Critical Path Research: Getting New Technology from Bench to Bedside
A Device Perspective

FDA Science Board
November 5, 2004

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Director, CDRH

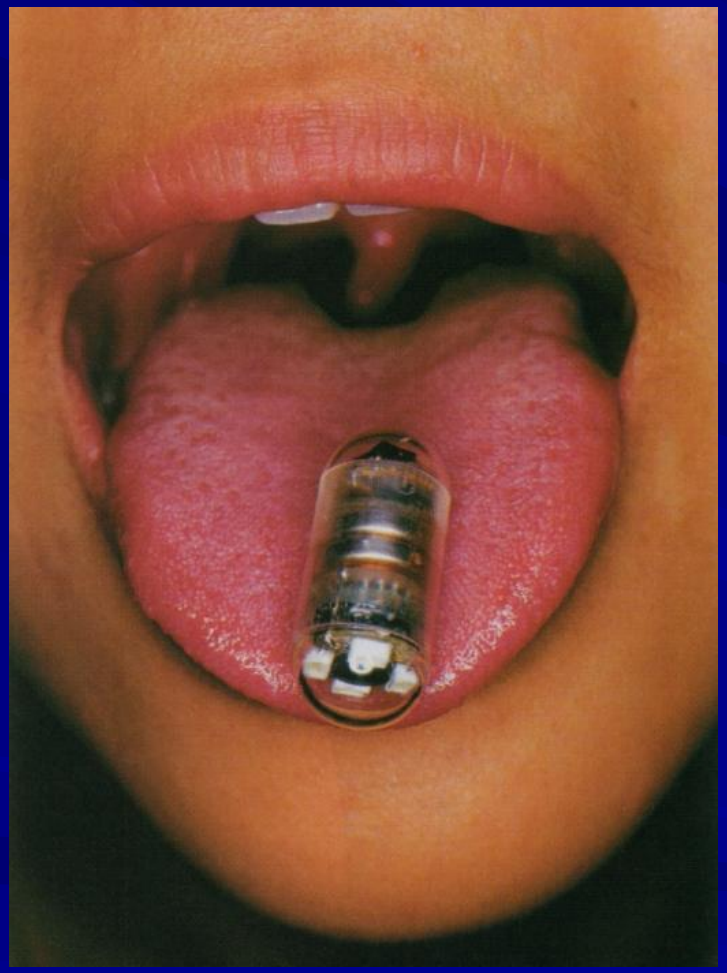
Role of FDA

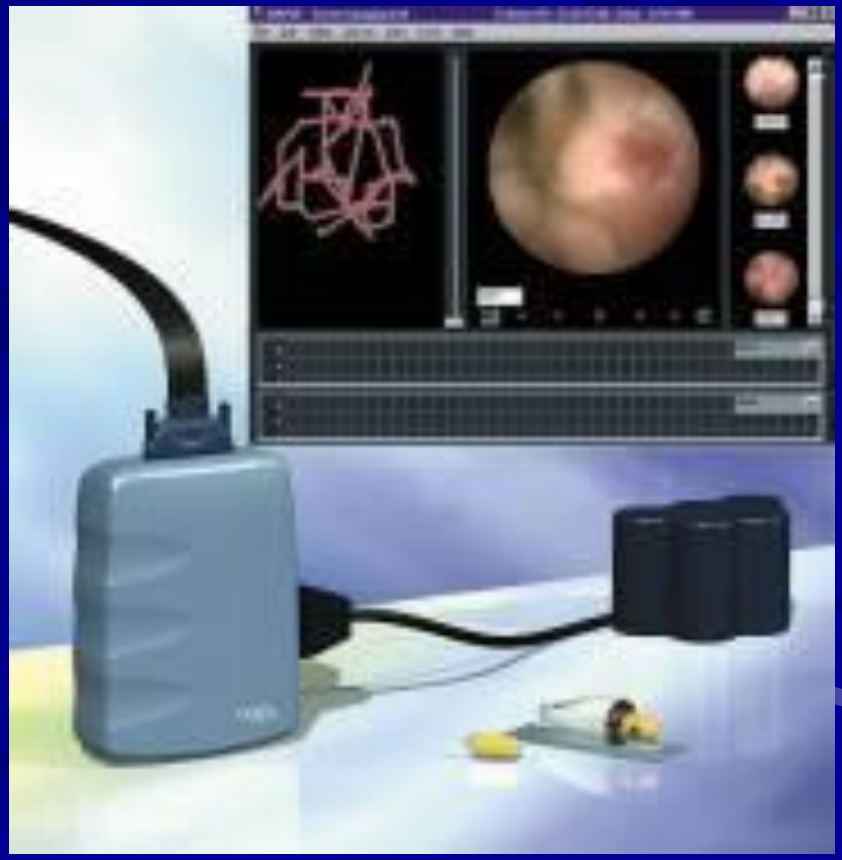
Establish ***reasonable*** assurance of the safety and effectiveness of medical devices marketed in the U.S.

C·D·R·H Center for Devices and Radiological Health

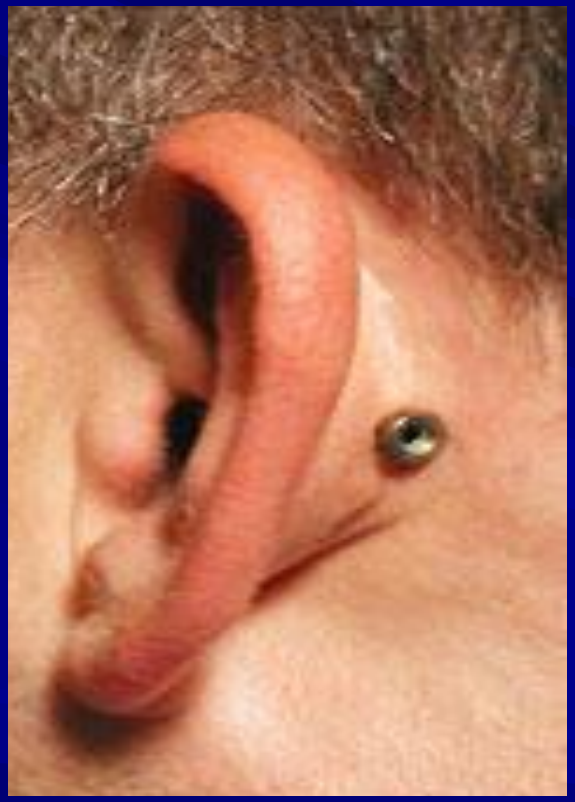
What is a “Device”?

