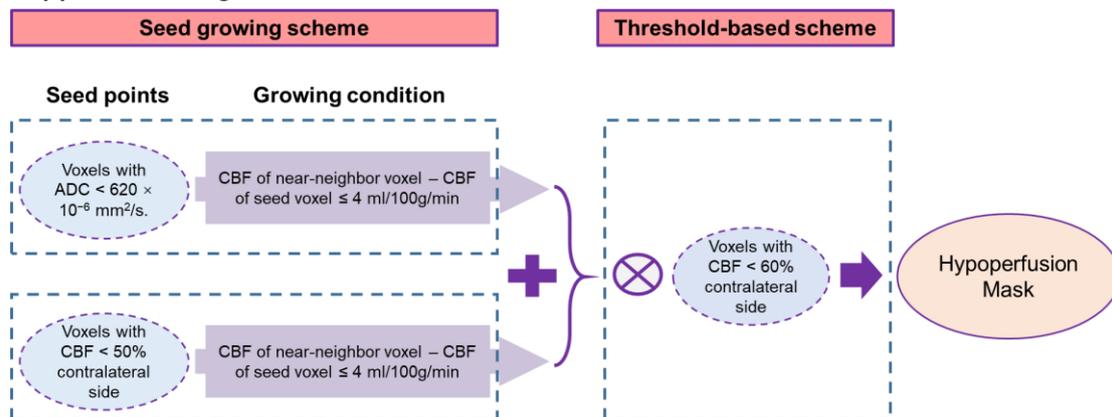
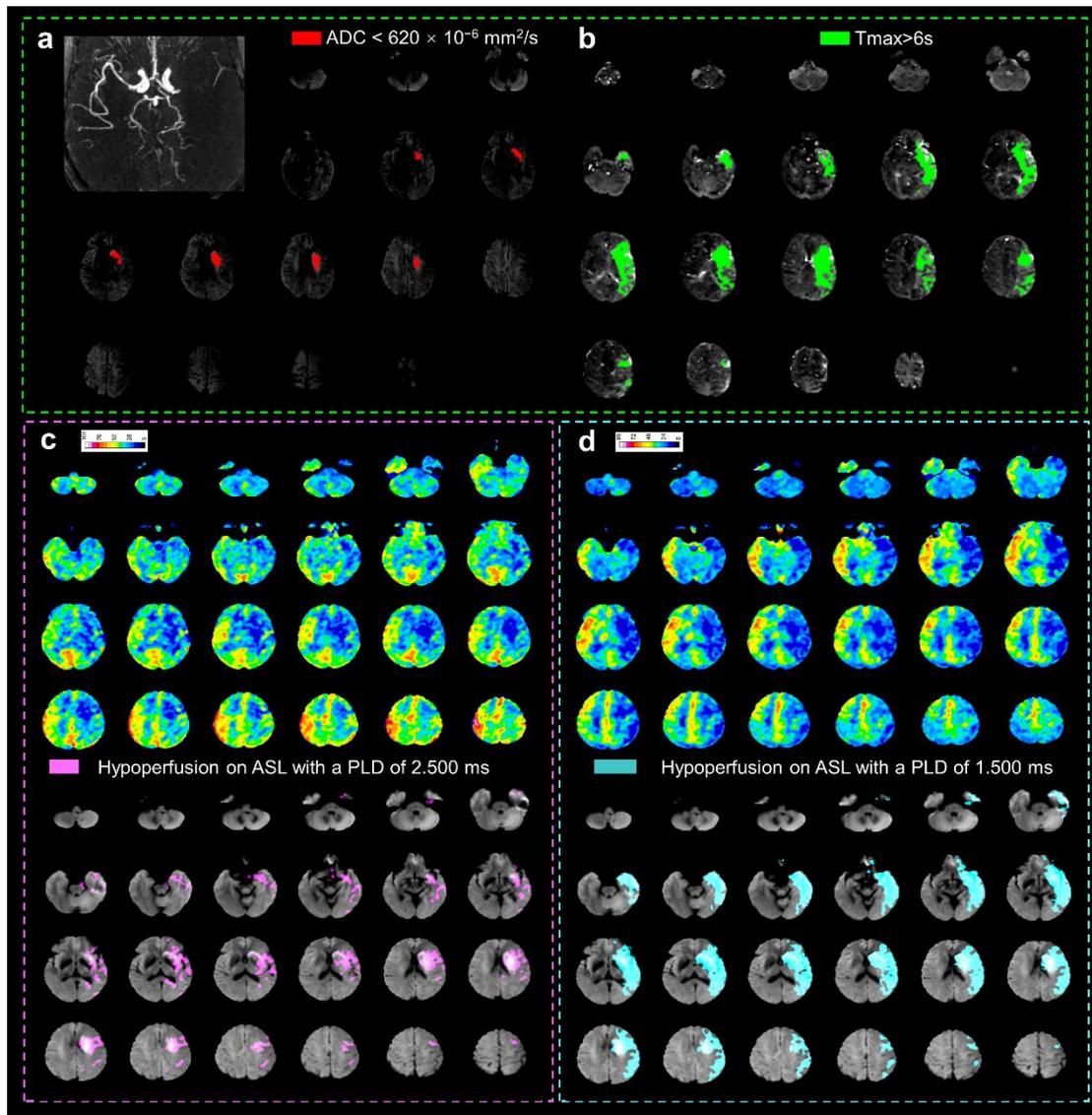


