



# Interventions Assisted by Image Fusion and EM Needle Tracking

## Volume Navigation with Contrast Enhanced Ultrasound and Image Fusion for Percutaneous Interventions: First Results

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*PLoS ONE*, 2012; 7(3): e33956

### Summary and Methods

In this article, the authors conducted a pre-clinical trial using a liver phantom with a corresponding CT dataset to evaluate the performance and time efficiency for performing liver interventions under US-guided image fusion using the LOGIQ™ E9 with Volume Navigation (VNAV, GE Healthcare, Chalfont St. Giles, UK) and a 16-gauge eTRAX™ needle tip tracking system (CIVCO Medical Solutions, Kalona, Iowa, USA). A clinical trial approved by the hospital ethics committee was then performed to evaluate the use of this system during a variety of ultrasound fusion guided interventions with the aid of contrast enhanced ultrasound (CEUS).

The phantom study involving 15 physicians compared the use of standard US-guided free-hand technique and US guidance assisted by VNAV and eTRAX. The comparison of the techniques were statistically evaluated for the time to successfully reach a lesion and perform the entire procedure.

The clinical trial included 23 patients with various interventional needs and assessed the time necessary to complete US-guided fusion imaging procedure using eTRAX. The procedure included a baseline sonographic evaluation of the region of interest to locate vascularity, fusion imaging using pre-acquired CT or MRI data sets, and CEUS to better highlight tumor or abscess formations. The eTRAX system was used to plan the approach and gain access to lesions. Procedure time was recorded from the moment the patient was ready for the intervention to the moment the patient was able to leave the exam room. For the comparison, 20 CT guided procedures including 10 biopsy and 10 drainages were chosen at random and procedure duration was also recorded.

### Discussion and Results

In this study, the mean time difference between performing a simulated free-hand US-guided procedure and a fusion with needle tip tracking procedure was 66 seconds. Overall, a practitioner required less time to perform the procedure using VNAV and needle tip tracking.

Comparing the time required to perform liver guided procedures, the CT guided average was 14 minutes whereas the US-guided biopsy using fusion, CEUS, and eTRAX was approximately 16 minutes. The resulting average time for CT guided drainages was 41 minutes and 32 minutes under US-guided fusion and CEUS when using eTRAX.

### Conclusions

The results of this study show US-guided biopsies and interventions using VNAV technology combined with needle tip tracking is equally as efficient and effective as CT guidance. Procedures performed with CEUS, fusion and eTRAX needle tip tracking allowed for real-time guidance and visualization of the needle during interventions while eliminating radiation exposure for both the physician and patient.

#### Author Commentary

*"We expect that the technique used in this study may enable less experienced examiners to successfully perform complex biopsies or place drainages involving complex access ways."*