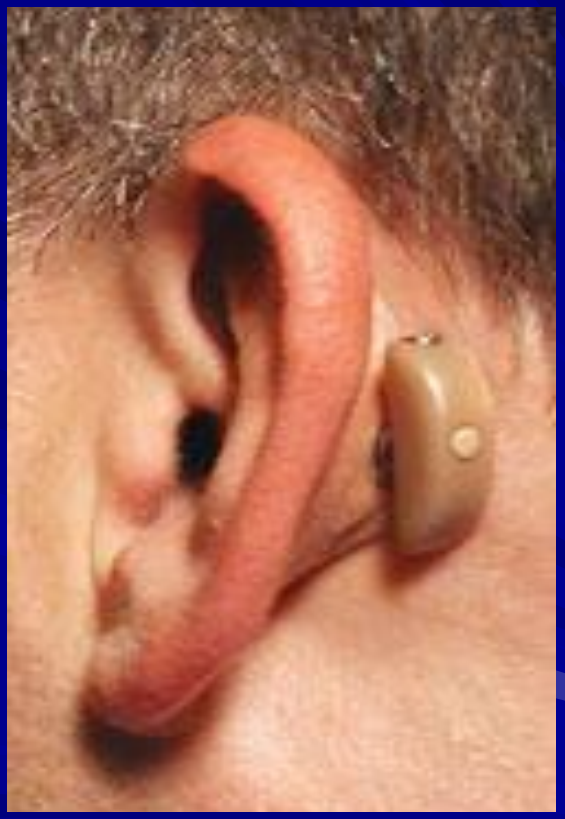
A Computer You Can Swallow





A Computer That Helps You Hear

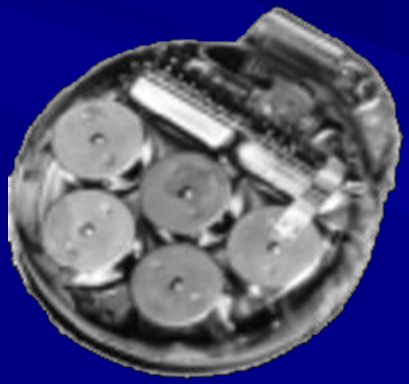




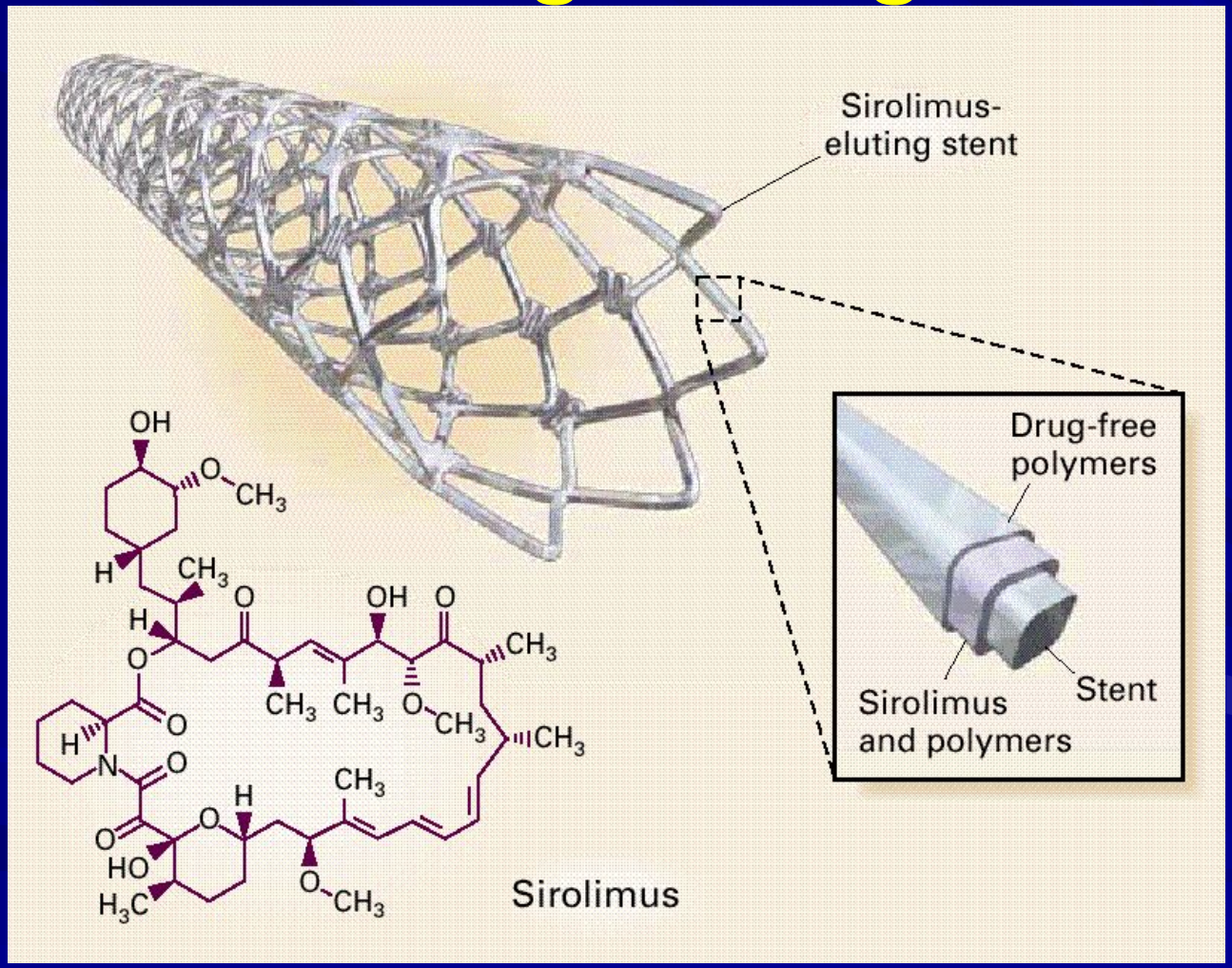
Devices that Measure Glucose Levels and Deliver Insulin to "Communicate"

