Intracerebral hemorrhage volume

- Continuous Intravenous Nimodipine Infusion With Ethanol as Carrier in Aneurysmal Subarachnoid Hemorrhage Does Not Result in Measurable Cerebral Ethanol Levels
- Effects of blood pressure lowering in relation to time in acute intracerebral haemorrhage: a pooled analysis of the four INTERACT trials
- Machine learning-based prediction of 6-month functional recovery in hypertensive cerebral hemorrhage: insights from XGBoost and SHAP analysis
- Tumor necrosis factor-alpha-stimulated gene 6 promotes hematoma clearance after intracerebral hemorrhage in a mouse model
- MicroRNA-29a-5p attenuates hemorrhagic transformation and improves outcomes after mechanical reperfusion for acute ischemic stroke
- Restrictive Versus A Liberal Transfusion Strategy in Patients With Spontaneous Intracerebral Hemorrhage: A Secondary Analysis of TRAIN Randomized Clinical Trial
- Current perspectives on endovascular therapy for large core ischemic stroke
- Imaging-Based Brain Frailty Predicts Unfavorable Outcomes in Acute Ischemic Stroke

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The volume of an intracerebral hemorrhage (ICH) is a crucial parameter for prognosis and management decisions. It is most commonly estimated using the ABC/2 formula, particularly on CT scans.

 Clinical Relevance <30 mL → often associated with better prognosis (especially if GCS is good and hemorrhage is supratentorial)

> 30 mL → increased mortality and worse outcomes
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> 60 mL → very poor prognosis in most cases

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Hemorrhage volume is a powerful predictor of 30-day mortality after spontaneous intracerebral hemorrhage (ICH).

A study aimed to enhance the accuracy and practicability of CT image segmentation and volume measurement of ICH by using deep learning technology. A dataset including the brain CT images and clinical data of 1,027 patients with spontaneous ICHs treated from January 2010 to December 2020 were retrospectively analyzed, and a deep segmentation network (AttFocusNet) integrating the focus structure and the attention gate (AG) mechanism is proposed to enable automatic, accurate CT image segmentation and volume measurement of ICHs. In the internal validation set, experimental results showed that AttFocusNet achieved a Dice coefficient of 0.908, an intersection-over-union (IoU) of 0.874, a sensitivity of 0.913, a positive predictive value (PPV) of 0.957, and a 95% Hausdorff distance (HD95) (mm) of 5.960. The intraclass correlation coefficient (ICC) of the ICH volume measurement between AttFocusNet and the ground truth was 0.997. The average time per case achieved by AttFocusNet, Coniglobus formula and manual segmentation is 5.6, 47.7, and 170.1 s. In the two external validation sets, AttFocusNet achieved a Dice coefficient of 0.889 and 0.911, respectively, an

IoU of 0.800 and 0.836, respectively, a sensitivity of 0.817 and 0.849, respectively, a PPV of 0.976 and 0.981, respectively, and an HD95 of 5.331 and 4.220, respectively. The ICC of the ICH volume measurement between AttFocusNet and the ground truth was 0.939 and 0.956, respectively. The proposed segmentation network AttFocusNet significantly outperforms the Coniglobus formula in terms of ICH segmentation and volume measurement by acquiring measurement results closer to the true ICH volume and significantly reducing the clinical workload [1].

Kothari et al., compared a bedside method of measuring CT ICH volume with measurements made by computer-assisted planimetric image analysis.

The formula ABC/2 was used, where A is the greatest hemorrhage diameter by CT, B is the diameter 90 degrees to A, and C is the approximate number of CT slices with hemorrhage multiplied by the slice thickness.

The ICH volumes for 118 patients were evaluated in a mean of 38 seconds and correlated with planimetric measurements (R2 = 9.6). Interrater and intrarater reliability were excellent, with an intraclass correlation of .99 for both.

Kothari et al., conclude that ICH volume can be accurately estimated in less than 1 minute with the simple formula ABC/2 [2].

see ABC/2.

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Peng Q, Chen X, Zhang C, Li W, Liu J, Shi T, Wu Y, Feng H, Nian Y, Hu R. Deep learning-based computed tomography image segmentation and volume measurement of intracerebral hemorrhage. Front Neurosci. 2022 Oct 3;16:965680. doi: 10.3389/fnins.2022.965680. PMID: 36263364; PMCID: PMC9575984.
2)
Kothari RU, Brott T, Broderick JP, Barsan WG, Sauerbeck LR, Zuccarello M, Khoury J. The ABCs of measuring intracerebral hemorrhage volumes. Stroke. 1996 Aug;27(8):1304-5. PubMed PMID: 8711791.