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Commentary: Radiofrequency identification of pulmonary nodules: Is there an app for that?

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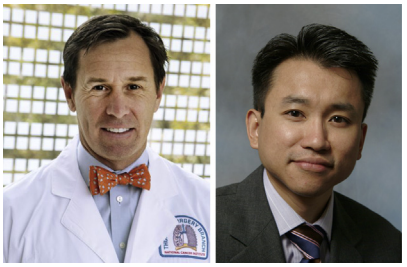

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CENTRAL MESSAGE

Use of a wireless radiofrequency identification system may have a future role to aid identification of pulmonary nodules that are typically nonpalpable and that may harbor malignancy.

The prevalence of ground-glass opacities (GGO) is as high as 9% in patients undergoing computed tomography scan.[1-3] The reported incidence of cancer in such lesions can be more than 50%.[4] Most clinicians watch these GGO with serial imaging and treat when either definitive growth has been identified or the lesion develops a solid component (ie, nodule). This strategy opens the opportunity for some nodules that have malignancy to continue to grow and possibly metastasize.

The use of various imaging modalities or radiomics to improve diagnostic accuracy (without invasive procedure) of GGO with malignancy continues to be a challenge.[5] Furthermore, biopsy approaches are not perfect. The overall diagnostic yield of a biopsy by either a transthoracic or transbronchial method of a 20 mm GGO is about 64% and drops to below 50% when the lesion is <10 mm in size.[6,7] This problem is best understood by the so-called chocolate chip cookie analogy. If one passes a needle through a chocolate chip cookie to obtain a biopsy and then tastes it, unless you get a piece of chocolate (ie, malignancy), it is just a cookie (ie, normal lung). In nondiagnostic cases, the patient harboring the GGO is then usually followed with repeat imaging and subjected to risks without an answer. Localization for a thoracic surgeon using palpation has a failure rate reported to be as high as 63%, and conversion to thoracotomy does occur.[8] Advances such as dye marking, needle localization with a hook-wire, and fiducial placement have all been reported. However, the success rate is inconsistent and varies from 56% to 100% in various publications.[9,10]

Everyone can now reliably find missing car keys and wallets with the use of geolocalizing chips and a smartphone app. Thus, the idea for using radiofrequency identification (RFID) technology to find pulmonary nodules. Yutaka and colleagues[11] report on the feasibility of RFID markers for small AND deep lung lesions undergoing resection. In the first 11 patients of their study, they were successful 100% of the time. This is even more impressive because the nodules ranged from 3.0 to 11.0 mm and were located a mean depth from the visceral pleura of 11.4 $\pm$ 8.4 mm. Although some authors advocate other localization techniques, another advantage of RFID localization is the ability to obtain margins at the time of resection (based on sound cues).

Although this is a small series that requires specialized equipment and experience, the broad applicability of this technology is clear compared with other localization techniques. However, the cost of technological advancement should be considered and weighed, taking into account the direct surgical costs plus the costs of the alternative (ie, repeat imaging), resection of benign lesions (occurred in 1 of 11 patients in the current study), and development of more advanced disease due to a delay in resection.[12] Finally, the long-term results of the JCOG 0802[13] and the CALGB 140503[14] trials may further play a role in which

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type of resection is offered to patients based on tumor size and radiographic characteristics. If nonanatomic sublobar resection has a role, obtaining appropriate margins will be paramount.[15] This is where the use of RFID-guided resection may really shine.

Now, if we could just find our car keys.

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