1. Selection of the advanced model-based iterative reconstruction (ADMIRE) levels (*Tables S1,S2, Figure S1*)

Before starting the experiments, a test was performed on the fantom1 consisting in carrying out multiple acquisitions by varying the constants (mAs and Kv) and the levels of iterative reconstructions (ADMIRE).

The images were visually analyzed by the two operators to determine in consensus what was the best level of ADMIRE for each dose level to allow sufficient detection of the targets.

**Table S1** Acquisition parameters for each dose level

Acquisition	kV	mAs	CTDI$_{vol}$ (mGy)	DLP (mGy·cm)
D0.10	100	15	0.59	10.62
D0.25	100	45	1.75	31.50
D0.50	100	90	3.52	63.36
D1.00	100	180	7.02	126.36

D1.00 corresponds to standard dose. The tube voltage was fixed to 100 kVp. DLP, dose length product; CTDIvol, volume computed tomography dose index.

Table S2 ADMIRE levels corresponding to the dose levels

Acquisition	ADMIRE	ADMIRE	ADMIRE
D 0.10	3	4	5
D 0.25	3	4	5
D 0.50	0	2	3
D 1.00		0	2

ADMIRE, advanced model-based iterative reconstruction.
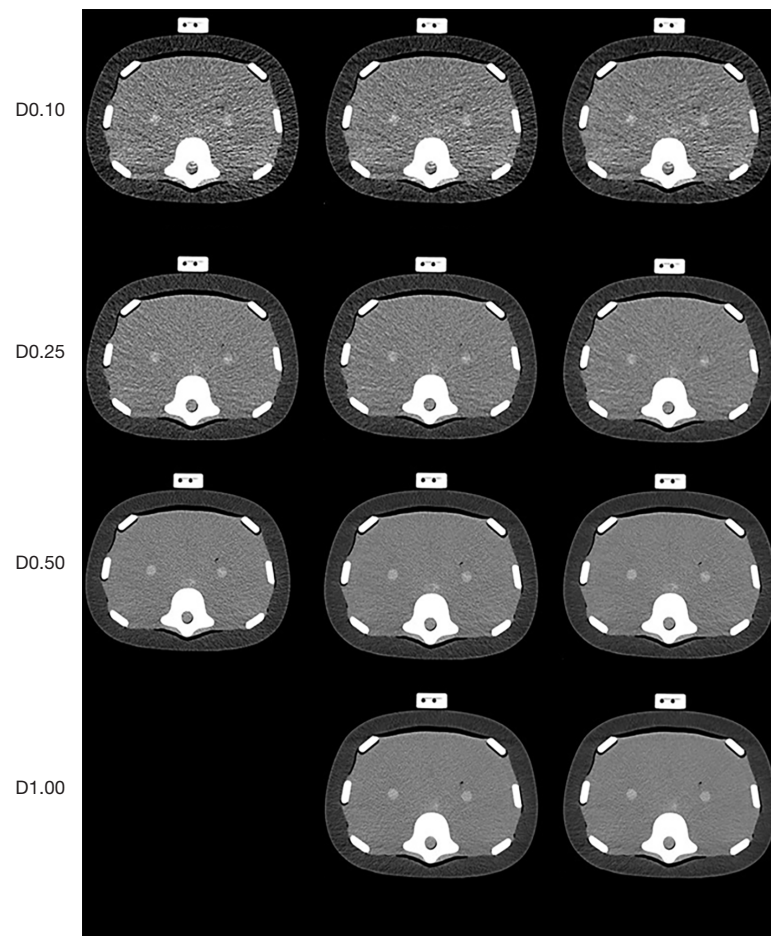
Figure S1 CT images at different ADMIRE levels and different dose levels, corresponding to *Table S2*. The two operators chose in consensus: D1.00: ADMIRE 2; D0.50: ADMIRE 3; D0.25: ADMIRE 4; D0.10: ADMIRE 5. CT, computed tomography; ADMIRE, advanced model-based iterative reconstruction.

2. IMACTIS® system (*Figure S2*)

This system allows the interventional radiologist to explore the patient's anatomy in any plane and visualize the planned needle trajectory before its insertion in real-time.

The IMACTIS® system is composed of a station with a touch screen and a proprietary electromagnetic locator. This locator is composed of a magnetic receiver, located inside a needle holder, providing good ergonomics. The magnetic transmitter, designed to be fixed to the phantom and detected in computed tomography (CT) images, allows an automatic registration between magnetic and CT coordinates. Once a CT-scan series (slice spacing of 2 mm maximum) is transferred to the navigation system, registration is automatically performed.

The touch screen is composed of two 2D reconstructed CT images extracted from the 3D CT volume that show the needle trajectory under two orthogonal views.

Figure S2 The Imactis® workstation, an example procedure. The Imactis® workstation (A) with one operator in action on phantom 2 (B). "A" represents the touch screen with two 2D-reconstructed CT images extracted from the 3D CT volume. The virtual needle path in two orthogonal views is virtually represented by a graduated blue line. The ergonomic needle holder handheld by the operator (blue holder with white arrow) is virtually projected onto the touch screen (white arrowhead). The magnetic transmitter is fixed to the phantom (white box with the white arrow) and detected in CT images (white arrow on the touch screen). CT, computed tomography.