Miniaturized Electrical Stimulators

Pacemakers



Drug-Eluting Stents



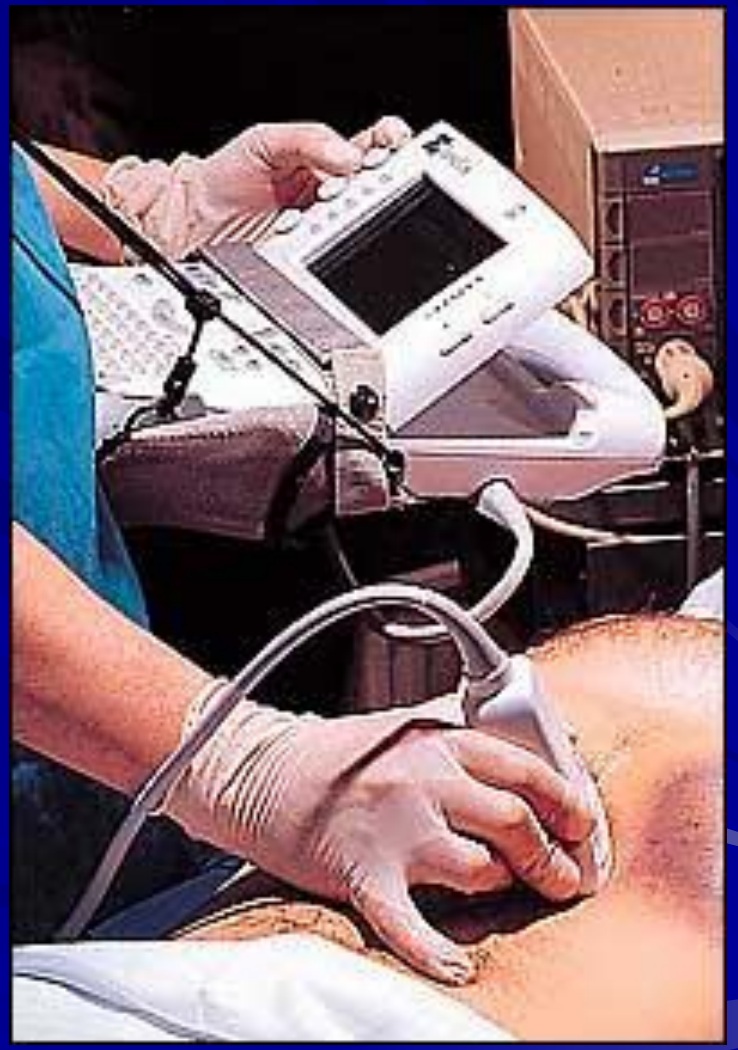
Components

- **Stent Platform & Delivery System**
- **Carrier(s)**
- **Drug**

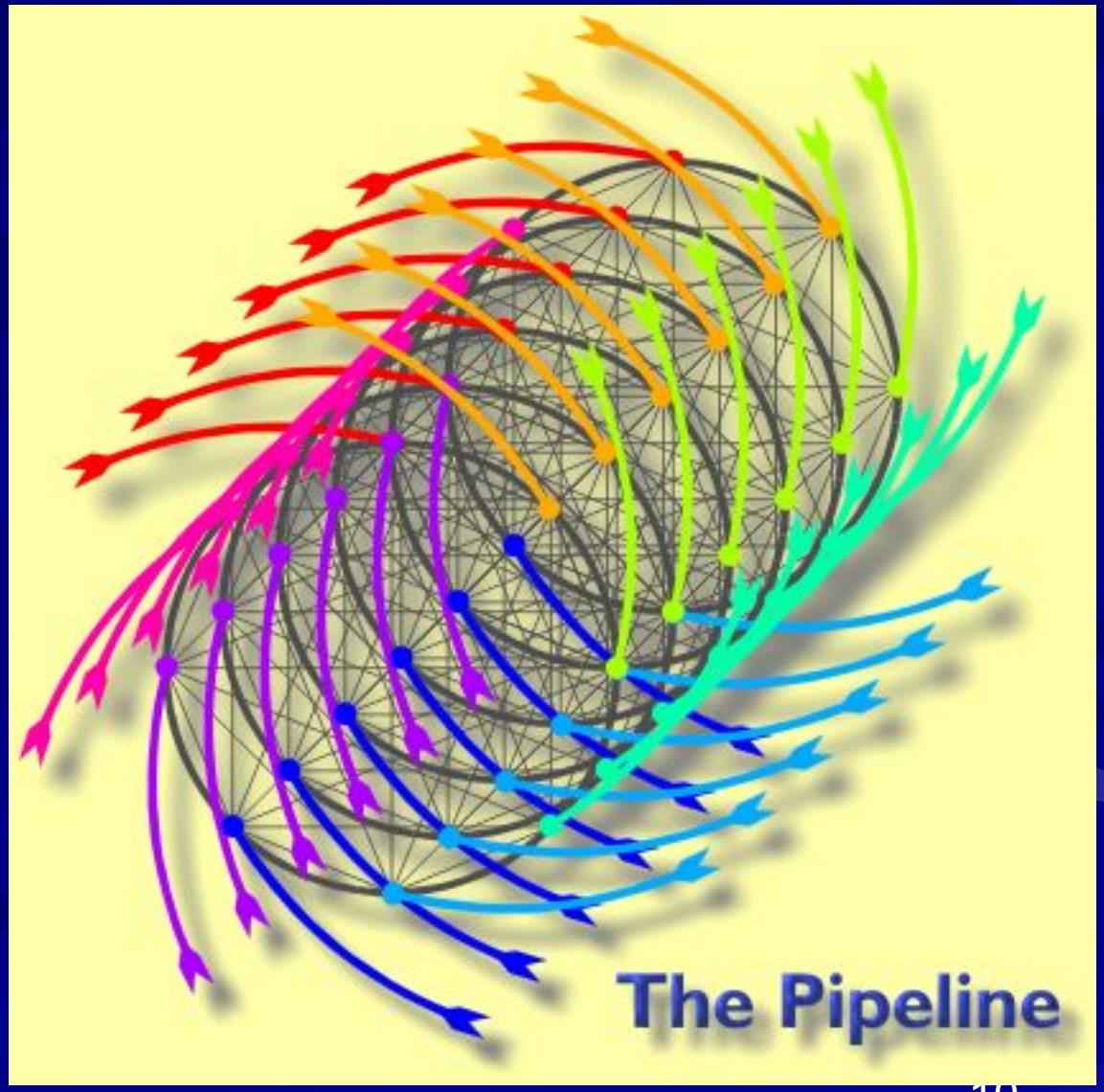
New Technology

Important Trends

- Miniaturization
- Intelligent Devices
- Designed for Consumer Use
- Minimally invasive
- Biotechnology Revolution
  - **Genomics, Proteomics**
  - **Biological Medical Devices**
- New Materials
- Combination Products
- Disruptive Technologies
  - **That change how we do business**
