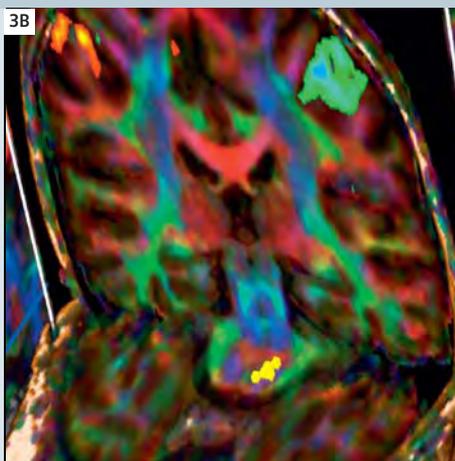
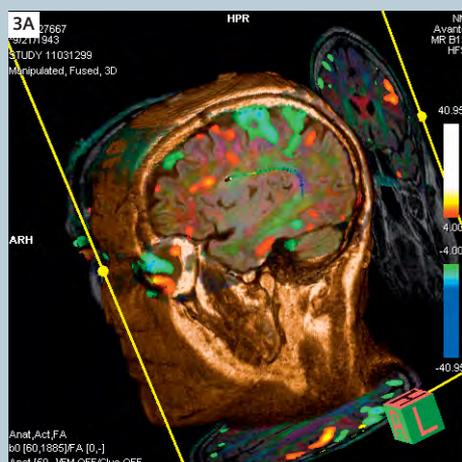
on a patient with a known lesion in the left hemisphere to assess a surgical approach. The neurosurgeon was concerned that damage would be done to the patients motor skills. The first important imaging technique is a 3D sequence loaded into Neuro 3D. In this case, a SPACE DarkFluid sequence was used to define tumor borders. *syngo* SPACE provides high isotropic resolution in a very short period of time using iPAT (integrat-

ed Parallel Acquisition Techniques). Next the GLM (General Linear Model) was loaded into Neuro 3D that was acquired from our 3D PACE epi bold sequence. The GLM was calculated inline with Inline BOLD imaging, so no post processing was needed to get the GLM. Next, the tensor data was loaded into Neuro 3D. This too was calculated inline, with Inline diffusion. With *syngo* MR B15 software, this can also be calculated offline. This will allow for

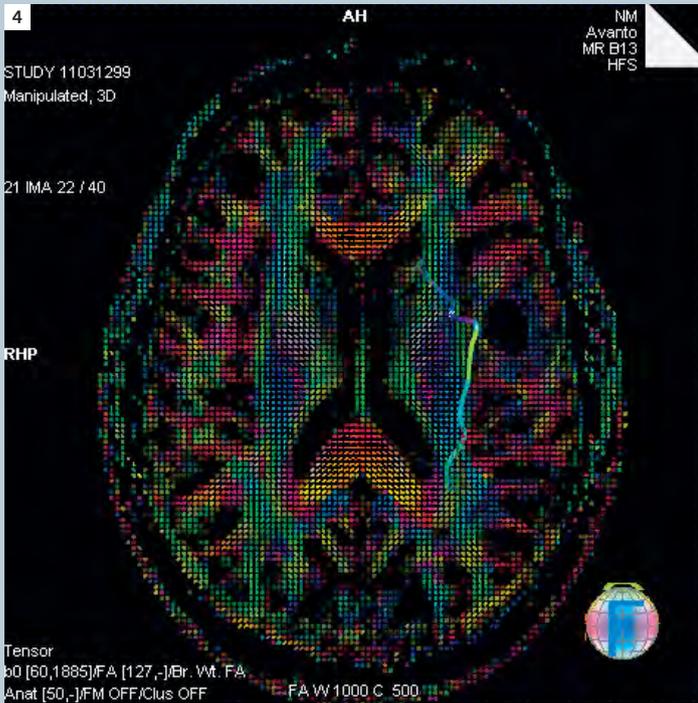
older data to be used with Neuro 3D as in this case. The functional information is automatically displayed as well as an FA (fraction anisotropy) map superimposed on the SPACE images. The BOLD experiment was done with bilateral finger tapping to activate the motor stripe. Excellent protocols for these techniques can be found in the new clinical libraries in the Siemens protocol tree on *syngo* MR B15 software.



