Brain Shift Compensation Using Computer Models

VANDERBILT UNIVERSITY
CTTC Center for Technology Transfer & Commercialization

Summary

The Vanderbilt University Biomedical Modeling Laboratory, led by Dr. Michael Miga, has developed a method to overcome intra-operative brain shifts experienced during neurosurgery using computer modeling that augments standard image-guided surgery technology. Current standard of care methods of image-guided surgery have limitations on accuracy, which is overcome by this new method.

Technology Description

This protocol begins with the generation of a model from standard pre-operative brain images. Using the computer model, a distribution of brain shift solutions that correspond to the surgical plan are determined prior to surgery. Brain displacements are measured intra-operatively using standard image-guided surgery tools. Using the displacements, an optimized composite solution from the distribute of pre-computed solutions is fit and intra-operative brain shift is determined and the guidance system is updated during the operation.

Unique Properties and Applications

- Low cost alternative to intra-operative imaging that uses computational methods and can be easily augmented to existing guidance technologies
- Overcomes alignment differences between pre-operative and intra-operative images that result with traditional image-guided approaches
- Provides personalized approaches to image-guided surgery

Technology Development Status

The protocol has been fully developed and tested. Implementation into the clinical environment is ongoing.

Intellectual Property Status

Issued US patent: 7,072,705

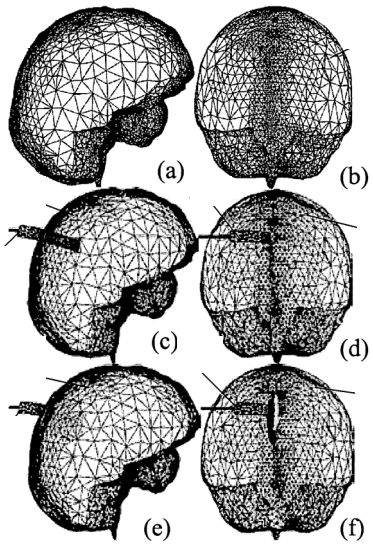

Figure 1: Brain images used in mapping out the brain field pre-operatively

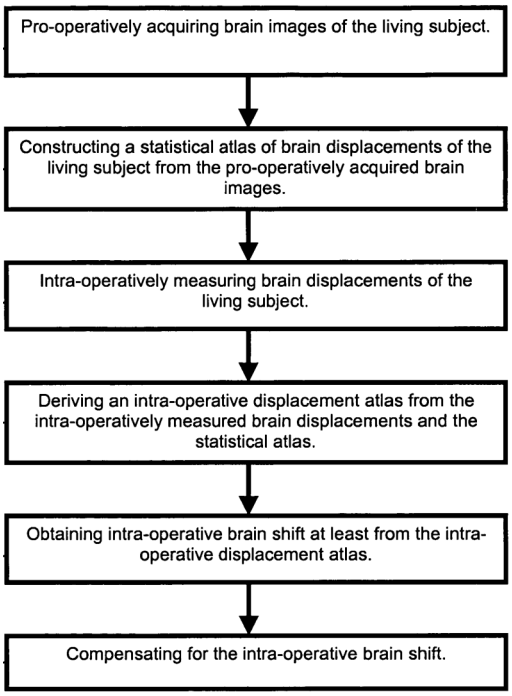

Figure 2: Flow of steps within the protocol to compensate for intra-operative brain shifts.

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VU REFERENCE: VU0506

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