Abstract: Deep Learning-based Detection of Vessel Occlusions on CT-Angiography in Patients with Suspected Acute Ischemic Stroke

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Swift diagnosis and treatment play a decisive role in the clinical outcome of patients with acute ischemic stroke (AIS), and computer-aided diagnosis (CAD) systems can accelerate the underlying diagnostic processes. Here, we developed an artifical neural network (ANN) which allows automated detection of abnormal vessel findings. Pseudo-prospective external validation was performed in consecutive patients with suspected AIS from 4 different hospitals during a 6-month timeframe and demonstrated high sensitivity ($\geq 87\%$) and negative predictive value ($\geq 93\%$). Benchmarking against two CE- and FDA-approved software solutions showed significantly higher performance for our ANN with improvements of 25–45% for sensitivity and 4–11% for NPV. We provide an imaging platform (https://stroke.neuroAI-HD.org) for online processing of medical imaging data with the developed ANN, including provisions for data crowdsourcing. Notably, this work has previously been published in Nature Communications [1].

References

1. Brugnara G, Baumgartner M, Scholze ED, Deike-Hofmann K, Kades K, Scherer J et al. Deep-learning-based detection of vessel occlusions on CT-angiography in patients with suspected acute ischemic stroke. Nat Commun. 2023;14(1):4938.