Prediction is difficult, especially about the future

Niels Bohr, 1885-1962
Traditional trial-and-error method of care is no longer acceptable

The occasional result: sub-optimal treatment, prolonged periods of trial and error, medical noncompliance, and increased cost—factors that can increase patient morbidity and mortality
In spite of all the money and effort devoted to biomedical research, the outcomes are not very satisfying.

<table>
<thead>
<tr>
<th>Category of Disease</th>
<th>% who respond to therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analgesics for pain (Cox-2 inhibitors)</td>
<td>80%</td>
</tr>
<tr>
<td>Asthma</td>
<td>60%</td>
</tr>
<tr>
<td>Cardiac Arrhythmias</td>
<td>60%</td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>60%</td>
</tr>
<tr>
<td>Migraine (acute)</td>
<td>52%</td>
</tr>
<tr>
<td>Migraine (prophylaxis)</td>
<td>50%</td>
</tr>
<tr>
<td>Rheumatoid Arthritis</td>
<td>50%</td>
</tr>
<tr>
<td>Osteoporosis</td>
<td>48%</td>
</tr>
<tr>
<td>HCV</td>
<td>47%</td>
</tr>
<tr>
<td>Alzheimer’s Disease</td>
<td>30%</td>
</tr>
<tr>
<td>Oncology</td>
<td>25%</td>
</tr>
</tbody>
</table>

Patient response rates to a major drug in selected categories of therapy

Source: Physicians’ Desk Reference
What does the consumer want?

• High quality
• Reasonable cost
• Delivery as fast as possible
• Minimal inconvenience
• Access to care with the latest technology
• Reduced risk
• Confidence and trust
...and they are being ‘educated’ by the media
What does the patient’s treating physician want?

**Help!**

- Fast and accurate results
- Understandable and useful information
- Direction on therapy
- Low costs--may not be as important
Market demand and emerging technologies are accelerating the shift to “Precision” medicine

- Provision of care for diseases which can be precisely diagnosed and subsequently treated with predictably effective rules-based therapies
  - Precision technologies driving the disruption of existing healthcare business models
  - *Precise diagnosis must precede predictably effective therapy*

- Requires technology progress on two fronts
  - Understanding the cause of disease
  - Ability to detect those casual factors

Source: Christensen/Hwang
It took centuries of significant events to get us to this point.

- Leeuwenhoek observes “little animals” under microscope in 1670.
- Jenner administers smallpox vaccine in 1770.
- Pasteur explores Germ Theory of Disease in 1820.
- Ehrlich introduces the acid-fast staining technique in 1870.
- Koch proves Germ Theory with discovery of B. anthracis in 1870.
- Reed proves mosquitoes are vector for yellow fever in 1870.
- Lister adopts antiseptic technique in surgery in 1870.
- Semmelweis proposes handwashing to prevent spread of disease in 1870.

The cost of diagnosing and treating infectious diseases has declined 5% per year since 1940.

Source: Christensen/Hwang
Today, Cancer is experiencing a similar shift toward precision medicine.

Precision medicine is at the core of personalization.

Source: Mara Aspinall, Genzyme
Diagnostics and knowledge integration are the critical links to the success of personalized medicine.
Industry recognizes the opportunity and are willing to work with anyone.

Are diagnostics the new wonder drug on Wall Street?
The value of traditional pathology has not diminished. It simply is no longer be sufficient.
Pathology *will* assume a critical role in health care delivery.

**Pathologists**

- Have a unique knowledge of disease processes
- Are knowledge integrators
- Can get access to all the diagnostic data necessary
- Are responsible for the testing that is driving therapy
Vision of Pathologists

Pathologists are physicians who take an active role in patient care, utilizing all available tools to integrate and interpret diagnostic information to provide an accurate diagnosis of disease. Pathologists work closely with other members of the medical team to assess the patient condition and prognosis in order to determine optimum therapy alternatives.
Re-assess your tool kit—all diagnostic tools are available to you

- Acknowledge market forces driving changes in practice of pathology
- Be life long learners
- Expand beyond the tissue on the slide
- Investigate new Dx tools that will bring value to your patients
Expand your sphere of influence; take the central role in the treatment team

• Market your services for consults
  – Establish and advertise an open door policy
  – Invite your clinician peers to meet with you to review slides, case histories and interpretations

• Take a more active role in influencing prognosis and treatment; Communicate!
  – Identify and sponsor educational opportunities that demonstrate integration of pathology and the rest of the treatment plan
  – Collaborate with others providing diagnostic data
  – Bring new Dx solutions to the table; educate your clinician peers on the incremental value to patient care

• Go see patients
  – Actively participate in patient grand rounds
  – Review charts and talk to the attending physicians