

Application of a novel artificial intelligence system in guiding the targeted puncture of a pancreatic mass

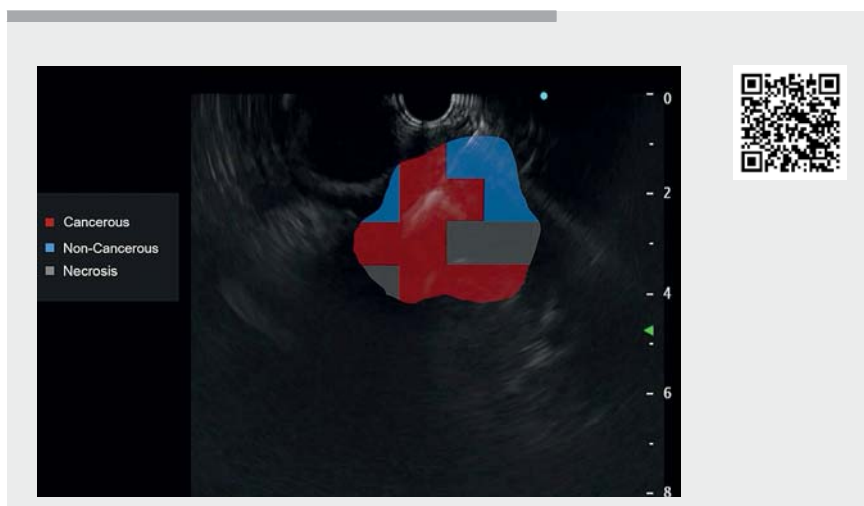
Endoscopic ultrasound-guided fine-needle aspiration (EUS-FNA) is a first choice for acquiring samples from a pancreatic lesion [1]. However, due to the heterogeneity of the tumor, inaccurate localization of the positive puncture site will lead to a missed diagnosis. The combination of contrast-enhanced harmonic endoscopic ultrasound and EUS-FNA can help to avoid puncture in necrotic areas, thus improving the diagnostic rate [2]. Unfortunately, the naked eye is not reliable for identifying and differentiating the targeted puncture sites suggested by contrast-enhanced harmonic EUS.

Therefore, we developed a novel system based on deep convolutional neural networks and random forest algorithms in order to identify and track the pancreatic masses dynamically in real time via describing time-intensity curve characteristics of each area of the pancreas, identifying points of interest, and guiding EUS-FNA.

A 55-year-old man was admitted to our department because of abdominal pain for 4 months. Computed tomography (CT) showed a lesion 8.3×6.3 cm in the pancreatic body and tail (►Fig. 1). The patient decided to undergo EUS-FNA with the guidance of the novel system (►Video 1).

EUS confirmed a lesion 6.5 cm in diameter in the pancreatic body and tail (►Fig. 2). The optimal insertion region was determined with the guidance of the system. A targeted puncture was performed in the malignant area based on diagnosis via artificial intelligence (AI) (►Fig. 3). Adequate tissue specimens were acquired after one pass with a 22G needle. The cytological examination found tumor cells (►Fig. 4).

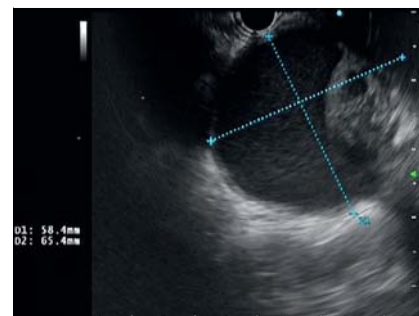
No adverse event and complications were observed during or after the procedure. The patient underwent surgery, and postoperative pathology suggested



►Video 1 Application of a novel artificial intelligence system in targeted puncture of a pancreatic mass. Red areas represent the malignancy where puncture was made, the blue areas are inflammation, and the gray areas are necrosis.



►Fig. 1 Computed tomography showed a space-occupying lesion in the pancreatic body and tail.



►Fig. 2 Endoscopic ultrasound confirmed a lesion 6.5 cm in diameter in the pancreatic body and tail.

pancreatic adenocarcinoma. Chemotherapy was then confirmed. The novel AI system is a valuable option for improving the diagnostic accuracy of EUS-FNA that can distinguish the malignant, benign, and necrotic regions in a lesion and guide the puncture.

