



# A Method of Computational Image Analysis for Predicting Tissue Infarction After Acute Ischemic Stroke

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## SUMMARY

UCLA researchers in the Departments of Radiological Sciences and Neurology have designed an algorithm to predict tissue infarctions using pre-therapy magnetic resonance (MR) perfusion-weighted images (pre-PWIs) acquired from patients with acute ischemic stroke. The predictions generated by the algorithm provide information that may assist in physicians' treatment decisions.

## BACKGROUND

Ischemic stroke occurs when a blood vessel supplying blood to the brain is blocked by a blood clot or plaque fragment. Sudden loss of blood circulation to an area of the brain results in a corresponding loss of neurologic function. Emergent and accurate brain imaging is essential for excluding hemorrhage, differentiating between irreversibly and reversibly affected brain tissue (dead tissue vs. tissue at risk), identifying stenosis or occlusion of major extra- and intracranial arteries, and allowing time-critical decision-making on selection of patients appropriate for thrombolytic therapy.

Current techniques apply single value decomposition (SVD) to deconvolve pre-therapy magnetic resonance (MR) perfusion-weighted images (pre-PWIs). Parameters, such as time-to-maximum (Tmax) and cerebral blood volume (CBV), generated from the deconvolution process are used for tissue at risk (penumbra) and infarct prediction. However, the threshold of these imaging parameters for detecting infarct is still under debate, and there are growing concerns that the parameters obtained from the plot generated via deconvolution are less predictive due to distortions introduced during the deconvolution process.

## INNOVATION

Researchers at UCLA have designed a specialized deep convolutional neural network (CNN) image analysis algorithm that automatically learns hierarchical spatio-temporal features, which are more predictive than traditional parameters, such as CBV.

## APPLICATIONS

- Clinical decision support
- Predict brain tissue infarction in acute ischemic stroke patients

## ADVANTAGES

- Better predict brain tissue infarction
- Provide new information to guide treatment

## STATE OF DEVELOPMENT

Algorithm has been developed and successfully tested.

## PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,741,601	08/29/2023	2015-955

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## INVENTORS

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## OTHER INFORMATION

### KEYWORDS

Stroke, ischemic stroke, ischemia, infarction, diagnostic, imaging, brain imaging, perfusion-weighted imaging, PWI, spatio-temporal, algorithm, software

### CATEGORIZED AS

- **Computer**
  - Software
- **Imaging**
  - Medical
  - Software
- **Medical**
  - Diagnostics
  - Disease: Cardiovascular and Circulatory System
  - Disease: Central Nervous System
  - Imaging
  - Software

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2015-955-0

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