

# Present Realities and Future Trends in Medical Electronics and Medical Technology

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# The Medical Technology Market

- \$120 bn annual market
- Drivers include:
  - an aging population living longer, often with chronic diseases
  - health care providers' drive to increase the quality of care and decrease the overall cost;
  - vast improvements in medical technology through miniaturization and information technology

# The Medical Technology Market

- Foundation for much of today's market has been the semiconductor industry:
  - embedded technology (specifically, chips designed for use inside of devices) and
  - microfluidics/micro- electromechanical systems (MEMS)

# Themes for Present & Future

- Wireless Technologies
- Imaging Technologies
- Neurology
- Cardiovascular
- Diagnostics
- Future Trends

# Wireless Technologies

- In-body wireless health monitoring
- Emphasis on ultralow-power RF technologies for cameras that can be swallowed and
- Devices that can be implanted

# Wireless Technologies



m-Health allows for wireless monitoring of a variety of distributed sensors and devices. The blue pager-sized device receives and interprets Bluetooth signals, converting them to GSM or GPRS before sending over the Internet for remote monitoring. (IBM)

# Imaging Technologies

- Novel imaging modalities
- Improving existing modalities
- Improved sensors and scanners
- Real time sensing
- Chemical and molecular sensing
- Non-invasive imaging
- Surgical planning

# Neurology

- Neuropathic pain management using novel implantable and wireless technologies for neuromodulation
  - Back pain
  - Post-surgical pain
  - Patient empowerment
- Treatment of alternative illnesses including epilepsy, incontinence, Alzheimer's and Parkinson's Disease (DBS), spasticity
- Neurostimulation market \$3.8bn in 2010

# Cardiovascular

- The “hottest” space in med tech?
- Drug-eluting stents
- Artificial hearts
- Ventricular assist devices
- Monitoring
- Pacemakers
- Implantable cardioverter defibrillators (ICDs)
- \$8.3 bn market in 2005 (J.P. Morgan) for interventional cardiology

# Diagnostics

- Personalised medicine
- DNA and Protein Microarrays
  - CMOS
  - Optical
- Lab On A Chip
  - Rapid detection
  - Multi-analyte; Multi-plexed
  - High Throughput and High Content Screening
- Non Invasive, Continuous Measurement on Whole Body

# Future Trends

- Application of semiconductor technologies to medicine – biosensors and biomarkers
- Wireless technologies – in body monitoring
- DSP architectures – portable non-invasive diagnostic and monitoring equipment
- Rapid diagnostics and biosensors
- Drug delivery
- Medication tracking
- Internet tracking of physiology
- Surgical planning and automation