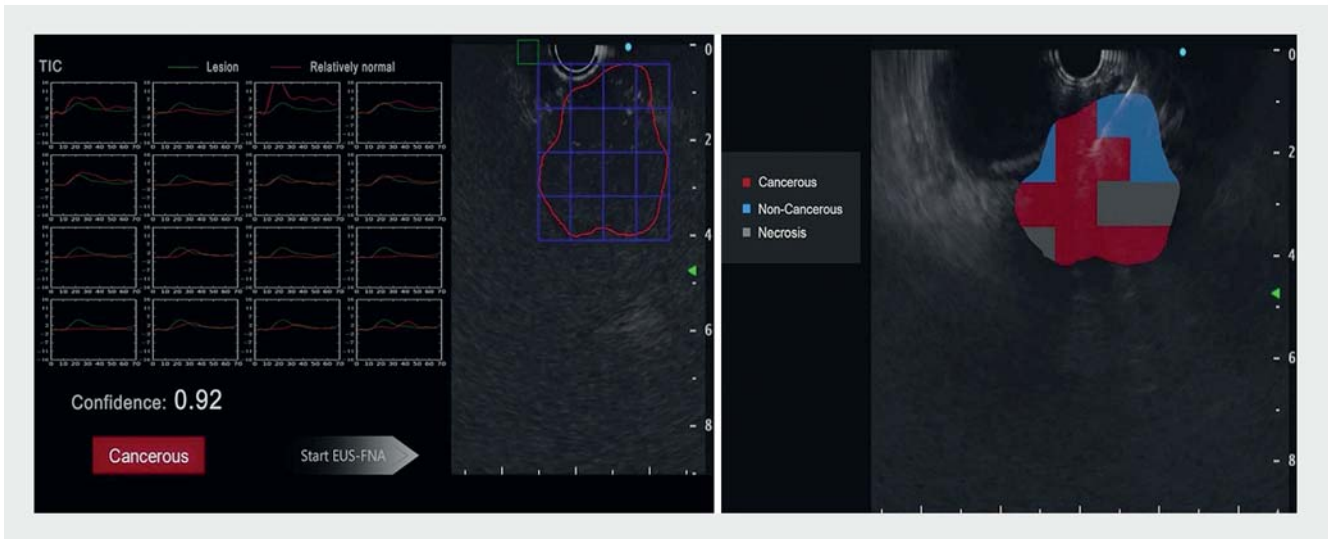
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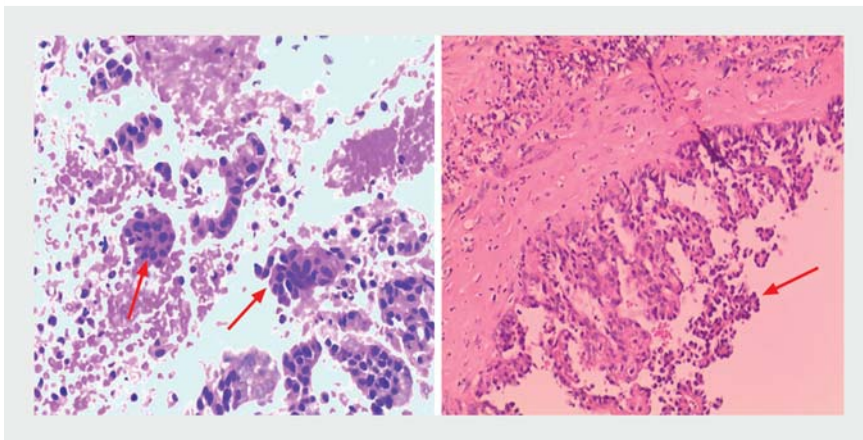
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► **Fig. 3** The optimal insertion region was determined with guidance from the system.



► **Fig. 4** The pathological examination found tumor cells and confirmed an adenocarcinoma of the pancreas.

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Competing interests

The authors declare that they have no conflict of interest.

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