## SWIM (susceptibility weighted imaging and mapping)

There have been major advances in studying susceptibility weighted imaging (SWI), filtered SWI phase images and quantitative susceptibility mapping (QSM).

The implementation of QSM, referred to as SWIM (susceptibility weighted imaging and mapping), is fast, robust and can be used with very high resolution matrices. SWIM also makes it possible to remove artifacts from SWI thereby creating a "true" SWI data set or tSWI.

SWI and SWIM have many clinical applications from studying aging (via iron content and reduced oxygen saturation), dementia (via cerebral microbleeds), multiple sclerosis (via iron content increases in lesions, basal ganglia and thalamus), stroke (via changes in oxygen saturation) and traumatic brain injury (via microbleeds and venous damage).

A total of 23 TBI patients (five women, 18 men; median age, 41.25 years old; range, 21.69-67.75 years) with an average Glasgow Coma Scale score of 7 (range, 3-15) at admission were recruited at mean 149 d (range, 57-366) after injury. Susceptibility-weighted imaging data were collected and post-processed to create SWIM images. The susceptibility value of small hemorrhages (diameter  $\leq$ 10 mm) and major deep veins (right septal, left septal, central septal, right thalamostriate, left thalamostriate, internal cerebral, right basal vein of Rosenthal, left basal vein of Rosenthal, and pial veins) were evaluated. Different susceptibility thresholds were tested to determine SWIM's sensitivity and specificity for differentiating hemorrhages from the veins. A total of 253 deep veins and 173 small hemorrhages were identified and evaluated. The mean susceptibility of hemorrhages was 435±206 parts per billion (ppb) and the mean susceptibility of deep veins was 108±56 ppb. Hemorrhages showed a significantly higher susceptibility than all deep veins (p<0.001). With different thresholds (250, 227 and 200 ppb), the specificity was 97%, 95%, and 92%, and the sensitivity was 84%, 90%, and 92%, respectively. These results show that SWIM could be used to differentiate hemorrhages from veins in TBI patients in a semi-automated manner with reasonable sensitivity and specificity. A larger cohort will be needed to validate these findings <sup>1)</sup>.

## 1)

Liu J, Xia S, Hanks R, Wiseman N, Peng C, Zhou S, Haacke EM, Kou Z. Susceptibility Weighted Imaging and Mapping of Micro-Hemorrhages and Major Deep Veins after Traumatic Brain Injury. J Neurotrauma. 2016 Jan 1;33(1):10-21. doi: 10.1089/neu.2014.3856. Epub 2015 May 26. PubMed PMID: 25789581.

From: https://neurosurgerywiki.com/wiki/ - **Neurosurgery Wiki** 

Permanent link: https://neurosurgerywiki.com/wiki/doku.php?id=swim

Last update: 2024/06/07 02:55

