



Nov 13, 2014

## In brief: research round-up

### Raman device diagnoses from inside the body

Product development firm [Cambridge Consultants](http://www.cambridgeconsultants.com/) (<http://www.cambridgeconsultants.com/>) is working with Singapore-based start-up [Endofotonics](http://www.endofotonics.com/) (<http://www.endofotonics.com/>) to create a real-time *in vivo* molecular diagnostic (IMDX) system. The endoscopic device – which comprises a spectrophotometer system, a proprietary fibre-optic probe and a custom software algorithm – uses Raman spectroscopy to identify any cancerous tissue or pre-cancerous changes. Until now, surgeons have had to take tissue samples and wait for the results of lab tests. The IMDX analyses data in real time, providing an almost instant diagnosis during routine endoscopic examinations.



<http://images.iop.org/objects/med/news/9/11/35/pic1.jpg>  
Raman offers early diagnosis (<http://images.iop.org/objects/med/news/9/11/35/pic1.jpg>)

Endofotonics has successfully built two prototypes and used them in trials of over 800 patients with a wide variety of cancer types. Cambridge Consultants is now working to create a commercial product with the necessary regulatory documentation. "We are extremely excited at the prospect of bringing molecular diagnosis into the body," said Florence Leong, CEO of Endofotonics. "The ability to shift disease diagnosis from subjective operator-dependent visual recognition to objective real-time molecular diagnosis will cause a paradigm shift in how diagnosis is made." Cambridge Consultants and Endofotonics are exhibiting at this week's Medica 2014 in Düsseldorf, Germany.

### Proton therapy doesn't always cost the most

A study from the [MD Anderson Proton Therapy Center](http://www.mdanderson.org/patient-and-cancer-information/proton-therapy-center/index.html) (<http://www.mdanderson.org/patient-and-cancer-information/proton-therapy-center/index.html>) has shown that, in terms of treatment duration and cost, patients with early-stage breast cancer may benefit from accelerated partial breast irradiation (APBI) with protons versus whole-breast irradiation (WBI). The researchers used Medicare reimbursement codes to analyse allowable charges for eight different types of therapies available to early-stage breast cancer patients. The cost of proton therapy when used for APBI, introduced to decrease overall treatment time and toxicity, was estimated at \$13,833. The highest charge, \$19,599, was seen for WBI using intensity-modulated radiotherapy. The average across the eight treatment regimens was \$12,784; thus, proton costs

were similar to that of other types of radiation.

Total Medicare Allowable Charges for APBI and WBI							
Protons	APBI				WBI		
	SAVI type	MammoSite type	Linac-based	3DC-FIF	Hypofrac	IMRT	Hypofrac IMRT
\$13,833	\$14,859	\$12,245	\$6,771	\$13,149	\$10,070	\$19,599	\$11,747

Source: MD Anderson Cancer Center

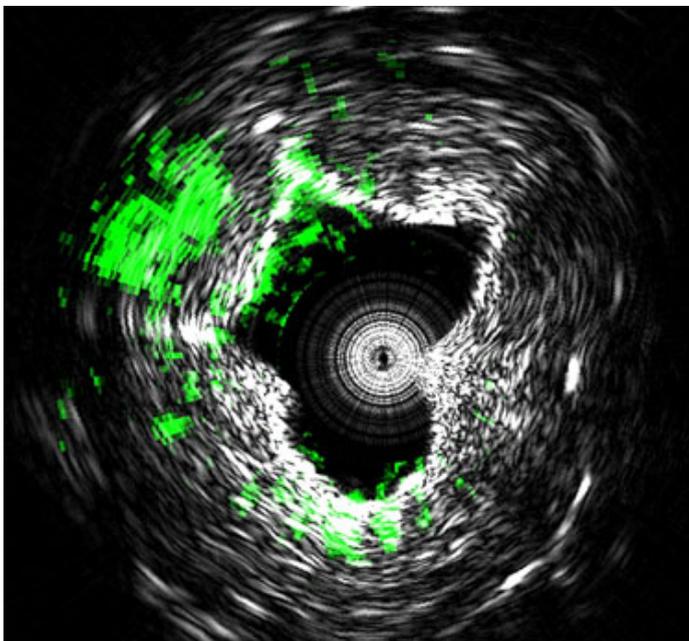
(<http://images.iop.org/objects/med/news/9/11/35/pic2.jpg>)

APBI and WBI: cost comparison (<http://images.iop.org/objects/med/news/9/11/35/pic2.jpg>)

Proton therapy, offered as a type of external-beam APBI, delivers the full radiation dose precisely to the tumour site, eliminating dose to the remaining breast, lung and heart. Research to date has shown effective tumour control, limited side effects and good cosmetic outcomes. "This cost analysis must be interpreted in light of clinical evidence for proton APBI, which while still in nascent stages, is promising," said principal investigator Valentina Ovalle. "The findings counter the presumption that proton APBI is so expensive that even excellent clinical results would be immaterial." Results were presented at the inaugural meeting of the [North America Particle Therapy Co-Operative Group](http://ptcog-na.org/) (PTCOG).

