# Intracranial Hyperdense Lesion after Intra-arterial Recanalization – Hemorrhage or Iodine Extravasation?

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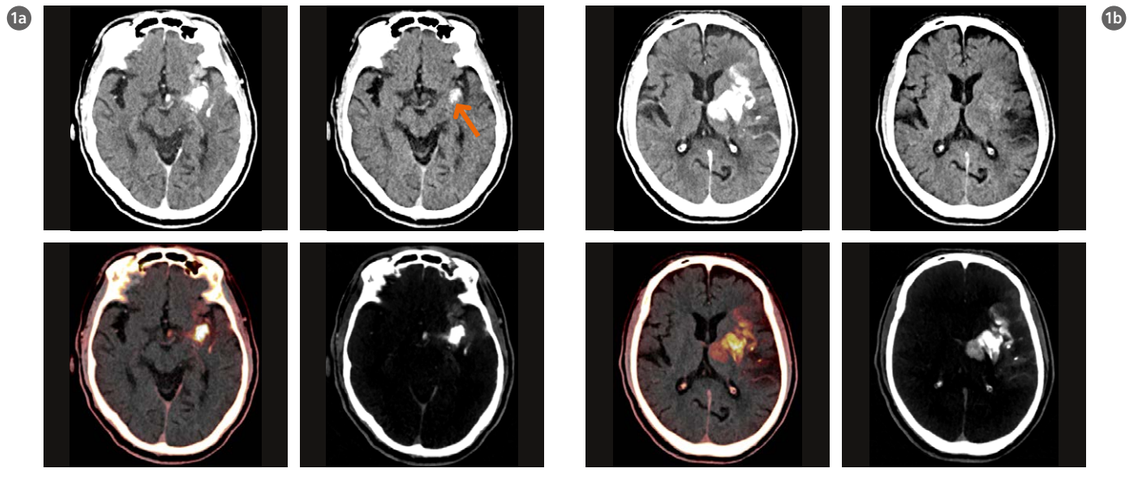
## History

An 88-year-old male patient, suffering from a sudden onset of right-sided hemiplegia as well as aphasia and unconsciousness, was diagnosed with an acute ischemic stroke in an external hospital. He was referred to our hospital and underwent intra-arterial recanalization (IAR). A control Dual Energy (DE) CT was performed right after the recanalization.

## Diagnosis

In the mixed (comparable to conventional CT), fused and iodine images, hyperdensities were shown in the left basal ganglia, the thalamus, the insula and the lateral sulcus, slightly compressing the left lateral ventricle. In the virtual non-contrast (VNC) images, the hyperdense area was much smaller and only seen in the left insula. These findings suggested a small hemorrhage with significant iodine extravasation. The antiplatelet therapy was accordingly discontinued.

In the follow-up DECT scan (after 48 hours), a large hypodense area in the territory supplied by the left middle cerebral artery (MCA) was seen, suggesting an ischemic stroke with severe parenchymal edema. The left lateral ventricle was significantly compressed, causing middle line shifting to the right. The hyperdense area, seen in the VNC images, extended to the left basal ganglia. The iodine extravasation, although reduced in density and area and barely seen in the mixed images, could still be visualized in the fused and iodine images.
The patient was stable at discharge.




1 Axial images (mixed – UL, fused – LL, iodine – LR) at two different levels (Figs. 1a and 1b) show hyperdensities in the left basal ganglia, the thalamus, the insula and the lateral sulcus, slightly compressing the left lateral ventricle. In the VNC (UR, Figs. 1a and 1b) images, the hyperdense area was only seen in the left insula (Fig. 1a, arrow), suggesting a small hemorrhage with significant iodine extravasation. (UL – upper left; UR – upper right; LL – lower left; LR – lower right)





