



**Supplementary Fig. 1. Schematic diagram of the image processing.**

**A-J.** Preoperative CE T1WI (**A**) and FLAIR MR images (**B**) demonstrate a rim-enhancing mass with non-enhancing, T2-HSI lesions in the right frontal lobe, which suggests glioblastoma. After two reviewers manually determined the arterial input function (not shown), the Ktrans, Ve, and Vp maps of the DCE MRI and the normalized relative cerebral blood volume map of the dynamic susceptibility contrast MRI were computed (**C-F**, respectively) and overlaid (coregistration) with the CE T1WI and FLAIR images. The reviewers meticulously defined the VOI for FLAIR, which consisted of the contrast-enhancing portion, necrotic (or cystic) regions, and the non-enhancing, T2-HSI lesions in each slice (**G**, yellow VOI). The VOI for the contrast-enhanced T1WI, covering the contrast-enhancing areas and the necrotic (or cystic) regions, was also drawn manually using the same method described above (**H**, green VOI). The adjacent nontumor vessels were meticulously excluded by the reviewers from all VOIs for the FLAIR and CE T1WI. After subtraction (**I**) of the green VOI from the yellow VOI, the final VOI (**J**), representing only the peritumoral non-enhancing, T2-HSI lesions, was defined. The parameter values were quantitatively calculated from the final VOI. DCE = dynamic contrast-enhanced, FLAIR = fluid attenuated inversion recovery, HSI = high-signal-intensity, T1WI = T1-weighted image, VOI = volume of interest