

**Advance Study: Automated Detection and Volumetric Assessment of Intracerebral Hemorrhage**

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**Introduction**

Acute intracerebral hemorrhages (ICHs) requires expedited imaging review for medical and surgical decision-making. Reliable ICH volume measurements are critical to determine eligibility for certain therapies and required for clinical trial screening. Existing semi-automated detection systems have shown inaccuracy and reproducibility challenges. We present a fully automated artificial intelligence algorithm for ICH detection.

**Methods**

A single center retrospective analysis of non-contrast CTs (NCCTs), randomly selected from a prospective cohort of acute stroke patients, with and without ICHs, admitted at a stroke center, from 2014-2017 was conducted. Experienced stroke neurologists graded NCCTs with a semi-automated tool (OsiriX MD v.9.0.1) for presence and volume of ICH, and of intraventricular hemorrhage (IVH). Viz-ICH® v2.0 – a Convolutional Neural Network programmed to fully automatically detect ICH (presence and volume) analyzed the same studies.

**Results**

284 subjects were analyzed: 132 with ICH and 152 controls. For the ICH group, mean age of 58.311.7, bNIHSS 10[3-19], ICH volume of 13[5-24] mL, males 51.5%, hypertension 75.8% and presence of IVH 47.8%. Intraclass Correlation Coefficient (uncontrolled for IVH): =0.983 (IC95%=0.979-0.987; p=<0.001). For presence of ICH, AUC of 0.951(CI95% 0.921-0.981, p<0.001), sensitivity 90.2%, specificity 99.99%, PPV 100%, NPV 92.2%, accuracy 95.5%. Maximal running time of the algorithm was under 15 seconds.

**Conclusions**

The Viz-ICH Algorithm can precisely predict the presence and volume of ICHs, on a independent fashion, and also reliably differentiates IVHs.

**Learning Objectives**

Understand the benefits of automated ICH volume calculation

Describe the technical aspects of automated volume calculation options available for ICH

Contrast available options with the Viz-ICH algorithm