  - **That change how medical devices deliver value**



CDRH Vision – Total Product Life Cycle



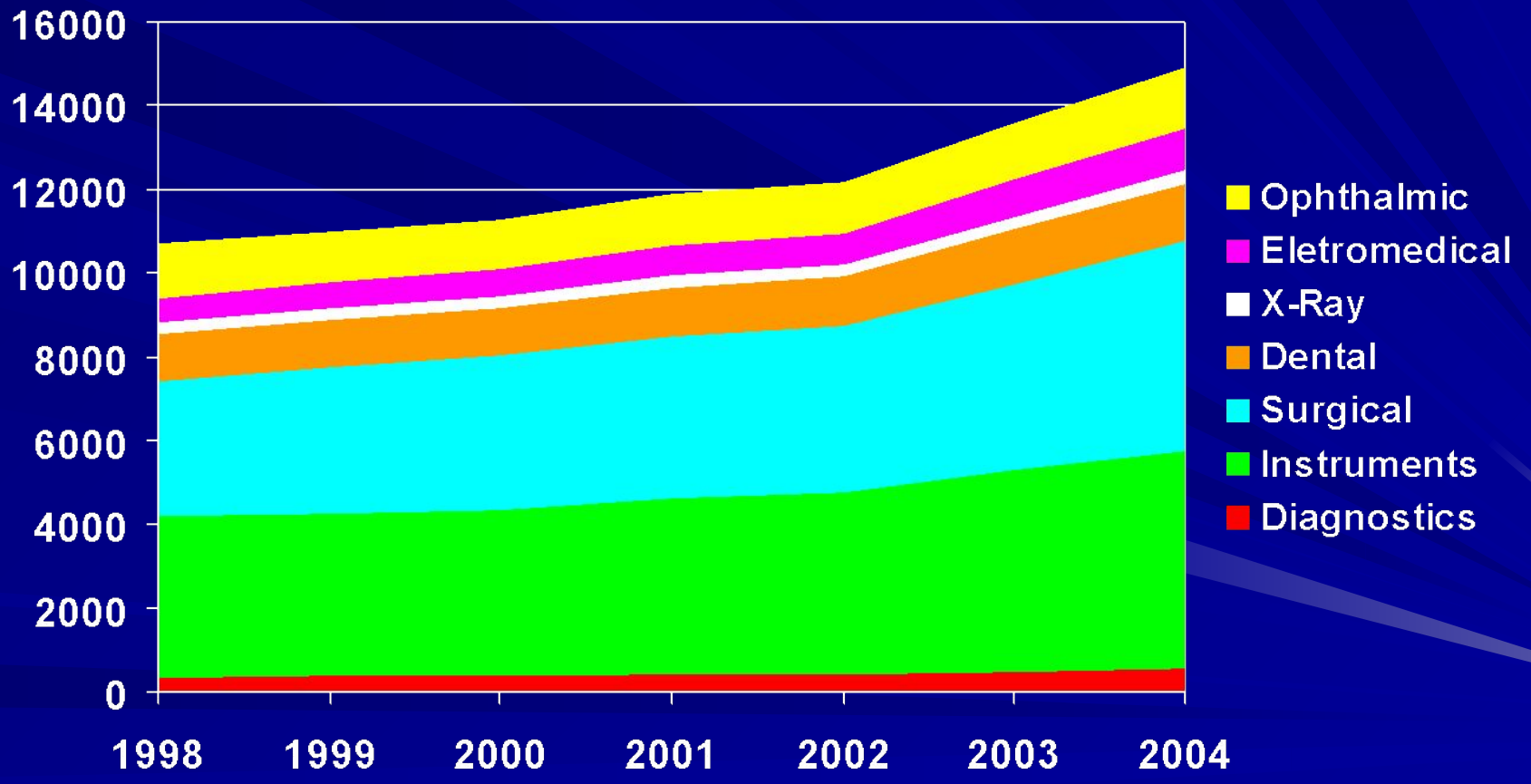
Devices are Different

- **Drugs**
  - Pure molecules
  - Toxicology
  - Short half-life
  - Long market life
  - Drug interactions
  - Wrong Drug / Dose
  - Clinically studied
  - Good Manufacturing Practices (cGMP)
- **Devices**
  - Complex components
  - Biocompatibility
  - Durable Equipment
  - Rapid product cycles
  - Malfunction
  - User Error
  - Bench studied
  - Quality Systems (ISO 9000)

