Medical Imaging

Optimizing the Use of Contrast Agents During Medical Imaging

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The Wisconsin Alumni Research Foundation is seeking commercial partners interested in developing an automatable solution to quantifying contrast enhancement. Establishing a quantitative measure of contrast enhancement through computer analysis of baseline and enhanced images allows statistical comparison of protocols and imaging parameters from routine hospital operations to enhance and evaluate operations.

Overview

The successful use of contrast agents in volumetric imaging, such as intravenous iodinated agent in computed tomography (CT), is guided by sophisticated protocols. Poor contrast enhancement is related to a variety of issues such as examination execution, contrast prescription, CT protocols and patient conditions. Currently, the field has **no metric to monitor true enhancement on routine single-phase examinations** because this requires knowledge of both pre- and postcontrast CT number.

Another urgent challenge is the **global shortage** of iodine contrast agent due to COVID-19 related logistics issues, forcing hospitals across the world to deny patients iodinated contrast for CT scans. For patients who do receive contrast, hospitals are reducing the administered dose. When less contrast is administered, diagnostic utility of the scan may suffer.

The Invention

A UW-Madison researcher has developed a method for producing a quantified measure of image contrast enhancement. This quantified measure allows routine medical imaging data to be directly compared and thus statistically processed to identify optimal contrast imaging parameters improving contrast agent use. The measure of contrast enhancement may be made, in most cases, without the need to acquire additional scans of the patient using scans obtained during conventional bolus tracking or from previous patient imaging. This technology allows sites to track in real time how reduction efforts are affecting enhancement of contrast-filled structures in the human body. It also allows customization of contrast prescriptions so sites can provide patients with the appropriate minimum volume while minimizing waste.

Applications

- Help address the current **COVID-19** contrast agent shortage
- Quantifying **differences in practice** across large health care enterprises
- Performance monitoring and quality control

Key Benefits

- **No comparable tool** is currently available on the market.
- Implementation of an **automatable metric** enables contrast prescription validation on an **institution-wide scale** and tangible outputs for quality improvement.
- Provides **more accurate** and **patient-specific** coordination of threshold and scanning.

    - Comparing the baseline image of the bolus tracking acquisition to the final contrast enhanced image **"closes the loop"** to allow for validation of contrast delivery.
- **Current state-of-the-art** bolus tracking systems compare the monitoring images to the baseline images, but **no further comparisons** are made after the monitoring threshold is reached.

Stage of Development

The researchers' **quality metric** for quantifying CT contrast enhancement suggests tangible opportunities for quality improvement and potential financial savings. Their **automatable CT protocol** and **technologist workflow metric** allowing for the quantification of CT iodine contrast agent enhancement was applied to 312 patients.

Additional Information

For More Information About the Inventors

- Timothy Szczykutowicz

Publications

- Szczykutowicz et al. A Metric for Quantification of Iodine Contrast Enhancement (Q-ICE) in Computed Tomography. J Comput Assist Tomogr. 2021 Nov-Dec 01;45(6):870-876. doi: 10.1097/RCT.0000000000001215. PMID: 34469906.

Tech Fields

- Medical Imaging : CT

For current licensing status, please contact Jeanine Burmania at jeanine@warf.org or 608-960-9846