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CORRECTION

Correction to: Technology for Intraoperative Margin Assessment in Breast Cancer

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In the original version of the article, some of the entries in Table 1 shifted during typesetting. The publisher regrets the error. The original article has been corrected. Following is the corrected Table 1.

The original article can be found online at https://doi.org/10.1245/s10434-020-08483-w.

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TABLE 1 Summary of key studies, methods, strengths, weaknesses and commercial devices of technologies for IMA in breast cancer

Categories	Subcategories	Mechanism	Differentiating factors	Commercial devices (* indicates FDA approval)	Key studies
IMA Technology Based on Spectroscopy	Rapid Evaporative Ionization Mass Spectrometry (REIMS)	REIMS characterizes human tissue in real-time by measuring the mass-to-charge ratio of aerosolized charged particles during electrosurgical dissection to compare chemical changes in cellular metabolism	REIMS aims to avoid disruption to surgical workflow and deliver results fast enough to allow a surgeon to make decisions regarding tissue resection in real time without having to worry about retrospective tissue orientation	iKnife (Medimass, Budapest)	J. Balog et al.; E. R. St John et al.
	Raman Spectroscopy (RS)	RS focuses a laser on a sample and measures scattered light to determine a frequency shift. Based on the shift, a unique vibrational spectrum is identified. Every biological molecule has its own distinctive Raman spectrum which can be used to determine tissue biochemical composition	The Marginbot scans an entire sample using RS to provide a 3D representation in relation to gross specimen morphology giving surgeons anatomical coordinates for regions requiring surgical re-excision in vivo during BCS	No current commercial devices in breast surgery	Haka et al.; Thomas et al.
	Optical Spectral Imaging	Optical spectral imaging is a technique that uses the absorption and scattering in the visible part of the electromagnetic spectrum to characterize benign versus malignant tissue	The device is able to sense up to a depth of 2 mm	No current commercial devices in breast surgery	Wilke et al.
IMA Technology Based on Differences in Electrical Properties of Tissue	Radiofrequency Spectroscopy	A single-use sterile probe is placed in direct contact with excised tissue that emits radiofrequency waves at the specimen surface. The reflected signal is analyzed using an algorithm based on a dataset from malignant and healthy tissue	MarginProbe uses a preset algorithm to determine if tissue is healthy or malignant. Relatively high sensitivities come at the cost of relatively greater rates of false positives	MarginProbe* (Dune Medical, Cesarea, Israel)	T. Karni et al.; T. Allweis et al.; I. Pappo et al.; F. Schnabel et al.; M. Thill et al.; A. Kupstas et al.
	Bioimpedance Spectroscopy	A probe applies small alternating currents to the sample to assess tissue resistance over a range of frequencies. This can identify variations in the extracellular and intracellular resistance in tissues that are hallmarks of breast cancer	Users first scan the probe over a patient's normal breast tissue to set its baseline to the patient's specific breast tissue features. ClearEdge thereby relies on this initial feature assessment to determine healthy versus malignant tissue	ClearEdge (LSBioPath, Saratoga, CA)	J. M. Dixon et al.
Optical Imaging for IMA:	Optical coherence tomography (OCT)	OCT is analogous to ultrasound, but uses light waves instead of sound waves to generate high-resolution multi-dimensional images of surface and subsurface tissue structures	OCT produce images with micron-scale resolution, which is at the same level as histopathology	OTIS (Perimeter Medical Imaging, Toronto)	F. T. Nguyen et al.; A. M. Zysk et al.; Erickson-Bhatt et al.
	Nonlinear Microscopy (NLM)	NLM works by mapping two photon fluorescence to visualize nuclear size and shape and second harmonic generation to visualize changes in collagen. The dual detection channels are then merged to produce an image with nuclear and stromal contrast, which a surgeon can interpret intraoperatively to guide their margin assessment	NLM can image ten to hundreds of microns below the tissue surface	No current commercial devices in breast surgery	Y. K. Tao et al.

Table 1 (continued)

Categories	Subcategories	Mechanism	Differentiating factors	Commercial devices (* indicates FDA approval)	Key studies
	Micro-computed tomography (Micro-CT)	In micro-CT a rotating sample is targeted and reduced intensity beams are picked up by a detector. Micro-CT then creates multi-planar, cross-sectional images of the internal structure of lumpectomy samples and shaved cavity margins	It can be used to scan breast specimens with a maximum diameter up to 14 cm and provides high quality images with spatial resolution to less than 1 µm	No current commercial devices in breast surgery	R. Tang et al.; S. Q. Qiu et al.
IMA Technology Using Molecular Imaging:	Optical see-through goggle augmented imaging and navigation systems (OST GAINS)	Indocyanine green (ICG) is an FDA-approved imaging dye that is injected intravascularly prior to surgery and detected by NIR imaging. Solid tumor uptake of many systemic agents such as ICG has been attributed to the enhanced permeability and retention (EPR) effect. OST GAINS are being developed to use in near-infrared fluorescence-guided surgery	The system allows a surgeon to integrate fluorescent-guided surgery into their existing surgical workflow by projecting fluorescent information from the surgical field directly to the user's goggles when needed	No current commercial devices in breast surgery	S. B. Mondal et al.
	Small-molecule fluorescent probes	The LUM015 dye is a protease-activated dye administered prior to surgery which becomes fluorescent when cathepsin, a protease known to remodel a tumor microenvironment, cleaves the peptide. The fluorescent signal is detected by a sterile probe inserted in the surgical cavity	The fluorescent signal is detected by a sterile probe inserted in the surgical cavity, with areas of fluorescence (tumor) displayed on a computer monitor for viewing by the surgeon. The probe captures a 2.6-cm-diameter area of the lumpectomy cavity wall in 1 s, thus allowing the entire cavity to be analyzed in under 1 min	Lumicell Imaging System (Lumicell inc. Newton, MA)	B. L. Smith et al.
	Cerenkov luminescence imaging (CLI)	Positrons traveling at super relativistic speeds in a tissue generate photons which can be imaged via Cerenkov luminescence imaging (CLI). Like a PET scan this has the diagnostic ability to differentiate malignant and benign performance but allows for the compactness of optical cameras allowing it to be used intraoperatively	CLI imaging is done ex vivo once the specimen has been radiographed	No current commercial devices in breast surgery	M. R. Grootendorst et al.