Integrative Leakage Correction For Contrast Agent Extravasation In Dynamic Susceptibility Contrast (DSC) - MRI

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OTHER INFORMATION

KEYWORDS

Perfusion imaging, dynamic susceptibility contrast, DSC MRI, dynamic contrast enhanced, DCE MRI, dynamic CT perfusion, contrast agent leakage correction method, relative cerebral blood volume evaluation, rCBV, compartmental modeling, vascular parameters

CATEGORIZED AS

- **Imaging**
  - Medical
  - Software
- **Medical**
  - Disease: Cancer
  - Disease: Central Nervous System
  - Imaging
  - Software

RELATED CASES

2015-089-0

SUMMARY

UCLA researchers in the Department of Radiological Sciences have developed a new technique for more accurately estimating relative cerebral blood volume (rCBV) from dynamic susceptibility contrast (DSC) perfusion MRI by improved modeling and correction of contrast agent leakage.

BACKGROUND

Dynamic susceptibility contrast (DSC) perfusion MRI scans are routinely collected on brain tumors, stroke, and traumatic brain injury patients, but accurate estimation of perfusion parameters is confounded due to contrast agent leakage into tissues as a result of changes in blood-brain barrier permeability. Companies such as IB Neuro, Olea Medical, NordicICE, General Electric, and Siemens currently employ a simple leakage correction technique to overcome these challenges. However, the commonly employed contrast agent leakage correction method does not properly correct for contrast agent exchange with surrounding tissues. Therefore, there is need for a better method that more properly corrects for contrast agent leakage in order to improve estimation of perfusion parameters.

INNOVATION

UCLA researchers have developed an improved model for correcting DSC perfusion MRI contrast leakage. By performing compartmental modeling of contrast agent flux into and out of the vasculature, they demonstrate higher accuracy calculations of relative cerebral volume (rCBV), a parameter often used for clinical management of patients with a variety of neurological disorders. This method can simultaneously calculate dynamic contrast enhanced (DCE)- MRI physiological parameters, such as vascular permeability, without a 2nd injection or additional MRI scans. Therefore, this model gains DSC-MRI and DCE-MRI information from only one injection/measurement. Additionally, this method has been shown to lower the variability of perfusion parameter estimations that exists due to differences in the MRI system hardware, software, and acquisition strategies or parameters.

APPLICATIONS

- Dynamic susceptibility contrast (DSC) perfusion MRI
- Dynamic computed tomography (CT) perfusion imaging
- Brain tumor imaging
- Stroke and ischemic disease
- Traumatic brain injury (TBI)

ADVANTAGES

- Estimates rCBV, blood flow, and other perfusion parameters with higher accuracy
- Simultaneously provides additional information about vascular permeability, normally collected using dynamic contrast enhanced (DCE) MRI, with only one injection
- Reduces variability across different MRI systems or acquisition parameters

STATE OF DEVELOPMENT

- Stand-alone prototype application for Mac
- Prototype source code in Matlab
- Variety of institutions and companies are currently evaluating the prototype

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10/973,433	04/13/2021	2015-089

RELATED MATERIALS

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ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- pH-Weighted MRI Using Fast Amine Chemical Exchange Saturation Transfer (CEST) Imaging
- Simultaneous pH- And Oxygen-Weighted MRI Contrast Using Multi-Echo Chemical Exchange Saturation Transfer Imaging (ME-CEST)
- Multi-Echo Spin-, Asymmetric Spin-, And Gradient Echo Echoplanar Imaging (Message-EPI) MRI

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