### Intravascular photoacoustics reveals dangerous plaques

US researchers are developing an intravascular photoacoustic system for diagnosing cardiovascular disease. The device works by exposing plaques in artery walls to pulses of near-infrared laser light. This causes the tissue to heat and expand locally, generating pressure waves that are detected by an ultrasound transducer. The resulting 3D images can be used to quantify the amount of lipid deposition inside the arterial wall (a key indicator of plaque vulnerability) and thereby identify deposits that are likely to rupture and cause heart attacks. The system is small enough to be incorporated into an endoscope and does not require samples to be marked with dyes (*Scientific Reports* 4 6889 (<http://www.nature.com/srep/2014/141104/srep06889/full/srep06889.html>)).



(<http://images.iop.org/objects/med/news/9/11/35/pic3.jpg>)

Intravascular photoacoustic image (<http://images.iop.org/objects/med/news/9/11/35/pic3.jpg>)

Previously, intravascular photoacoustic systems suffered from the inability to perform high-speed imaging in tissue. The researchers improved the imaging speed by two orders of magnitude, to 1 s per frame, using a custom-built 2 kHz barium nitrite Raman laser. "This innovation represents a big step toward advancing this technology to the clinical setting," said [Ji-Xin Cheng](https://engineering.purdue.edu/BME/Research/Labs/Cheng) (<https://engineering.purdue.edu/BME/Research/Labs/Cheng>), a professor at Purdue University. The researchers used the device to image intact pig tissue; next they plan to perform research with live animals followed by clinical studies on humans.

## Ten-year data show excellent local control with lung SBRT

Cleveland Clinic (<http://my.clevelandclinic.org/>) researchers have reported on 10 years of experience using stereotactic body radiotherapy (SBRT) to treat medically inoperable, early-stage lung cancer patients. The study included 300 patients with 340 lesions, 15% of whom had multiple treatments. All patients were treated on a Novalis platform, using vacuum-bag immobilization and abdominal compression to limit tumour motion, and received 50 Gy in five fractions delivered over one week. Median follow-up was 17.4 months, with 46.7% of patients alive at analysis. At five years post-treatment, local control was 79.0% for the 115 lesions classified as "central" tumours, and 75.4% for non-central tumours; overall survival was 18.3% and 20.3%, for patients with central and non-central tumours, respectively.

"We have been privileged in demonstrating that lung SBRT can now be considered the standard of care for medically inoperable patients with early-stage lung cancer," said lead author Gregory Videtic, who presented the research at the 2014 [Chicago Multidisciplinary Symposium in Thoracic Oncology](http://www.thoracicsymposium.org) (<http://www.thoracicsymposium.org>). "Since our results indicate no unusual long-term side effects, we are hoping to extend the potential uses of this therapy to more fit, operable lung cancer patients whose cancer has not spread outside of the lung. SBRT could provide a more minimally invasive procedure than surgery, with fewer side effects and improved patient outcomes."

## Novel imaging drug improves prostate cancer detection

A novel molecular imaging drug shows potential to detect and visualize early prostate cancer in soft tissue, lymph nodes and bone, according to a study headed up at [New York Presbyterian Hospital](http://www.nyp.org/) (<http://www.nyp.org/>) and [Weill Cornell Medical College](http://weill.cornell.edu/) (<http://weill.cornell.edu/>). The study compared the pharmacokinetics, biodistribution and tumour uptake kinetics of two Tc-99m-labelled ligands, MIP-1404 and MIP-1405, in six healthy men and six men with radiographic evidence of metastatic prostate cancer. Whole-body planar gamma camera images were obtained at 10 min and 1, 2, 4 and 24 hr. SPECT/CT was also performed, between three and four hours after injection (*J. Nucl. Med.* **55** 1791 (<http://jnm.snmjournals.org/content/55/11/1791.abstract>)).

Good correlation with standard-of-care bone scans was seen in most subjects, although more lesions were visualized with MIP-1404 and MIP-1405 than with bone scans, suggesting that these agents are more sensitive to detecting skeletal or marrow invasion. "This research represents an innovative prostate cancer planar and SPECT imaging technology - addressing unmet clinical need for sensitive and selective imaging of loco-regional and distant metastatic prostate cancer," said lead author Shankar Vallabhajosula. "We also demonstrated that MIP-1404 has favourable pharmacokinetics and biodistribution, which represents a breakthrough in imaging of prostate cancer."

## Related stories

- [Molecular imaging: making moves into the clinic](http://medicalphysicsweb.org/cws/article/opinion/59285) (<http://medicalphysicsweb.org/cws/article/opinion/59285>)
- [Will protons gradually replace photons?](http://medicalphysicsweb.org/cws/article/research/50584) (<http://medicalphysicsweb.org/cws/article/research/50584>)
- [VPA microscopy eyes cardiovascular disease](http://medicalphysicsweb.org/cws/article/research/46711) (<http://medicalphysicsweb.org/cws/article/research/46711>)
- [Digital tomosynthesis guides lung SBRT](http://medicalphysicsweb.org/cws/article/research/55346) (<http://medicalphysicsweb.org/cws/article/research/55346>)
- [Start-up develops prostate PET agent](http://medicalphysicsweb.org/cws/article/research/57174) (<http://medicalphysicsweb.org/cws/article/research/57174>)

## About the author

Tami Freeman is editor of *medicalphysicsweb*.