Critical Path is Different for Devices

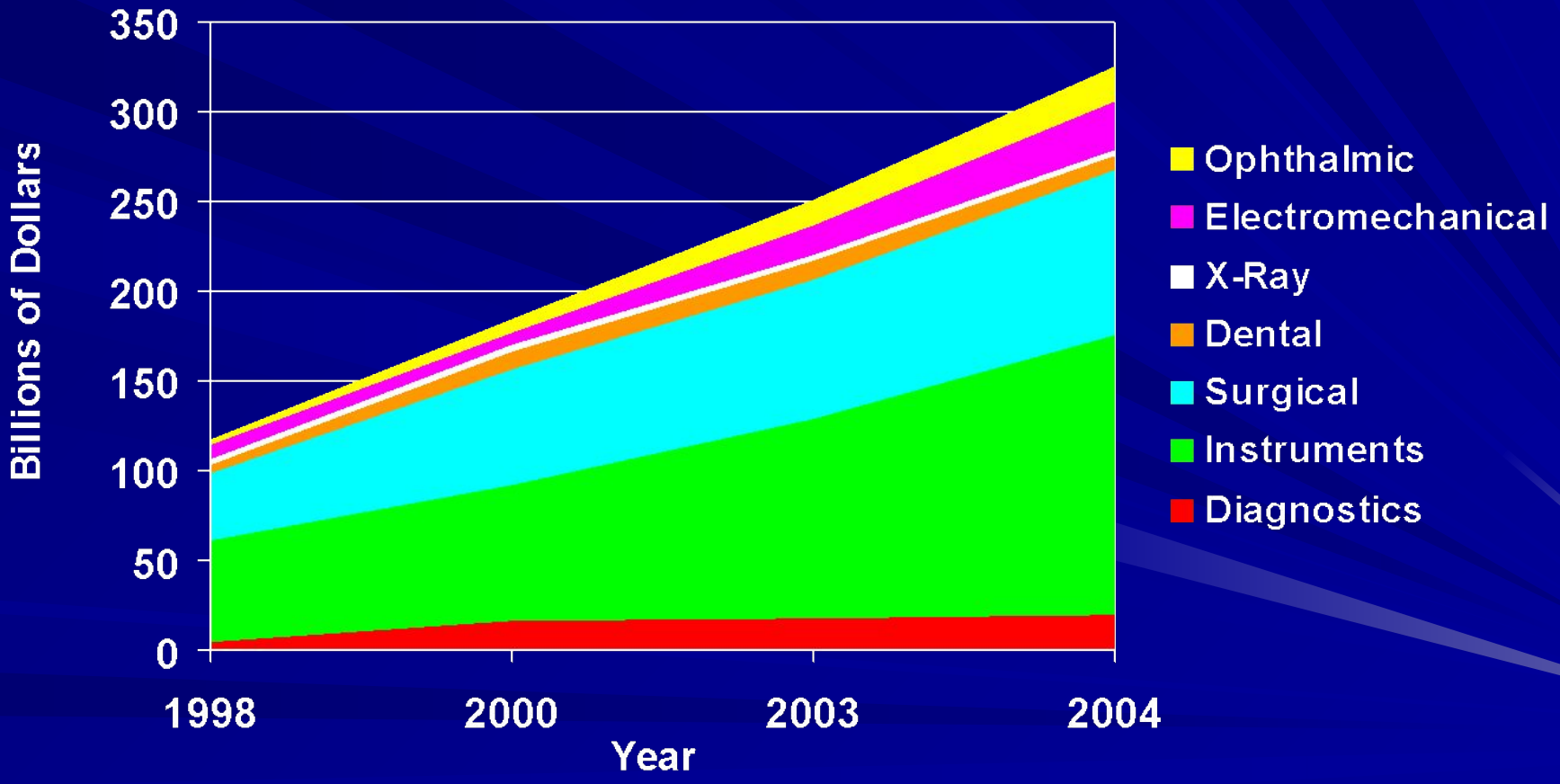
- **Device Regulation**
  - Least Burdensome Provision of FDAMA
  - Quality Systems and Design Controls
- **Device Innovation Process**
  - Biocompatibility
  - Iterative Process
  - User learning curve
  - Performance and durability
- **Device Industry is Represented by Small Manufacturers**

Medical Device Industry Growth
Number of Manufacturers by Year



Dun & Bradstreet Medical Device Firm Data

Sales Volume Growth
(Billions of Dollars)



Note: No Economic Adjustment to Dollar Value

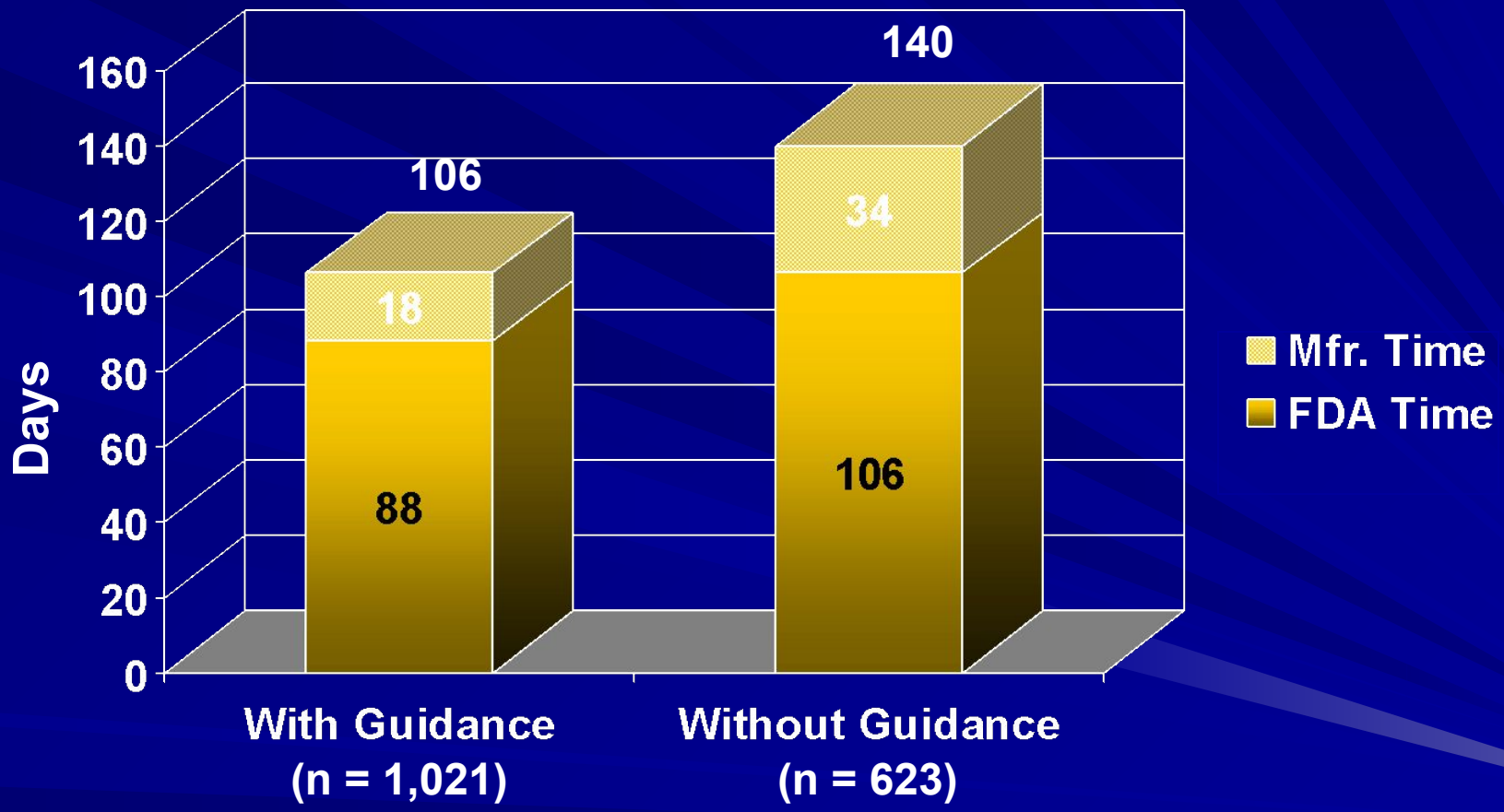
Device Industry Continues to Grow in FY 04