Supplemental Material  
Supplemental Figure 1



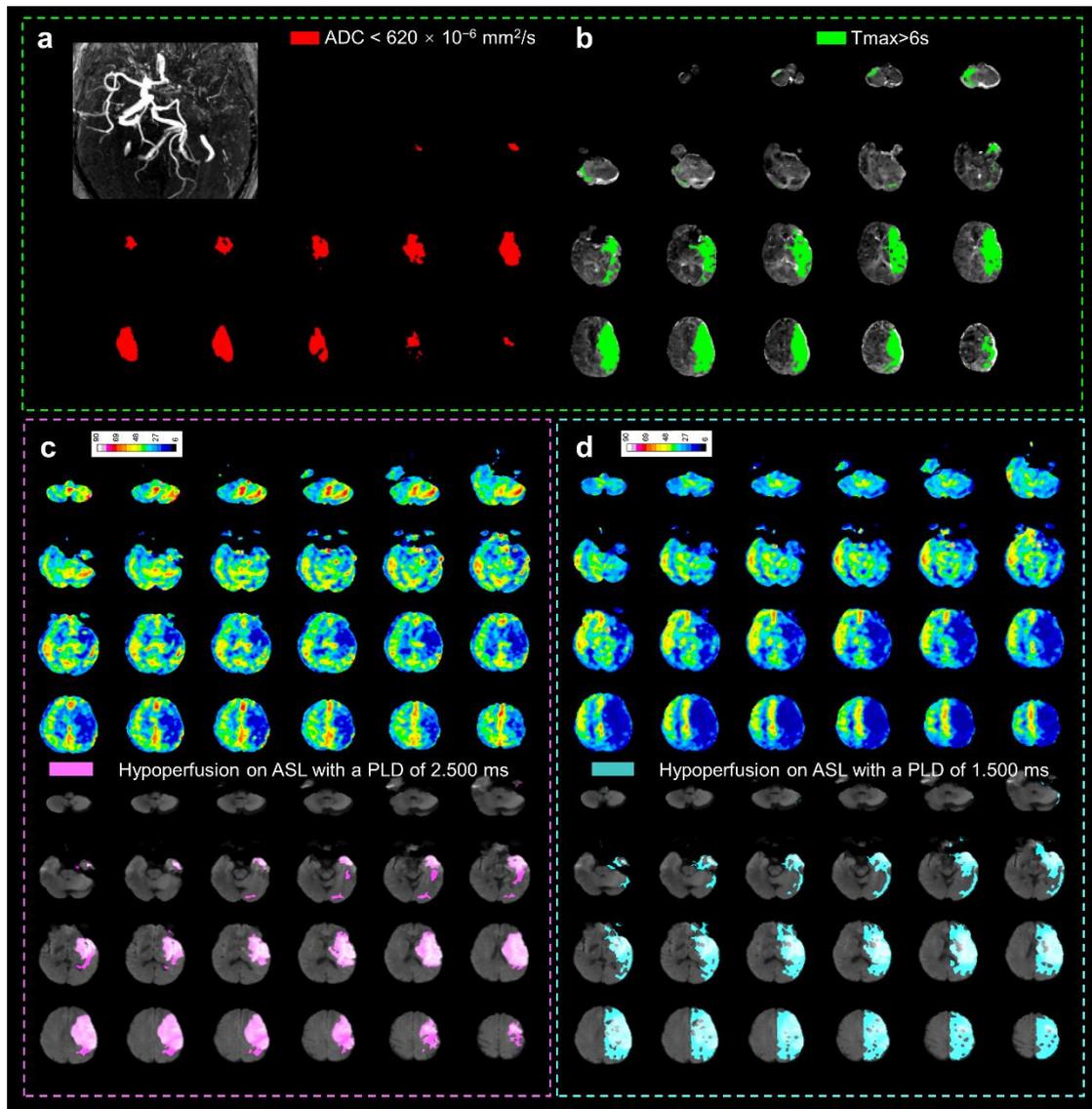
**Supplemental Figure 1** Figure illustrates the segmentation method as a combination of a seed growing scheme and a threshold-based scheme. Seed points for region growing are selected by voxels with  $ADC < 620 \times 10^{-6} \text{ mm}^2/\text{s}$  and voxels with  $CBF < 50\%$  contralateral side. The seed growing threshold  $4 \text{ ml}/100\text{g}/\text{min}$  is determined by the CBF standard deviation of penumbra tissue according to the prior knowledge.  $60\%$  is adapted from a previous threshold.

