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Artificial Intelligence improves patient outcomes for diagnostics of Pulmonary Nodules During Navigational Bronchoscopy

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Abstract:

Background: Multiple imaging modalities are involved into lung patient management flow, providing valuable information at every step of the process from detection to treatment. While the summary is collected from every step of the process, the current flow largely relies on the physician's memory, while most of the imaging information is lost and underutilized. As a result, the non-diagnostic results obtained for 70% of small peripheral lung nodules (<20 mm)[1] are unexplained for medical community. A novel platform (LungVision™, Body Vision Ltd, Israel) is applying innovative artificial intelligence approach to integrate all imaging information together in real time, at the tip of the operational tool, providing the unprecedent level of control for physician during interventional procedure. Artificial intelligence is a powerful assistant in procedure room, that allows physician to integrate historic and real-time imaging information together. Moreover, since Artificial Intelligence is inspired by the human brain operation, it constantly learns from each interaction with operational environment around it, while gradually improving its performance over time without the need of software engineering involvement.

Methods: Patients with PNs referred to bronchoscopy were included in this study. CT scans were imported into the LungVision planning software, where the physician identified the targeted PN. The LungVision platform was used for navigation and access of the nodule, while the nodule location was verified with REBUS, CBCT or CABT. The AI system was trained over the set of 51 procedures from 8 clinical sites. Its performance was tested and measured over 18 independent procedures, comprising 398 configurations from 7 clinical sites, to quantify the AI capabilities compared with trained human operator in offline on prerecorded procedures.

Results: The AI component of navigation and biopsy guidance system demonstrates performance improvement from 80% till 95% to detect surgical tools on the challenging fluoroscopic images. The AI system is agnostic to the operational environment, type of the bronchoscope or fluoroscope.

Conclusion: The AI technology is improving its performance over time, tracking complex anatomy and operational tools on the challenging fluoroscopic imaging, making the guidance of diagnostic biopsy reliable and meaningful during procedure. This is turn translates into better control of procedure and high diagnostic results.

Reference: State-of-the-Art Modalities for Peripheral Lung Nodule Biopsy. Kalanjeri et al. Clin Chest Med 39 (2018) 125–138