Improved Localization of GI Bleeding: Software for Fusion and Viewing of Planar Dynamic Radiolabeled RBC Scintigraphy with Multiplanar CT


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The software described in this presentation, which was developed by the authors, has been disclosed to and is under management by the Emory University Office of Technology Transfer given it has potential commercial applications.
Accurate localization of the origin of GI bleeding is essential for patient care.

RBC scintigraphy is a well established technique in the evaluation of gastrointestinal hemorrhage.

Yet, localization, especially differentiation of large from small bowel origin, may be difficult due to anatomic variations.

Laing et al. Radiographics 2007;27:1055
Background

• Aim of this study:
  – to develop a method of improved localization of the bleeding site through registration of the dynamic scintigram to a separately acquired CT scan.
Evaluation

- Created specially designed IDL program
- Co-register dynamic planar scintigraphic images and coronal slices from a CT scan
Evaluation

- Scintigram can manually translate and rotate with respect to the CT
  - may be displayed as a dynamic planar projection, as a time-projected MIP (TPMIP), or as a single frame
- Color tables and transparency can be adjusted for both the nuclear study and the CT
- Triangulation between three CT orientations
Evaluation

• In practice, the nuclear data was registered via:
  – overlay of blood pool structures with corresponding anatomy in the coronal CT

• Tested on 10 RBC dynamic scintigrams with accompanying low-dose abdominopelvic CT scans
  – acquired on GE Discovery 670 SPECT/CT
Discussion

• All data was successfully processed by the software program

• Both normal activity and abnormal activity characteristic for GI hemorrhage were visualized and overlaid to corresponding CT images
74 Year Old Male BRBPR
Angiogram and Dynamic CT Negative

Taken to surgery for hemicolecotomy. Mucosal and submucosal hemorrhage without vascular anomaly
67 Year Old Female with Melena
Bleeding Localized to Jejunum

Iterative Alignment

Dynamic
Negative Angiogram but Confirmed with Capsule Endoscopy
50 Year Old Male BRBPR
Polycystic Kidney Disease
Confusing on Scintigraphy Alone
We Utilized Old CT to Confirm Activity in Distorted Colon
Confirmed on Angio and Coiled

Better registration using contemporaneous (L) vs old CT (R)
Conclusion

• Co-registration and simultaneous viewing of planar dynamic RBC scintigraphy with multiplanar CT is feasible by means of specially designed software.

• Potential to increase diagnostic confidence, especially in anatomic localization of GI bleeding.
Future Directions

• Automate registration

• Geometric localization in AP plane by using anterior and posterior acquisitions
In Memoriam

- Tracy Faber, PhD
  - Passed away
    - on March 24, 2012

- Tracy Faber Memorial Fund established to:
  - Annual award to individual promoting women investigators in Imaging Science and Engineering
  - Seeking matching partners