Applications of Imaging Technologies in Transforming Medicine

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GE Healthcare:
A Unique Collection Of Expertise…

Technologies

Bio-Sciences

Information Technology

Imaging and Intervention

Molecular Diagnostics

Pharmaceutical Solutions

imagination at work
The Two “Whats” of R and D

What if ??

So What ??

It’s the transition that’s the hard part.........
# The Burden of the “Big 6”

<table>
<thead>
<tr>
<th>Disease</th>
<th>US Cost</th>
<th>Disease</th>
<th>US Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac disease</td>
<td>~$400+B</td>
<td>Breast cancer</td>
<td>~$15+B</td>
</tr>
<tr>
<td>Alzheimer's disease</td>
<td>~$100+B</td>
<td>Diabetes</td>
<td>~$132+B</td>
</tr>
<tr>
<td>Colon cancer</td>
<td>~$14+B</td>
<td>Lung cancer</td>
<td>~$5+B</td>
</tr>
</tbody>
</table>

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**Improving patient care and healthcare economics**
The Changing Health Agenda

WHO predicts 35 million deaths from chronic disease in 2005. 80% in low-mid income countries.

We need tailored global health strategies to manage and limit the impact of these epidemics.

The challenge of Chronic Disease:

- Cardiovascular diseases: 17.5
- Cancer: 7.6
- Chronic respiratory diseases: 4.1
- HIV/AIDS: 2.8
- Other: 1.6
- Other: 0.8

Source: WHO Preventing Chronic Diseases October 05
Confronting the “Big 6”

- Cardiac disease
- Alzheimer’s disease
- Colon cancer
- Breast cancer
- Diabetes
- Lung cancer

✓ Finding disease earlier
✓ Leveraging the power of
  - Biology
  - Chemistry
  - Physics
  - Engineering
  - Genomics
  - Informatics
Colon Cancer
Cardiovascular Disease
Lung Cancer
Alzheimer's Disease

Normal

Alzheimer's

$^{18}$FDG

$^{11}$C PIB
Amyloid Agent

Alzheimer’s Disease
On the road to better healthcare

Three clinical situations

Can find disease, can find patient

Find disease, probably find patient

Probably find disease, can’t find patient
Can find disease, can find patient

Tomo Mammo

Colonography
Can find disease, probably find patient

Diabetes

Cardiovascular Disease
Can probably find disease, can’t find patient

Alzheimer’s Disease

Lung Cancer

18FDG

11C PIB
Amyloid Agent
Throughout the history of the world, 50% of people who have reached 65 years old, are alive today

We need to find this patient…
1.3 billion smokers worldwide of which 44 million are in the US

We need to find this patient…
In vitro and in vivo diagnostics are crucial to earlier and better health.
So, what does this imply for educational and manpower needs?

**Electrical**

Analogue – the world is really analogue.....

System – “a system used to be a bunch of boards, now it’s a universe on a chip”

**Biomedical**

“cell to chip to console to clinic”

**Industrial**

making ‘it’ is becoming an increasingly difficult
So, what does this imply for educational and manpower needs?

**Scientists**

Chemists
  - Medicinal
  - Analytical

*Radiochemists*

Physicists
  - Materials science

*Health Physics*

Mathematics
  - Bioinformatics
  - Image analysis / Signal analysis

*Epidemiology and Clinical Trial design*
Bringing about this transformation in Healthcare is **not** just about the ‘hard sciences’

There are other *Educational* skill sets that are needed:

- Health Economics
- Macroeconomics
- (science literate) Public Policy
- Experimental Medicine
And finally, there are some non-educational (but trainable..) skill sets that are crucial to success

- Translator
- Work in a team