

## Volume 13 - Issue 2, 2013 - Perspectives

### Medical Technologies -A Glimpse into the Future

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#### Acknowledgements

Sandhya Kamath, *Industry Manager*

(*Health & Wellness*) Darshana De

*Industry Analyst (Medical Devices & Imaging)*

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#### Could You Briefly Describe the TechVision 2020 Research Process?

This research unveils 50 technologies that are set to dramatically transform industries, strategies and businesses. The selected technologies are spread across nine sectors – Sensors & Control, Materials & Coatings, Clean & Green Environment, Information & Communication Technology, Microelectronics, Sustainable Energy, Health & Wellness, Medical Devices & Imaging Technology, Advanced Manufacturing & Automation – and represent the bulk of R&D and innovation activity today.

This annual body of work is increasingly focused on deciphering the underlying impact of the top 50 technologies in shaping our tomorrow. “Therefore, apart from identifying the top 50 technologies for 2013, our global technology team has identified various convergence opportunities (e.g. self-healing artificial organs, Interactive Augmented Reality-enabled predictive remote patient monitoring etc.) enabled by a combination of the technologies. We believe these identified opportunities represent the exciting times ahead for the multitude of industries and markets they will impact.

TechVision 2020 showcases each selected technology, closely assessing the potential of a given technology platform to understand the true market opportunities, while evaluating the riskreward elements. It appraises technology maturity and adoption ratings, possible year of impact and patent landscape, examines private and government funding trends, and explores future technology and application roadmaps.

And more interestingly, the output assesses future convergence opportunities as well as the next waves of innovation that will have lasting impact on industries and markets.

#### What are the Most Innovative Health & Wellness Technologies in 2013?

Personalised medicine aims to characterise disease at different levels and evolution stages to target specific genes or molecular pathways. Diagnostic tests and therapeutic drugs continue to merge under the term of companion diagnostics, resulting in marketing a particular test with a corresponding drug or treatment. More clinical trials working with a specific group with genetic similarities are expected to considerably diminish side effects and contraindications.

Individually customised therapy benefits not only the patient’s health. Physicians can prescribe a better therapy, regulatory authorities can assess the process in a more precise manner, payers benefit through more efficient use of available resources by potentially reducing the number of additional or ineffective treatments.

#### And the most Innovative Medical Devices and Imaging Technologies in 2013?

Breast cancer is one of the most common cancers among women. Currently, deaths due to the disease are much higher than those caused by any other form of cancer. Through awareness about regular screening procedures have helped in reducing this number by almost 20%, interest has always remained in innovative imaging procedures with the ability to diagnose the disease at the earliest possible stage.

Mammography has been one of the most successful diagnostic tests for the early detection of breast cancer. However, the procedure has its own challenges as the female breast is composed of different types of tissues and two-dimensional imaging cannot always produce an accurate representation of the three-dimensional tissues.

Breast tomography or 3D mammography has helped in addressing this issue to a greater extent. It does not exactly replace breast mammography but is performed along with mammography as an adjunct procedure. The x-ray arm of the device takes several pictures of the breast at different angles which later is combined to produce a 3D image of the breast at the radiologists' workstations. The picture is more detailed and can provide finer details about the breast. Data collected from breast tomography clinical tests have indicated that tomosynthesis increases the cancer detection rate, which consequently reduces patient callbacks quite significantly.

#### **What Emerging Convergence Opportunities are There for Medicine?**

Cloud based systems that can cost-effectively handle large volumes of biological data are being developed and this is the best example of an upcoming convergence area (Healthcare and IT). With the increase in throughput and reduced costs/base and costs/run, next-generation sequencing is likely to become more widely used in a number of research labs and diagnostic labs. Pharma companies will also use sequencing data during clinical development to guide the entire process and work on a personalised medicine approach. Since all labs do not have the infrastructure to store data in their servers or set up a bioinformatics division, there are a few cloud based data storage software that have been recently developed. However, much more needs to be done in this aspect to develop more publicly available data repositories and tools that will simplify the entire data storage and exchange process.