- Dun and Bradstreet FY 04 data shows the device industry grew from 13,579 to 14,937 firms with about $320 billion in sales.
- Innovation is alive and well!
- 20% annual turnover in individual device firms.
- FDA-industry interaction is more important than ever. FDA needs to keep guidances and reviewers up to date.

Innovative Science-based Strategies at Work

- **Leveraging**
  - Breast Cancer (DMIST): Screening and Digital Mammography
  - Medical Device Fellowship Program
- **Objective Performance Criteria**
  - Heart valves
  - Hip implants
- **Novel Trial Designs**
  - Bayesian Statistics
  - ROC Curves
- **Guidance Development**

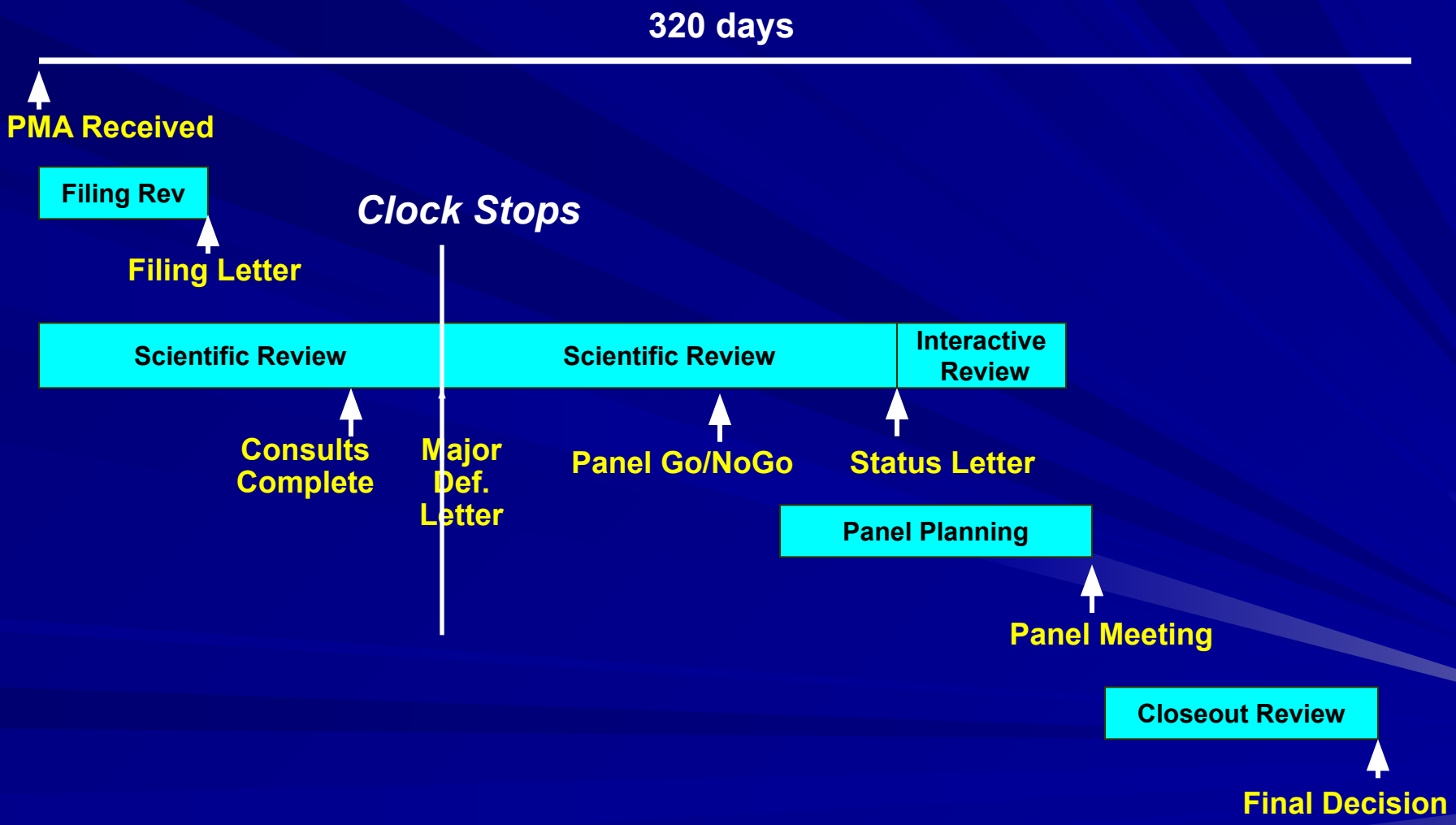
Comparison of 510(k) Average Review Times for Devices With and Without Guidance*



