

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)
 - Cholesterol (Heart Disease)
 - Hormones (Cancer, Pregnancy, Cardiac, Development)
 - Na, K, Ca (Organ failure, diet)
- Blood cell assessment
 - Red blood cells counts (anemia)
 - Immune reaction monitoring
- Monitor drug levels during surgery or treatments

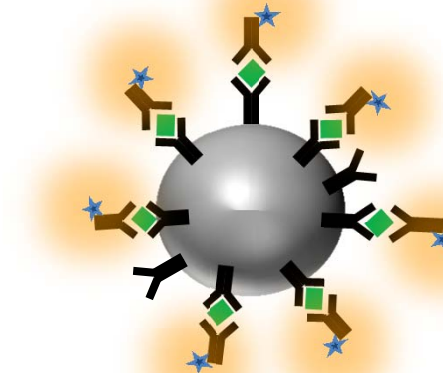
Immunoassays

Use antibodies to detect specific chemicals/proteins

◆ Chemical to detect

Y Antibody

Y* Labeled Antibody



Immunoassays Yesterday and Today

40 years ago

- Expensive
- Slow
- Labor-intensive
- Unreliable



Image from www.sri.com

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)

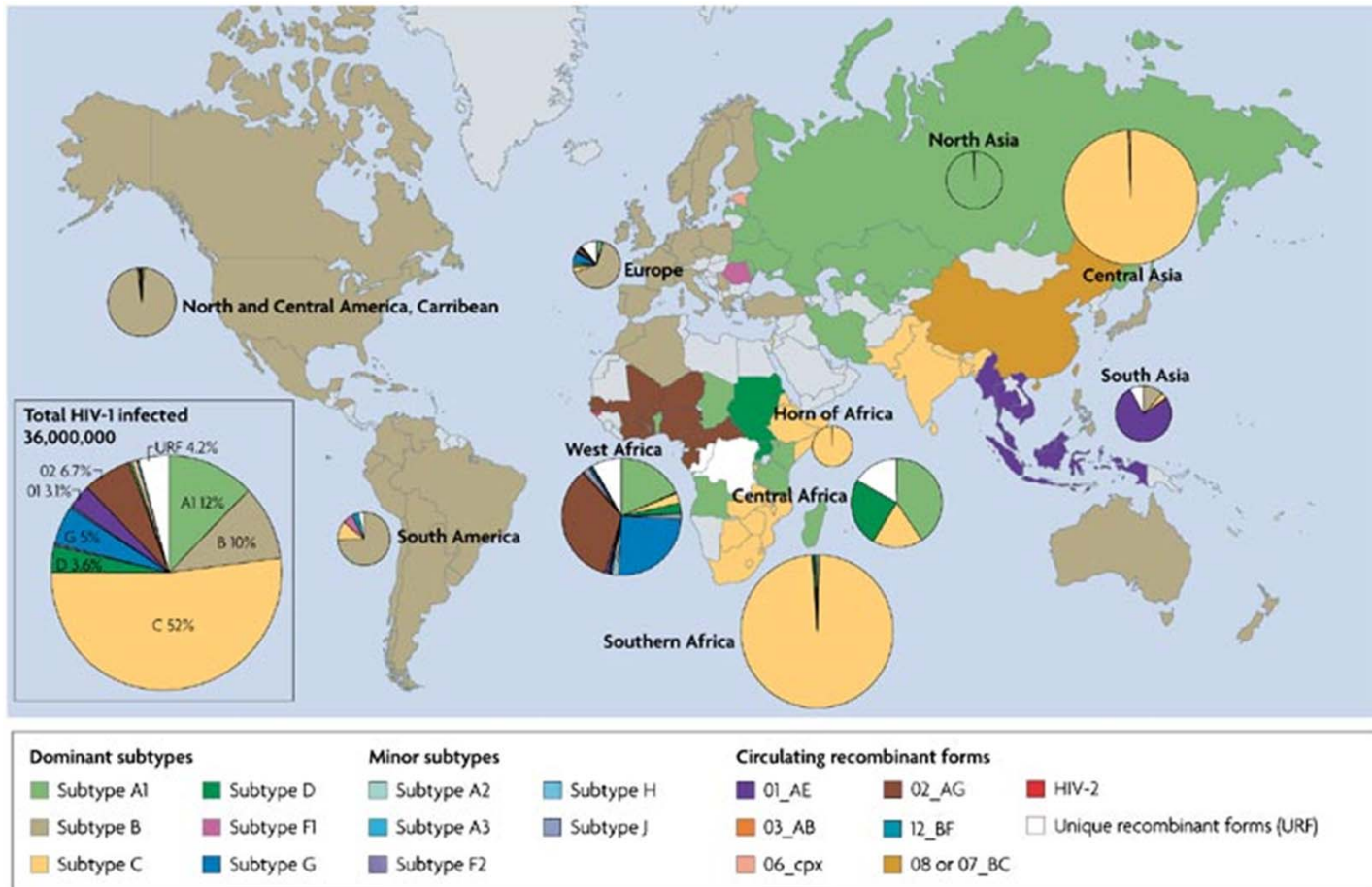


1985 – Abbott developed the first licensed test for HIV
~2000 – 100% U.S. blood supply screened by Abbott PRISM
2015 – Developing rapid tests for Ebola

Global disease monitoring

HIV subtype distribution

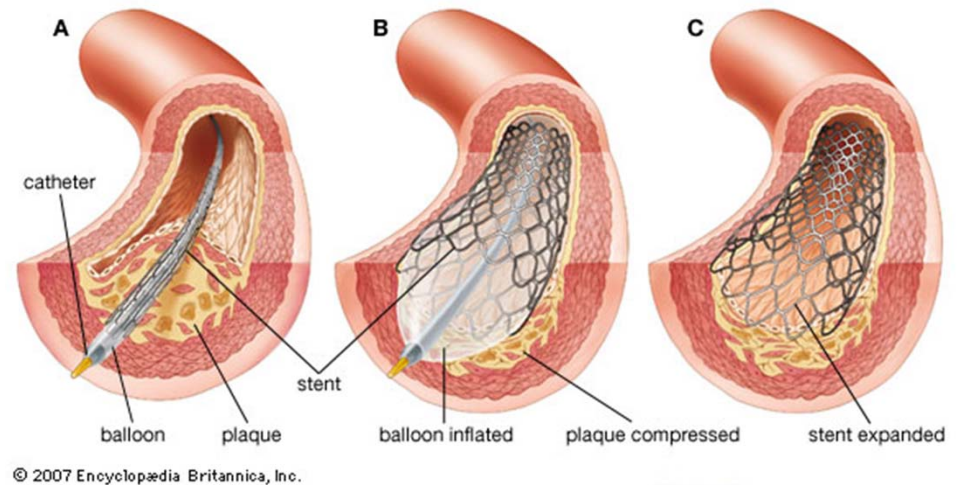
Continuously monitoring patient sequences



