

## MIR 2014: Radiology - Opportunities or Challenges?



The future, value and direction of radiology was the focus of the Management in Radiology meeting in Bologna last week. Chairman Peter Mildenerger (pictured, right) welcomed delegates to the two day congress, which featured a wide-ranging programme looking at strategy, globalisation, social media, communication and imaging biobanks. A roster of distinguished speakers attended from the U.S., Europe and beyond.

Professor Moshe Graif (pictured below), from Israel, set the scene with a wide-ranging look at the challenges and opportunities for radiology in 2020.

The growth in world population and life expectancy correlated positively with the rate of technological innovation in the last few hundred years. There are two basic types of innovations - disruptive and sustaining. Sustaining innovations are an evolution not a revolution, and tend to get to the point where the product has more performance than the customer needs or can afford. Disruptive innovations are the game changers, and replace an existing product with a simpler more affordable technology or business model. For radiology, the disruptive innovation phase started in the 1970s. As technology approaches the physical limit, now radiology is in the sustaining phase.

The current two major technological limitations of medical imaging are direct tissue characterisation and micro-resolution to enable earlier detection of a lesion, micro-metastases (smaller than 0.2mm) and the free edges of a lesion. Graif observed that technological innovation is the easy part; changing professional habits is harder, as medicine is conservative and usually slow to change and to trust new technologies.

### The Challenges

In vitro diagnostics (genomics, proteomics) is a challenge. Picking up tumours before they are visible has great potential to provide for preventive and preemptive response. In vitro diagnostics is growing more strongly than the medtech and devices market as a whole, thanks to advances in molecular diagnostics etc. The effect on imaging will mean that screening and early detection by imaging is out. However, due to its high sensitivity, in vitro diagnostics will probably increase the necessity for an advanced radiological workup and follow up of lesion site, evaluation of the tumour burden, guided Dg and therapeutic interventions.

A second challenge is affordability. Imaging is the fastest growing segment of medical services, even though it represents less than 5% of total healthcare expenditure. This is due to the increasing cost of imaging technology, growing use, and overutilisation.

Looking back at the "golden age" of radiology, Graif suggested that it was more comfortable for radiologists to pick the easy 'low hanging fruits' trail than providing heavy duty evaluation and reporting. Radiology today operates as a digital tool rather than a quantitative one. Interpretation is a subjective art based on intuition, using manual scoring. He put the question - is it a sign of stagnation and/or under exploitability?

### The Opportunities

Graif does see opportunities for radiology, however, in quantitative and qualitative imaging, further improvements in networking and communication and particularly for interventional radiology. Quantitative imaging will enable objective and quantitative metrics, and thus allow phenotyping and personalisation by imaging the disease in an individual patient or population.

Improved networking and communication will offer active sharing of databases (data anytime anywhere), such as PACS, RIS and IHE. Decision support technology will improve utilisation management by enabling better justification, appropriateness and economically reasoned 'value-based radiology' and 'accountable care.' Telemedicine offers better use of human resources by recruiting and employing radiologists independent of geographical location and time zone. Workflow management will have improved analytic tools to assist in clinical prioritisation, pre-detection of abnormal cases and faster reporting of urgent findings.

Interventional radiology is a great opportunity, being less invasive and less expensive. However, Graif cautioned, it will fuel ongoing turf battles with other clinicians. According to the New York Times, 30% of what used to be accomplished with surgery is now performed with less invasive IR. As IR grows in usage, the operational model will change. It needs to be practised in high cost multi-modality interventional suites, which will be used by multiple disciplines, hence the potential for turf wars. It is both an opportunity and a challenge. The employment model he sees as being "the wandering interventionalist", which will be increasingly interdisciplinary.

The internet of things has medical and healthcare aspects, explained Graif. By 2020 there will be more than 50 billion devices connected to each other.

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other and to the internet, with medical devices being the 3rd largest component. Some imaging devices are becoming peripheral devices, such as smartphone ultrasound, display for remote reading and accessibility, and near-infrared thermography. The U.S. Food and Drug Administration regulates only a small proportion of mobile medical apps. Along with growth in networking and communication is the increase in security accidents and privacy breaches. This is a huge challenge.

Handheld devices Graif sees more as an opportunity than a challenge. Use of low level handheld equipment performed by staff with limited skill and training will generate a trial of imaging follow up studies of necessity performed by experienced radiologists using high end equipment. As the proverb says, "A fool may throw into a well a stone which a hundred wise men cannot pull out".

Innovation in technology will enable personalisation while being somehow less personal, observed Graif, with VOIP (voice over internet) and sight already available and hopefully being joined in the future by palpation over IP and olfactory over IP. The danger is of treating the digital information instead of the patient. The invisible doctor and faceless patient represent the identity crisis of modern medicine, driven by reductionism, digitalisation and objectivism induced by the pure scientific approach.

The automation and digitalisation of the medical art is a huge challenge. Already the IT revolution is inducing a hollowing out of middle income routine jobs. However, automation and autopilot can not perform those tasks that involve perception and manipulation, creative and social intelligence and dealing with emotional situations

Wireless wellness will generate an overwhelming amount of imaging volume, and as radiology is basically an "intuitive art" it will initially increase dependency on radiologists. However, automated autonomous reading systems will be developed to "help" the interpretation process, thus simplifying reading of a significant portion of the work. Non-radiologists may take an increasing role in supervising and providing the basic initial steps by using semi-autonomous imaging processes. This will make the radiologists more invisible, and the risk is that radiologists lose their say and influence on imaging healthcare policies and decision-taking processes.

There will be increased demand for imaging services, despite economic restraints and the advent of new in vitro diagnostic tools. Factors affecting demand include the ageing population, growing chronic diseases and cancer survivors. In vitro testing will create demand for imaging workups. More sensitive diagnostic methods will potentially lead to overdiagnosis. There is a also growing demand in developing countries so far not saturated with imaging services.

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