

## SSA24-05 Feasibility Study of CT-Guided Needle Insertion Using Stereotaxic Unit for Lung Biopsy

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### PURPOSE

Purpose of this study is to evaluate accuracy and feasibility of CT-guided, robot-assisted needle placement of lung lesion

### METHOD AND MATERIALS

The robot system including 5-axis robot arm, a mobile platform with motor controllers, dedicated workstation for planning of needle path, and the navigation system (Polaris Spectra®; NDI, Canada) was developed. It provides useful functions including such as needle path planning, respiration monitoring, laser guidance, automatic needle positioning and guiding. To evaluate the feasibility and accuracy of the system in needle placement, patient with lung lesions requiring biopsy were included. Under CT guidance. CT scan was performed to localize the target lesion and the CT data was transferred to the system. The spatial relation between patient and the robot system was registered with navigation system. After planning the needle path on workstation, the spatial information was translated to the robotic system. The robot system automatically angulates the needle to the target and depth of insertion is determined. Total of 21 needle insertion trials were performed. Using the CT images after the insertion, distance between the target and actual needle tip and angle between preplanned route and actual needle pathway were measured.

### RESULTS

The distances between the target and the needle tip for robot assisted was  $8.13 \pm 5.2$ mm. Angular deviation was  $4.49 \pm 2.86^\circ$ . Procedure was  $17m45s \pm 4m36$ . Since additional CT scanning was performed. Small amount of pneumothorax occurred in three patients, but no additional procedures were needed. Small amount of hemoptysis occurred in one patient.

### CONCLUSION

Developed robot system provides comparable accuracy of CT guided needle placement for lung lesion to conventional procedure.

### CLINICAL RELEVANCE/APPLICATION

Compared with conventional biopsy procedures, it is expected to use tools that make it easier to perform biopsy by lowering barriers to entry by non-experts.