Careers for Physicists in

Medical Diagnostics & Devices







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Outline

- Medical Diagnostics
- Abbott Diagnostics
- Private Sector R&D
- Systems Integration
- Advice
- Questions Please interrupt me!

What is Medical Diagnostics?

Information to guide treatment

What is Medical Diagnostics?

Guide medical treatment decisions

- Detecting Diseases/Infections
 - Hepatitis, HIV, Syphilis, Chagas, Ebola
- Measuring chemical concentrations in body fluids
 - Glucose (Diabetes)
 - Cholesterols (Heart Disease)
 - Hormones (Cancer, Pregnancy, Cardiac, Development)
 - Na, K, Ca (Organ failure, diet)
- Blood cell assesment
 - Red blood cells counts (anemia)
 - Immune reaction monitoring
- Monitor drug levels during surgery or treatments

Immunoassays

Use antibodies to detect specific chemicals/proteins

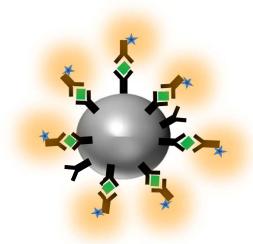
Chemical to detect



Antibody



Labeled Antibody



Immunoassays Yesterday and Today

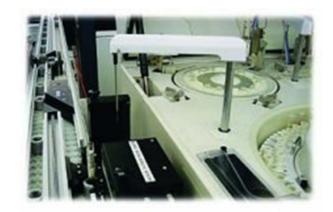
40 years ago

- Expensive
- Slow
- Labor-intensive
- Unreliable



Today

- Cheap
- Fast
- Automated
- Reliable



Abbott Accelerator Video

Medical Diagnostics at Abbott

- Automated devices (hundreds of tests per hour)
- Point of Care devices (at patient location)
- Informatics (global disease monitoring)

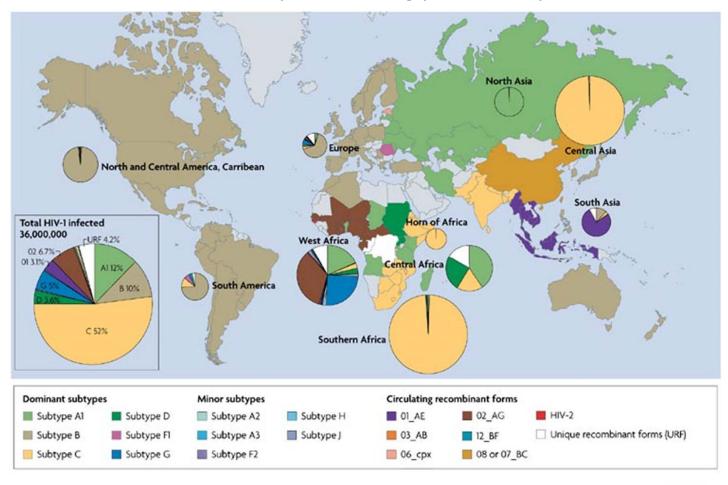


1985 – Abbott developed the first licensed test for HIV ~2000 – 100% U.S. blood supply screened by Abbott PRISM 2015 – Developing rapid tests for Ebola

Global disease monitoring

HIV subtype distribution

Continuously monitoring patient sequences

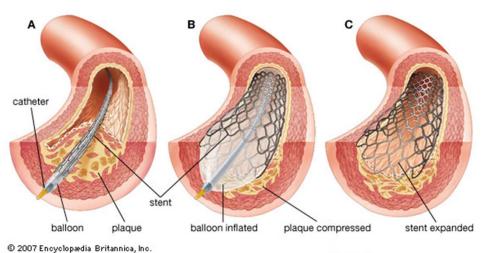


Nature Reviews | Microbiology

Other Medical Devices at Abbott

- Vascular
 - Self-expanding, bio-absorbable stents
 - Drug eluting stents and catheters
 - Coronary guide wires





- Optics
 - iLASIK
 - Glaucoma implants
 - CATALYS system for cataracts surgery



What am I doing now?

Systems Integration Specialist in Medical Diagnostics

What is Research & Development

Research

Development

Discovery	Intellectual Property	Product Design	Product Development	Operations
Prior art				Market
Similar to academic research. Publish in scientific journals. Often involves buying startups	Write patents. Research ideas and existing products	Core R&D Creating marketable products and making them function	Refine products, improve reliability, repeatability, ease-of-use. Make it the best product on the market	Maintain and improve existing products. Keep up with new diseases. Troubleshoot new problems as they arise

What is Research & Development

Research Development I work here **Product Product** Intellectual **Operations** Discovery Development Design **Property** Prior art Market Similar to Core R&D Refine products, Maintain and Write academic Creating improve improve existing patents. Research marketable products. research. reliability, Publish in ideas and products and repeatability, Keep up with ease-of-use. scientific journals. making them new diseases. existing Often involves products function Make it the best **Troubleshoot** new problems as buying startups product on the market they arise I feed back

over here

What do I do?

Systems Integration

Integrating all components of the instrument

I solve problems and improve existing instruments

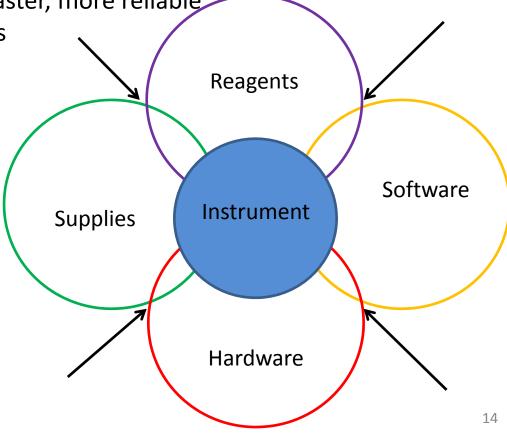
• New tests are more sensitive,

Improvements make tests faster, more reliable

Customers do strange things

Who do I work with?

- Biochemists
- Organic chemists
- Electrical Engineers
- Bioengineers
- Computer Programmers
- Customer support
- Marketing



Why Medical Diagnostics?

Rewarding

- Developing instruments that save and improve millions of lives
- Working for a company that isn't evil

Autonomy

- Flexible "9-5"
- Organize my own time
- Set my own goals

Faster pace

- More projects
- Faster project turnover

Life-work separation

- I rarely bring work home
- Bosses do not email requests on nights and weekends

Great compensation

Vacation, retirement, parental leave, continued Ed support

Potential downsides

- Not doing cutting-edge science
- Business considerations drive decisions

Advice for now

- Develop technical skills in grad school You have...
 - Time
 - Access to classes
 - Access to experts in many fields
- Do an internship
- Practice communication
 - This is the most underappreciated skill of PhDs
 - Speak about your research as often as possible
 - Learn to make good graphs

Advice on applying for jobs

- Network (cliché, but this is how you find jobs)
- Career Center
- Research the field
 - Figure out what you want to do
 - and why
- Sell your skills

(They don't know what Physicists do)

- Software/Programming
- Data analysis
- Instrumentation
- Electronics

Extra Slides

Biography

- BS Physics, Hope College 2002-2006
 - Nuclear Physics Research
- PhD Physics, University of Illinois 2007-2014
 - Biophysics Research
- Abbott Labs Diagnostics Division, April 2014-Present
 - Systems Integration