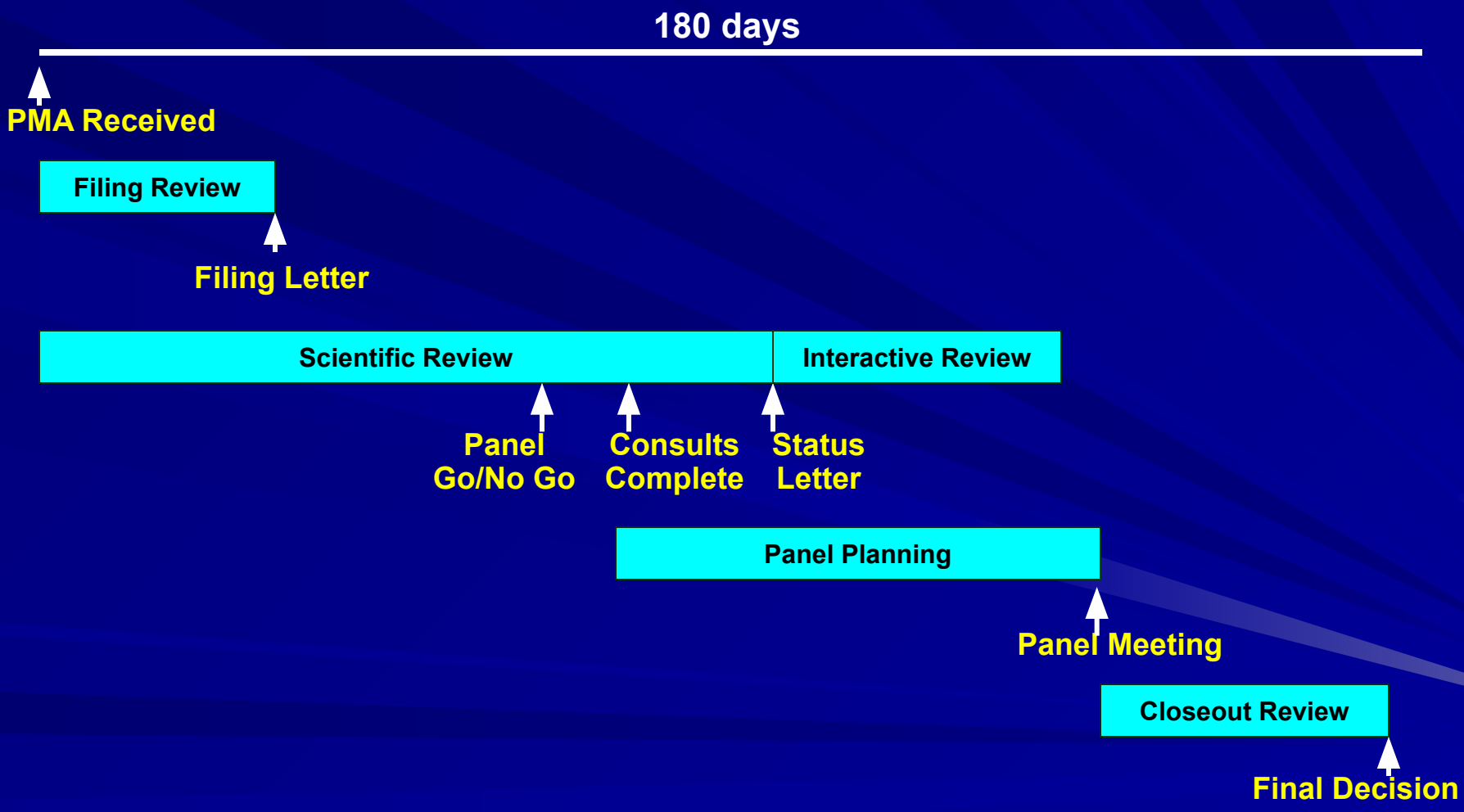
*Based on all 510(k)s (1,644) with SE decisions during FY 2002 that were for Class II devices eligible for third party review, excluding special and 3rd party 510(k)s

