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Artificial Intelligence-Guided Fiducial Marker Placement To Enable Tumor Tracking In SBRT

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Abstract:

Background: Fiducial markers enable tumor tracking and localization with radio surgery. The placement of these markers using an endobronchial approach optimizes safety, stability, and accuracy. The challenge with endobronchial placement is accessibility to targets surrounding peripheral lung lesions. There may be difficulty in visualizing small lesions and optimizing the placement of fiducials to allow greater accuracy in treatment planning for planned radiation. LungVision™ is a novel platform (Body Vision Medical Ltd, Israel) that applies artificial intelligence technology to provide real time augmented endobronchial fluoroscopic guidance and visualization of peripheral nodules (PN) during navigation to targets of fiducial marker placement. It is capable of tracking PN movement during the procedure to increase accuracy, making any nodule visible during an interventional procedure using C-Arm based Tomography (CABT). CABT is a unique imaging device, enabling placement of fiducials, in a most appropriate spatial location to increase efficiency of radio surgery.

Methods: 18 patients with PN's were referred for bronchoscopic placement of fiducial markers for planned radio surgery. CT scans were imported into the LungVision™ planning software, where the physician identified the targeted PN and planned a navigation pathway. The marker delivery tool and nodule location were verified with the CABT feature. Navigation correction took place to ensure accurate marker placement. Post procedure CT scan was performed after marker placement for appropriate radiation planning.

Results: Fiducial markers were able to be placed in all patients to mark PN location for radio surgery. CABT was able to reveal poorly visualized lesions in real time to support accurate fiducial marker placement. Markers were able to be utilized in all patients for radio surgery treatment planning and delivery.

Conclusion: The LungVision™ platform was capable of calculating a navigational pathway to PN's, track the PN movement in real time during bronchoscopy and optimize visualization of poorly seen PN's on fluoroscopy, providing an aid for safe, efficient and accurate marker placement.