# Sonotrac: Training Wheels for Ultrasound-guided Procedures

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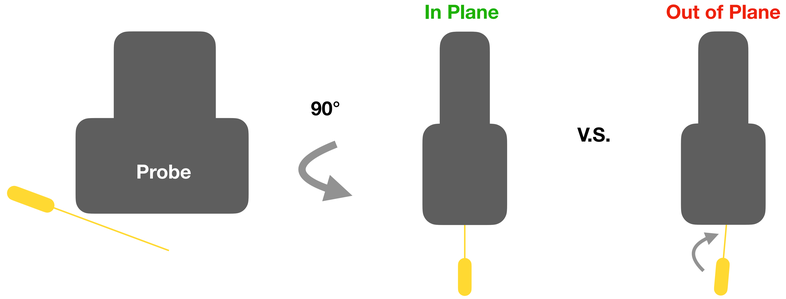
## Introduction

Ultrasound imaging is inexpensive, portable and does not require ionizing radiation. In addition to diagnostic imaging, ultrasound can be used to perform a number of minimally invasive procedures including tissue biopsy, vascular access, and peripheral nerve blocks. Ultrasound is highly operator dependent however, and technical barriers contribute to underutilization.

## Background

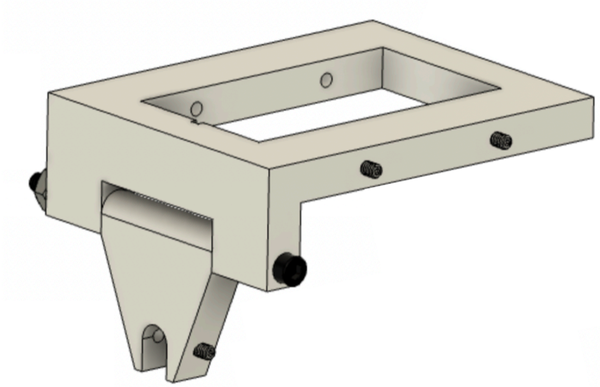
The lack of biologically relevant preclinical models is a major barrier to the translation of anti-cancer therapies. Current techniques to establish malignancies at different sites of interest are laborious and require significant technical skill. These challenges prevent the execution of important preclinical studies. To overcome these challenges, we report the development of an instrument stabilization device for ultrasound-guided procedures and the novel preclinical models made possible by its development.

**Figure 1) Schematic illustrating in plane technique. In order to visualize the full length of the instrument under ultrasound guidance using a longitudinal approach, the instrument must be perfectly in plane with the transducer. Maintaining the instrument in plane is necessary for visualization and safety, but technically difficult.**




## Device Description

**Sonotrac** is an accessory for ultrasound-guided procedures that functions to maintain the instrument in plane with the transducer, allowing continuous visualization of the instrument throughout the procedure.



**Sonotrac** features:

- Low-profile and affixed to the probe
- Designed for small spaces and compatible with bedside procedures
- Adjustable along the length of the transducer
- Adjustable instrument angle
- Guides instrument while permitting tissue feedback
- Patent pending (provisional application number 63/386,961)

## Results

**Sonotrac** has been validated in multiple *in vivo* studies, demonstrating proof of concept at the extremes of size.

**Figure 2) Generation of liver metastases in preclinical models of cancer by injecting tumor cells in to the portal vein under ultrasound guidance. C57BL/6 mice, 6 to 8 weeks of age, were injected with 2.5x10$^4$ B16F10 luciferase-expressing cells and surveilled with bioluminescent imaging (n = 20).**

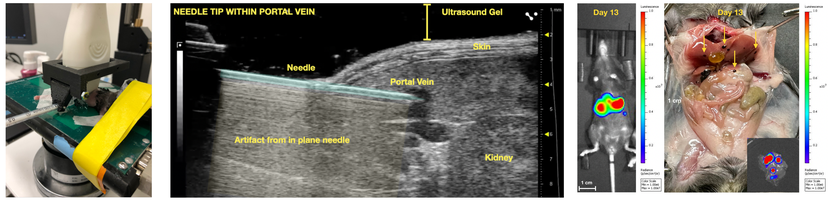
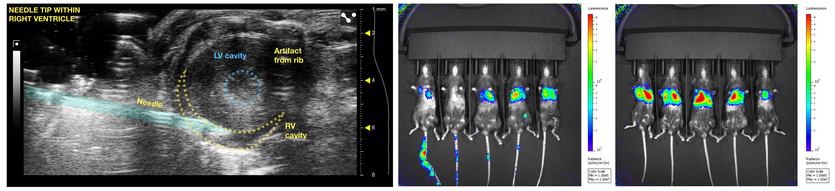



**Figure 3) Generation of lung metastases in preclinical models of cancer by injecting tumor cells in to the right ventricle under ultrasound guidance or tail vein. C57BL/6 mice, 6 to 8 weeks of age, were injected with 1.0x10$^6$ B16F10 luciferase-expressing cells and surveilled with bioluminescent imaging (n = 5).**




## Conclusions

**Sonotrac** is a Class I instrument stabilization device for ultrasound-guided procedures with applications in research and pharmaceutical development as well as veterinary and clinical care.