Virtual ACS 2021 Surgeons and Engineers: A Dialogue on Surgical Simulation Meeting

Promoting Technology and Collaboration

Parallel Development of Physical and Virtual Simulators for Image-guided Biopsy

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Background: Traditionally, image-guided soft tissue biopsy phantoms involve a combination of explanted tissue with olives or raisins as targets. Although inexpensive, shelf life is short, and these phantoms are limited to a single imaging modality. Other simulators have employed techniques such as VR and haptic feedback to replicate the biopsy experience but have limited users' visual field and instrument selection thus minimizing training fidelity and usage [1,2]. Our team has developed a low-cost multi-layered biopsy simulation model which allows for the use of several imaging modalities and can be used with instruments intended for clinical use.

Technology Overview: Our team was tasked with developing a multi-layered modular biopsy simulator o complement and pair with an augmented reality (AR) project for image-guided biopsy training. Thus, we created interlocking discs of Medical Gel (Humimic, Greenville, SC) to simulate various tissues within the abdomen. The discs can vary in thickness and density (shore) and can be interchanged to better mimic unique patient anatomy. The discs can also be rotated at discrete angles to change the position of the target to match the available images in the AR component.

Potential Application in Surgical Simulation and Education: This technology could be applied to any specialty that requires training for image-guided needle biopsy procedures.

Potential Opportunities to Collaborate: We welcome collaboration following completion of project and evaluation of preliminary validity evidence.