E Rechen, 5/03

Original PMA Milestones:
2-cycle Scenario



Original PMA Milestones:
1-cycle Scenario



The rest of the story…

FDA Webview

Boston Scientific Stent Recall Grows to 96K Units

The Boston Globe

Boston Scientific Expands Recall of Troubled Stent

FDA won't expand recall of stents

Drug-coated stents may face additional FDA scrutiny

WSJ.com THE WALL STREET JOURNAL. ONLINE

FDA Is Reviewing Reports of Trouble With Taxus Stent

Boston Scientific's Older Stents Draw Scrutiny of FDA

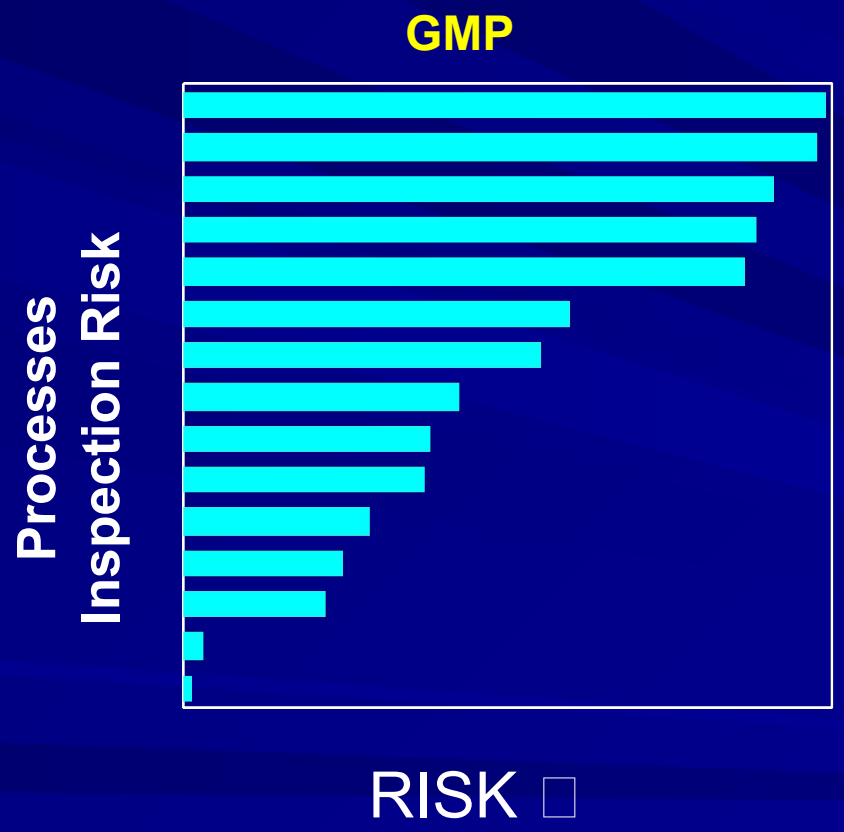
The Miami Herald

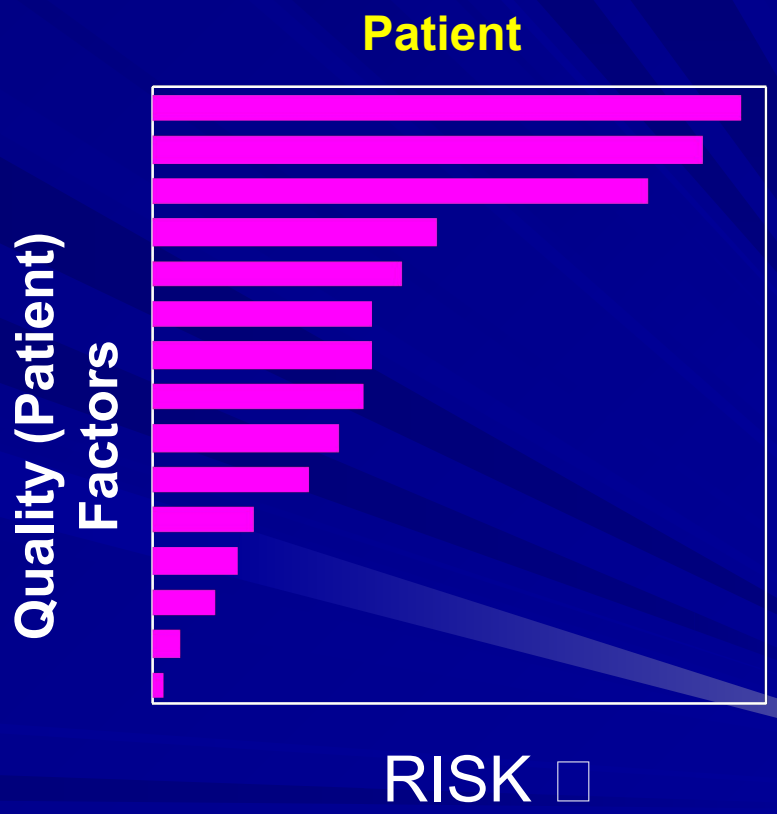
FDA Temperature up over Cordis

FDA U.S. Food and Drug Administration Department of Health and Human Services

FDA Advises Physicians of Adverse Events Associated with Cordis Cypher Coronary Stents

Goal: Prioritize Actions on GMP Risks Correlating to Patient Risks

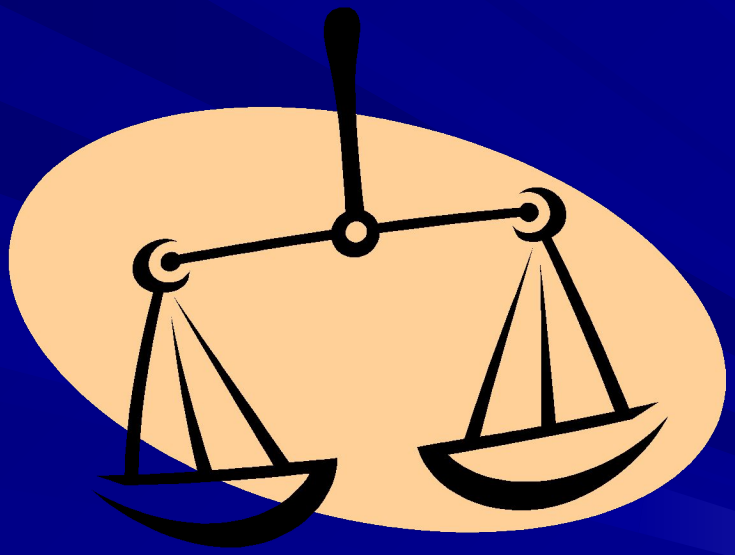




Postmarket Questions of Interest

- Long Term Safety
- Performance in Community Practice
- Change in User Setting
- Rare/Unexpected Events
- Rates of Anticipated Adverse Events
- Human Factors Issues – Use Error
- Off-Label Use

Achieving Pre/Postmarket Balance



Why Balance Works

- Speeds Product to Market by Moving Some Premarket Requirements to Postmarket
- Offers Added Assurance to FDA and Advisory Panel
- Free Up ODE Staff for Premarket Review
- Generates Data for Next Generation
- Generates Data for Enhanced Labeling

Postmarket Studies - Present

- Ill-Conceived
- Not Initiated
- Not Completed
- Not Tracked
- Not Enforced

Postmarket Studies - Future

- Better Designs
- Standardized Reporting System
- Better Tracking
- Make Status of Studies Public

Life Sciences Laboratory

Awards

2004, GSA Construction Excellence, Projects Over $25 Million

2004, Washington Building Council, Craftsmanship Award (Mechanical / HVAC-Sheet Metal, Mechanical / Plumbing, Mechanical / HVAC-Piping)

Critical Path Projects Being Developed

- Establishing a pedigreed and credentialed blood panel that could be used for assessing the sensitivity/specificity of new hepatitis assays
- Developing computer models of human physiology that allow testing and soft failure of peripheral vascular stents before animal and human studies are ever considered
- Developing a clear regulatory path with consensus from the Obstetrics community for intrapartum fetal diagnostic devices

Critical Path Projects Being Developed

- Establishing agreed pathways for the statistical validation of surrogate markers
- Working with Medical Specialty Organizations to develop practice guidelines for appropriate monitoring of permanently implanted devices
- Obtaining consensus on the extent of neurotoxicity testing for neural tissue contacting materials

Summary

- Steady progress towards meeting review performance goals and TPLC strategic goals
- Success is achievable but highly resource-intensive
- CDRH continues to seek innovative methods and partnerships for evaluating new technology based on sound science in a least burdensome manner
- Critical path will further our existing efforts to achieve the right regulatory balance and ensure the safety and effectiveness of medical devices

CDRH Vision – Total Product Life Cycle