

Focal low and global high permeability predict the possibility, risk, and location of hemorrhagic transformation following intra-arterial thrombolysis therapy in acute stroke

G. Zhu¹, Y. Li¹, M. Wintermark¹, A. Jackson², H. Chen³, Z. Su⁴, W. Zhang³

¹*Department of Radiology, Neuroradiology Section, Stanford University, USA*

²*Wolfson Molecular Imaging Centre, University of Manchester, UK*

³*Department of Neurology, PLA Army General Hospital, China*

⁴*GE Healthcare, GE, China*

Background and Purpose: K^{trans} , which reflects blood-brain-barrier permeability(BBBP), is influenced by circulation and measurement conditions. We hypothesized that focal low BBBP values can predict the spatial distributions of hemorrhagic transformation(HT), and global high BBBP values can predict the likelihood of HT. **Patients and Methods:** We retrospectively enrolled 106 patients with hemispheric stroke who received intra-arterial thrombolytic treatment. K^{trans} maps were obtained using first-pass perfusion CT data. The K^{trans} values at the region level, obtained using the Alberta Stroke Program Early CT Score (ASPECTS) system, were compared to determine the differences between the HT and non-HT regions. The K^{trans} values of the whole ischemic region based on baseline PCT were obtained as a variable to predict HT possibility at the patient level. **Results:** Of a total of 106 patients, 48 (45.28%) had HT and 21(19.81%) had symptomatic intracranial hemorrhage(sICH). At the region level, there were 72 regions of interest(ROIs) with HT(mean K^{trans} : $0.49 \pm 0.53/\text{min}$). The mean K^{trans} value of 615 non-HT ROIs was $0.69 \pm 0.61/\text{min}$, which was significantly lower than that in the non-HT regions ($P=0.0066$). At the patient level, there was significant difference($P=0.0113$) between the K^{trans} values of patients with sICH(1.31 ± 0.88) and without sICH(0.76 ± 0.37). Only a high K^{trans} value at patient level could predict the occurrence of sICH ($P=0.001$; OR:5.040, 95%CI:2.009-12.651). **Conclusion:** Global high K^{trans} values can predict the likelihood of HT or sICH at the patient level, whereas focal low K^{trans} values can predict the spatial distributions of HT at the region level.