Supplemental Figure 2



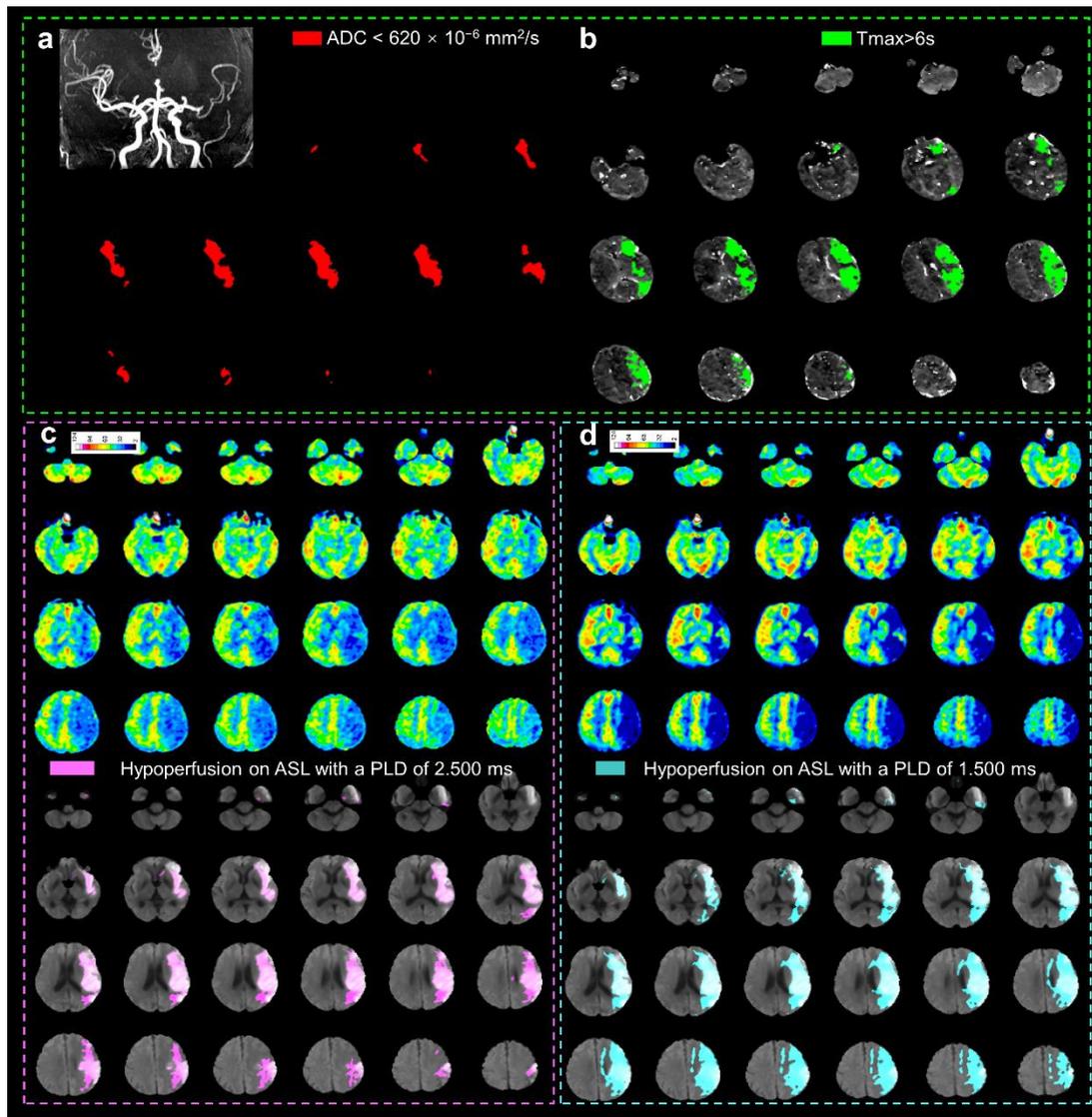
**Supplemental Figure 2** A representative case of a 60-year-old woman with acute left middle cerebral artery occlusion (a). The infarct core volume was 19.85 mL (a). The volume of hypoperfusion on time to maximum of the residue function (T<sub>max</sub>) > 6 s (b), arterial spin labeling (ASL) with a post-labeling delay (PLD) of 2.500 ms (c), and ASL with a PLD of 1.500 ms (d) were measured as 115.26 mL, 94.67 mL, and 261.17 mL, respectively. Hypoperfusion mask in purple on ASL with a PLD of 2.500 ms (c) shows good agreement in location and extent with the region with T<sub>max</sub> > 6 s in green (b).

