We have developed a new software tool that integrates 2D MRI images with reconstructed 3D images and other measures of interest. This tool enables users to look at standard 2D views of MS lesions and their 3D surface models side by side, and allows them to see changes over time in various ways.

The software includes features such as the ability to map a 2D data point to a surface point on the displayed 3D surface model, and vice versa. Specific 3D volumes can be selected from the 3D model for zooming or animation or a point on the 3D model can be selected to highlight all of the lesions that are connected to it. Changes in MS lesions over time can also be shown as an animation to demonstrate differences across scanning sessions while the total volume of MS lesions can be calculated, displayed as a chart, and exported for statistical analyses. This visualization tool has been used to examine MRI scans from MS patients who were scanned once a month, for six months.

Conventional clinical MRI scans allow us to see damage to the white matter structures, tissue deep in the brains of people with MS. This damage is seen as extremely bright areas on the standard structural MRI images which show the regions of inflammation and loss of the myelin surrounding nerve fibers that is characteristic of MS. Studies seeking to understand how MS progresses over time have used MRI images to calculate the volumes of these bright areas to create a measure of MS “lesion burden”. This measure has then been used to evaluate the effectiveness of new MS treatments. While there are many tools that can be used to visualize combinations of MRI images, none had been developed to visualize small and large scale changes in MS white matter lesions over time, in combination with 2D/3D modes.

Accordingly, researchers and clinicians will benefit from new and easily applied methods for visualizing MS lesions that allow for quantifying their volumes, and that allow for viewing changes in lesion size, shape and location over time.

**A Novel MRI Visualization Tool for White Matter Pathology in Multiple Sclerosis**

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