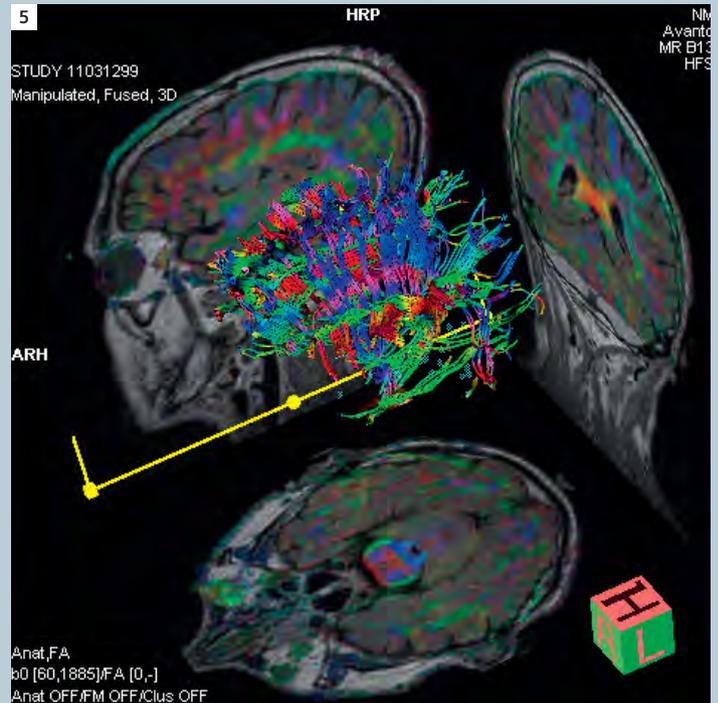
2 Texture diffusion is a fast way to get a quick impression of possible tracts. The image shows anisotropic diffusion as flow patterns across the entire image. The FA image shows the absence and deviation of tracts.



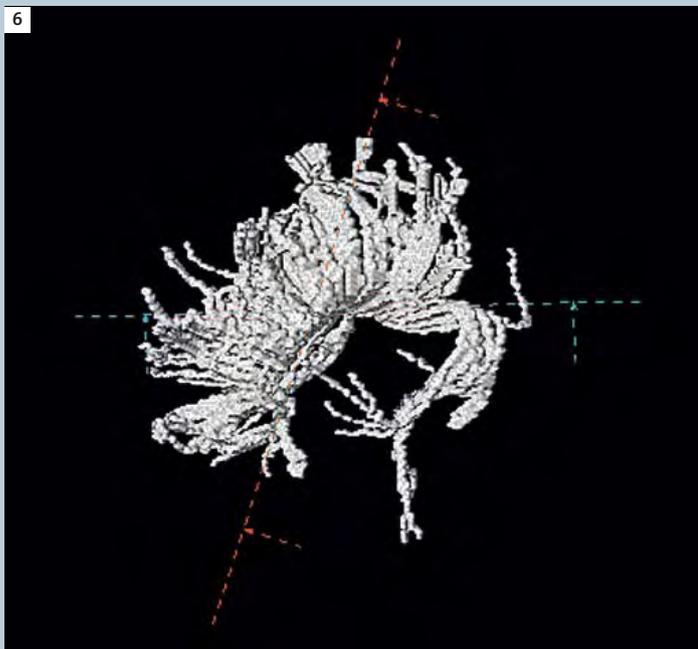
3 Quick Tract is another very useful new tool. By selecting the pixel lens, tracts can be instantly seen. This can be done by pressing the shift button while selecting the left mouse in fusion mode on the 3D data set (A). Quick track can also be used in Diffusion Mode with a left mouse click via pixel lens (B).



4 Quick Tract is a great starting point for the next step in the process. By selected the “ctrl” key and using the left mouse, seed points can be defined along the areas where the tracts are shown.



5 Once seed points are created tracts can be generated with a left mouse menu and selecting “start tractography”. Several seed groups can be created and tracts generated between seed groups. Colored tracts are displayed in 3D. Color denotes direction of the tracts.



6 Both the seed points can be saved and exported to be processed offline. Tractography can be saved as a color image. There is also a “save tracts as volume” option. This produces a 3D monochrome image that can be exported to other systems for surgical planning. The data can also be used on the 3D card to produce MPR and volume rendered images (VRT).

In conclusion, Neuro 3D, along with SPACE, BOLD and DTI, produced a comprehensive imaging protocol for surgical planning for this case. With Siemens Inline technology, very little processing time was needed. These powerful tools are available on syngo MR B15 software.