Supplemental Figure 3



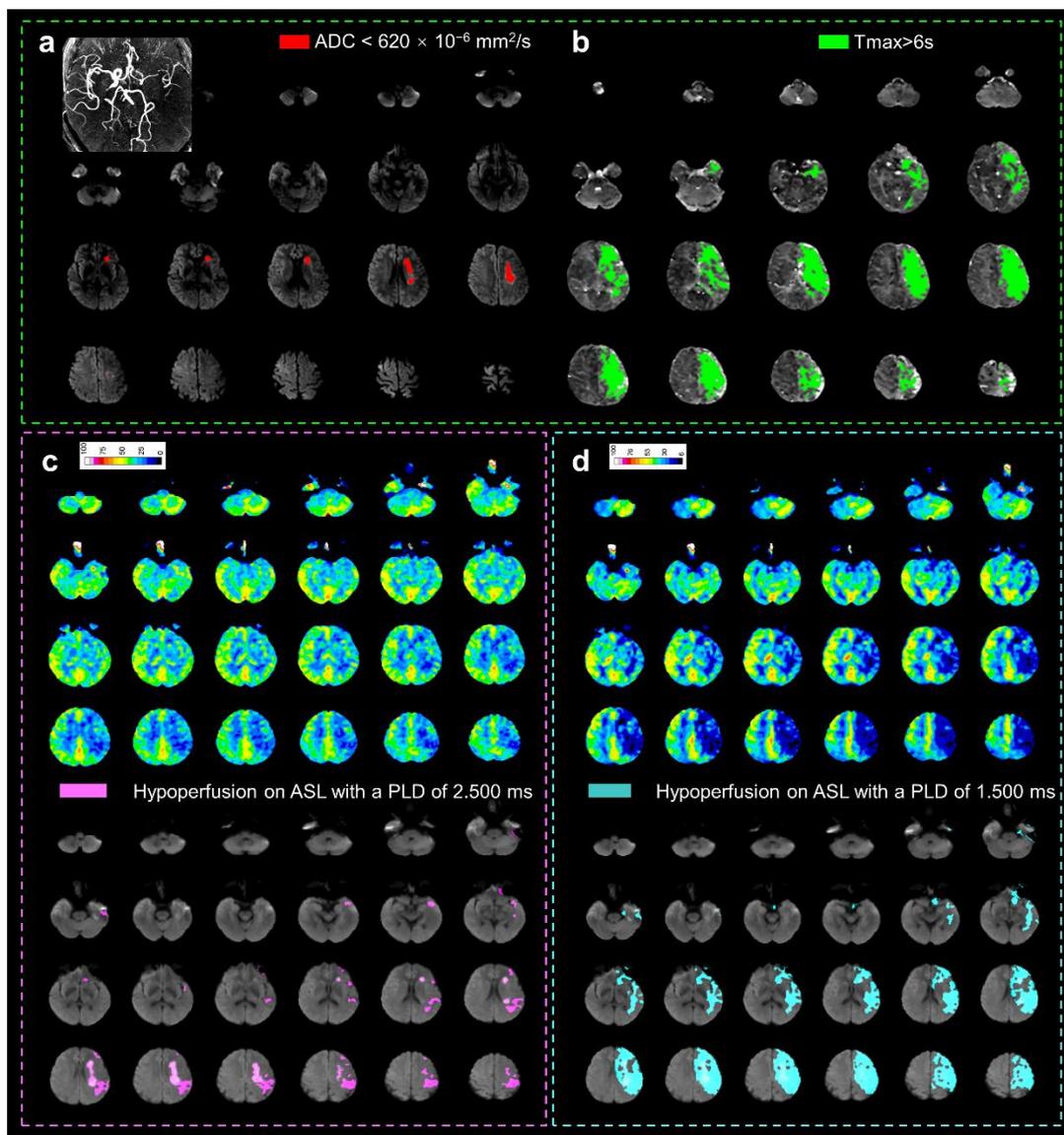
**Supplemental Figure 3** A representative case of a 68-year-old woman with acute left internal carotid artery occlusion (a). The infarct core volume was 117.94 mL (a). The volume of hypoperfusion on time to maximum of the residue function (Tmax)  $> 6 \text{ s}$  (b), arterial spin labeling (ASL) with a post-labeling delay (PLD) of 2.500 ms (c), and ASL with a PLD of 1.500 ms (d) were measured as 192.34 mL, 190.68 mL, and 362.64 mL, respectively. Hypoperfusion mask in purple on ASL with a PLD of 2.500 ms (c) shows good agreement in location and extent with the region with Tmax  $> 6 \text{ s}$  in green (b).

Supplemental Figure 4



**Supplemental Figure 4** A representative case of a 56-year-old man with acute left middle cerebral artery M2 occlusion shows territorial infarction in the corresponding blood supply territory (a). The infarct core volume was 103.8 mL (a). The volume of hypoperfusion on time to maximum of the residue function (T<sub>max</sub>) > 6 s (b), arterial spin labeling (ASL) with a post-labeling delay (PLD) of 2.500 ms (c), and ASL with a PLD of 1.500 ms (d) were measured as 132.67 mL, 198.23 mL, and 331.19 mL, respectively. Hypoperfusion mask in purple on ASL with a PLD of 2.500 ms (c) shows better agreement in location and extent with the region with T<sub>max</sub> > 6 s in green (b).

Supplemental Figure 5



**Supplemental Figure 5** A representative unconfident case of a 62-year-old man with acute left internal carotid artery occlusion (a). The infarct core volume was 8.88 mL (a). The volume of hypoperfusion on time to maximum of the residue function (T<sub>max</sub>) > 6 s (b), arterial spin labeling (ASL) with a post-labeling delay (PLD) of 2.500 ms (c), and ASL with a PLD of 1.500 ms (d) were measured as 196.34 mL, 56.12 mL, and 249.58 mL, respectively. Hypoperfusion mask in cyan on ASL with a PLD of 1.500 ms (d) shows better agreement in location and extent with the region with T<sub>max</sub> > 6 s in green (b).