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

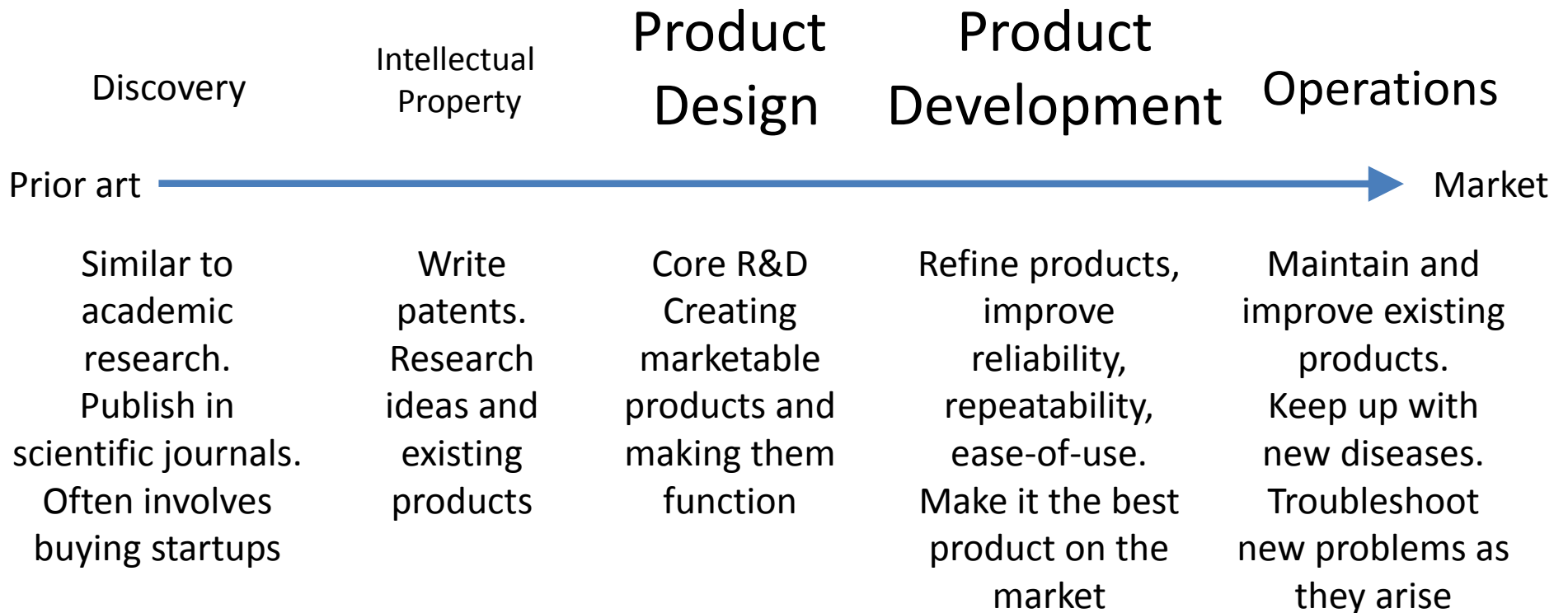


What am I doing now?