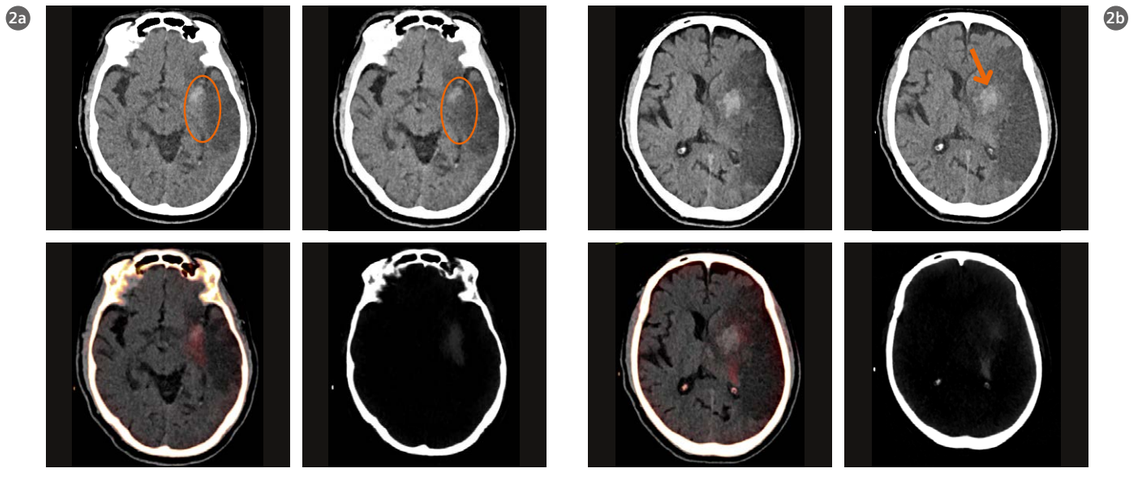
## Comments

IAR is an effective treatment for early cerebral ischemic stroke. A post procedural CT scan is performed as a standard practice to rule out hemorrhage, a feared reperfusion complication, which can have a critical impact on further patient management. However, iodine extravasation in brain parenchyma, caused by the breakdown in the blood-brain barrier, can also happen and is difficult to differentiate from a hemorrhage within the first 24 hours after IAR. This results from the fact that the Hounsfield densities of hemorrhage and iodine are similar in conventional CT images. DECT performs simultaneous image acquisition at two different kV settings and enables differentiation between hemorrhage and iodine using the three-material decomposition method. In this case, the hyperdensities presented right after IAR were characterized, not as a feared large hemorrhage, but as a much smaller focal hemorrhage with significant iodine extravasation. In the follow up scan after 48 hours, the iodine extravasation, although barely visible in the mixed images, can still be visualized in the fused and iodine images. This indicates that iodine extravasation can persist for a few days; therefore, DECT may even be helpful in differentiating it from a hemorrhage in later follow up scans. ●

## Examination Protocol

| Scanner | SOMATOM Definition Flash | | |
|---|---|---|---|
| **Scan area** | Head | **CTDIvol** | 49.11 mGy |
| **Scan mode** | Dual Source Dual Energy | **DLP** | 820 mGy cm |
| **Scan length** | 155 mm | **Rotation time** | 0.5 s |
| **Scan direction** | Cranio-caudal | **Pitch** | 0.55 |
| **Scan time** | 12.3 s | **Slice collimation** | 40 × 0.6 mm |
| **Tube voltage** | 80 / Sn140 kV | **Slice width** | 1 mm |
| **Effective mAs** | 530 / 265 mAs | **Reconstruction increment** | 1 mm |
| **Dose modulation** | CARE Dose4D™ | **Reconstruction kernel** | Q40f |

The outcomes by Siemens Healthineers customers described herein are based on results that were achieved in the customer's unique setting. Since there is no "typical" hospital and many variables exist (e.g., hospital size, case mix, level of IT adoption), there can be no guarantee that other customers will achieve the same results.




2 Mixed images (UL) of the follow up DECT show a large hypodense area in the territory supplied by MCA, suggesting an ischemic stroke with severe parenchymal edema. The left lateral ventricle is significantly compressed causing middle line shifting to the right. The hyperdense area shown in the VNC images (UR) extends into the left basal ganglia (Fig. 2b, arrow). The iodine extravasation, although reduced in density and area and barely seen in the mixed images, could still be visualized in the fused (LL) and iodine images (LR). Note the density differences in the mixed image and the VNC image (Fig. 2a, circled). (UL – upper left; UR – upper right; LL – lower left; LR – lower right)