Bleeding Volume Quantification Analysis:

Given the different protocols used in this study, bleeding volume quantification was retrieved from susceptibility sensitive sequences directly. In order to accurately quantify bleeding volume, only hypointensities likely to be caused by bleeding were deemed aberrant. These include: large bleeds, microbleeds, linear bleeding regions, iron deposition along vein paths, and pooled intraventricular blood. The processor avoided blood vessels, calcifications, artifacts, and areas outside of normal brain parenchyma. In cases with Susceptibility Weighted Imaging (SWI) magnitude and phase collected, Quantitative Susceptiblitly Mapping (QSM) confirmed calcifications. However, given the nature of gradient echo imaging, some calcifications may be misrepresented when not accompanied by phase data. This is mitigated by careful consideration of location and morphology on sequences available. Areas avoided due to the likelyhood of calcifications are: the falx, choroid plexus, pineal gland, globus pallidus, and parenchymal edges near bony structures (sinuses, ears). For instance, a small hypointensity located in the choroid plexus is not considered aberrant. Some exceptions were made based on accompanying sequences, especially when QSM or phase was available. A large bleed extending into the falx is considered aberrant. A small hypointensity in the globus pallidus that is hyperintense on QSM is considered aberrant.

Steps followed:

Two objects were drawn for each scan. One included all aberrant hypointensities outside of the infarct. Another included all aberrant hypointensities within or reaching the infarct. A region of interest containing normal appearing white matter was then selected. The average intensity within this ROI was obtained and halved. This value was the threshold used for the bleeding volume quantification. The number of pixels lower than the threshold was produced through SPIN software. The volumes of each thresholded object within the sequence were calculated using the Cavalieri method with slice thickness including any gaps in data collection. The name of the header file value used for the third dimention is “Spacing Between Slices”.

Post processing included a longitudinal comparison of individual cases as well as a group analysis. The volume analysis described above was compared between different cases and graphed. An additional comparison eliminating changes within 10% of the previous scan was put in place in order to accommodate small false variations due to noise or sequence collection. This is in an effort to increase the robustness of the group comparison.

Please note the section “Change in BV between time points” on page 4. Given the newest set of data, now involving up to five time points for each case, some cases increase and decrease in BV. Therefore, they can be counted twice. In an effort to view the results more comprehensively, one additional comparison was made eliminating a change of 20% between scans.