**Systems Integration Specialist in
Medical Diagnostics**

What is Research & Development

Research Development

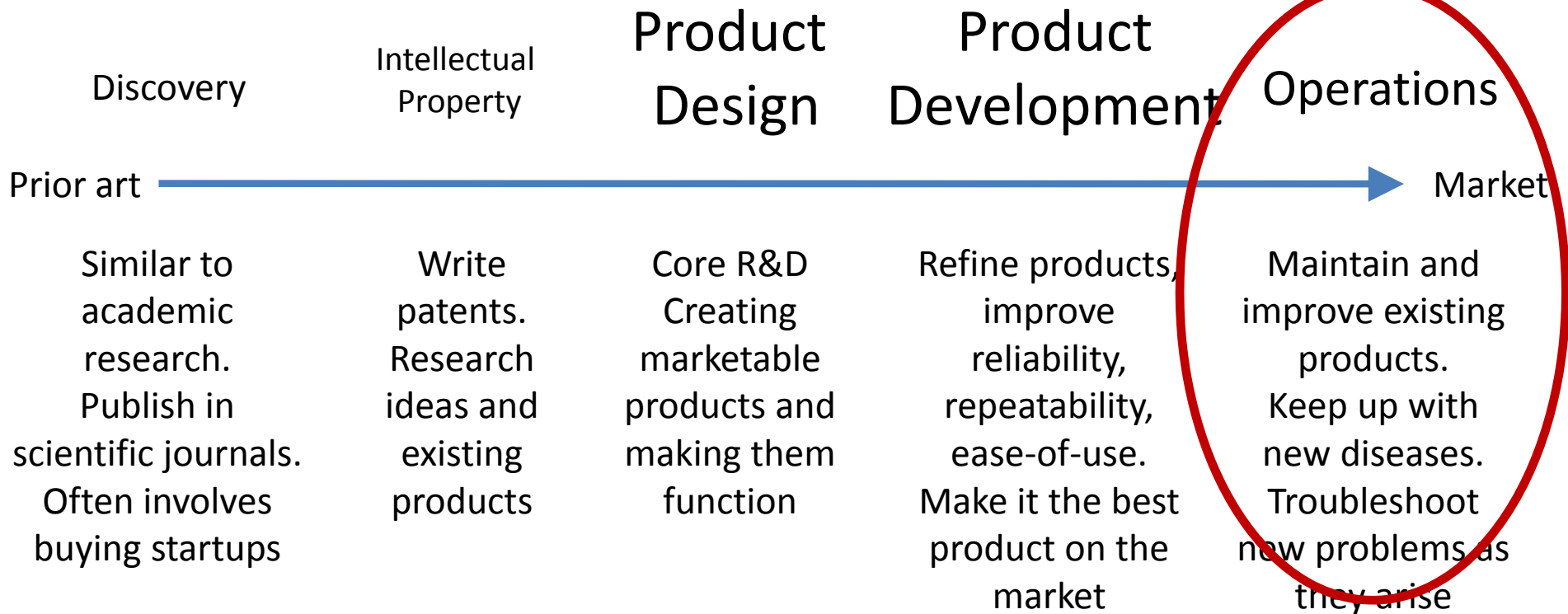


What is Research & Development

Research

Development

I work here



**I feed back
over here**

What do I do?

Systems Integration

Integrating all components of the instrument

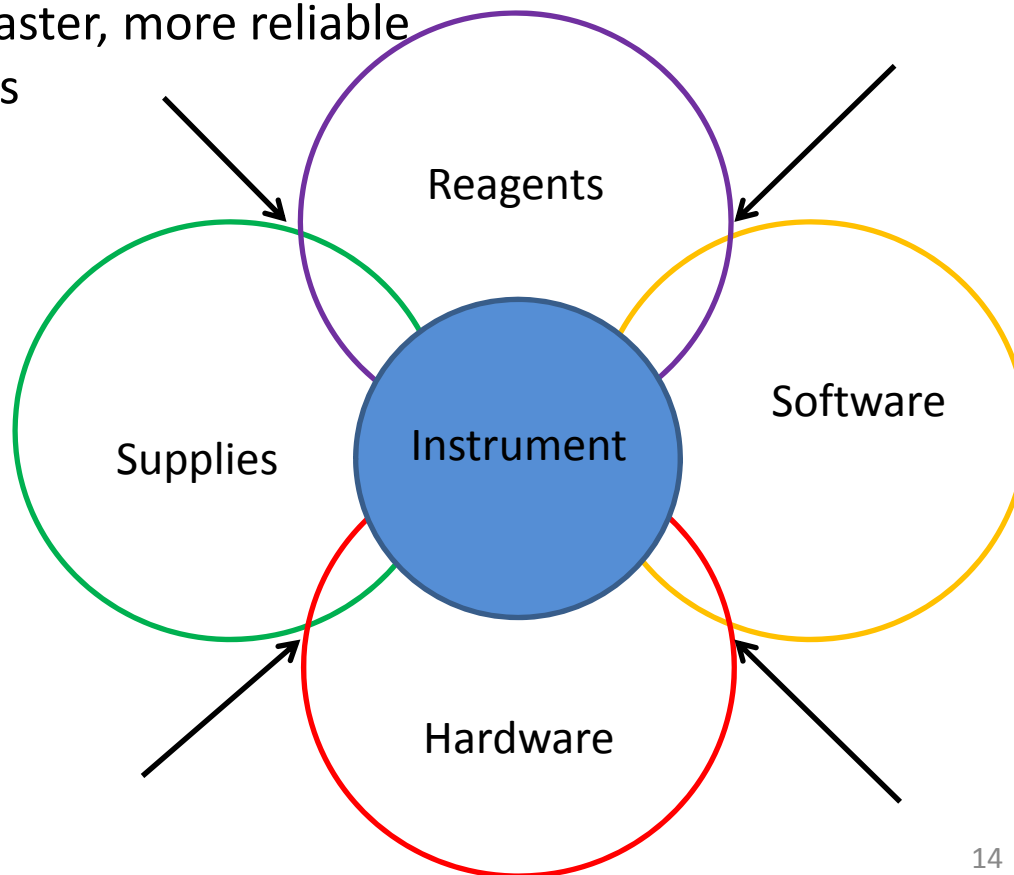
I solve problems and improve existing instruments

- 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