#### **Healthcare Systems Face Two Major Challenges: 1) Increasing Costs and Limited Budgets and 2) Ageing Population, Increase in Chronic Diseases. How are Innovative Technologies Meeting this Challenge?**

One example is the advent of OMICS technologies and tests based on biomarkers: Predictive and/or screening tests that can help early diagnosis have been introduced in several countries, which help in informed decision making and also reduce healthcare costs in the long-run.

#### **Medical Imaging was Identified by the New England Journal of Medicine as One of the Top Developments in Clinical Medicine in the Last Millennium. What do You See as the Leading Development in Medical Technology in the 21st Century so Far?**

Hybrid imaging is seen as one of the leading developments in medical technology. Hybrid imaging is defined as the fusion of two or more imaging technologies into a single form of imaging. Ideally, this mode of imaging is considered to be most powerful, more powerful than the individual modalities. Some of the hybrid imaging modalities may be used to illustrate only anatomical details, and more and more hybrid imaging modalities are being used to explore in vivo molecular processes rather than anatomical details. Some of the hybrid modalities that are now in existence include ultrasonography (US)/magnetic resonance (MR) imaging, computed tomography (CT)/angiography, MR imaging/angiography, etc. Researchers believe that the potential for hybrid imaging is immense and in future it can be used for the development of personalised medicine.

#### **Can You Identify Trends in Medical Devices and Imaging Technology Innovation? What's Driving these Innovations?**

There is a clear trend towards molecular diagnostic and imaging technologies. More and more imaging technologies are focusing on the spatiotemporal distribution of molecular and cellular processes for diagnostic and therapeutic applications. The bottom line is to detect the disease at the cellular level to prevent its occurrence at macroscopic level.

#### **Imaging is an Easy Target in Healthcare Budgets, as the Costs are Easily Seen and have Rapidly Increased Over the Last Few Decades. How can Industry Work with Clinicians to Prove the Benefits and Value of Medical Imaging?**

OEM vendors are now focusing more on the clinical benefits of the imaging modalities. Manufacturers need to be more innovative in order to provide accurate, reliable and end-user friendly equipment. The current trend is towards streamlining workflow procedures so that patient turnabout rate can be increased. Another focus is on the use of big data to improve healthcare delivery. Healthcare big data requires advanced algorithms for effectively processing the data with tolerable speed so that hospitals and medical centres can collect, search and share data without compromising on security. Hospital big data analytics can be implemented for enhancing hospital operations, tracking

outcomes of clinical and surgical procedures, tracking patient history etc.

#### **Do You Think Enough is Being done to Educate Patients and Society about Innovative Medical Technologies?**

Patient-resource websites play a key role in the adoption of new innovative medical imaging technologies. Most medical imaging companies have a page on their website dedicated to patient imaging, covering issues such as who needs a particular medical imaging procedure for which type of medical disorders.

#### **Are Barriers to Innovation such as Pressures on Reimbursement, Economic Recession, Concerns Over Diagnostic Radiation Hampering Innovation in Medical Technology?**

To a certain degree such factors are acting as challenges for medical imaging innovations. However, at the same time, there are funding bodies (government or private) that are financing the development of healthcare technologies. Healthcare technologies and IT developments have

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always remained the top priority of all developed and developing nations. Economic recession and reimbursement cuts have definitely impacted the healthcare industry, but manufacturers have started focusing on streamlining workflows with their imaging solutions within hospital environments so that hospital turnover can be increased. Also with the increased concern over diagnostic radiation issues, many companies are now working on low-dosage high-contrast image generation.

#### **What's on the Horizon for Medical Imaging?**

The trend is towards molecular imaging where the bottom line is to detect at the microscopic level before the disease starts to manifest at the macroscopic level. Imaging has progressed from displaying anatomical shapes to describing the internal functions of the main organs. Medical imaging is progressing towards more improved disease management along with personalised treatment. In the future, there is will more predictive diagnosis and personalised medicine for the prevention of chronic diseases.

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