U.S. FOOD & DRUG ADMINISTRATION

Careers in Government: FDA

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Small group: Careers in Government
Jan 28, 2022.

Outline

- Brief history and Facts of FDA
- Org Chart– FDA
- Careers at FDA/CBER
  - CMC (Product) Reviewer
  - Research/Reviewer
  - Pros v. Cons Career in Government.

U.S. Food and Drug Administration (FDA)

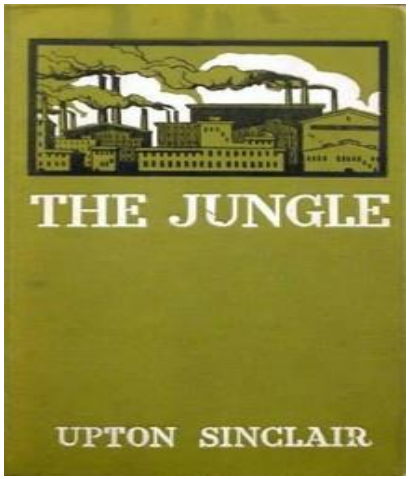
FDA protects the public health by assuring the safety, efficacy and security of:

- Human and veterinary drugs,
- Biological products,
- Medical and radiation-emitting devices,
- Foods and cosmetics

Brief history of FDA

- **Food and Drug Act (1906)**: Product must not be misbranded or adulterated.
  - The first comprehensive federal consumer protection law
  - Gaps: Many products left untouched and many hazardous consumer items remained on the market legally.

- **Biologics Control Act (1902):** Regulation of production of vaccines and anti-toxins



Jim

Tetanus

Brief history of FDA(continue…)

- **Federal Food, Drug, and Cosmetic (FD&C) Act (1938):** Product must be safe.

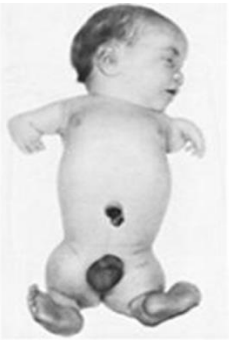
Elixir Sulfanilamide Disaster

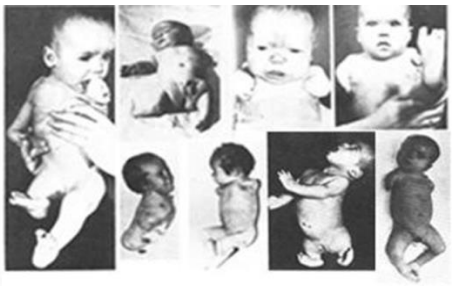
- Sulfanilamide using diethylene glycol (DEG) as a solvent
- No test for toxicity
- Death of over 100 people (many were children)

A letter to President Roosevelt, a woman described the death of her child:

"…All that is left to us is the caring for her little grave. Even the memory of her is mixed with sorrow for we can see her little body tossing to and fro and hear that little voice screaming with pain and it seems as though it would drive me insane. ... It is my plea that you will take steps to prevent such sales of drugs that will take little lives and leave such suffering behind and such a bleak outlook on the future as I have tonight."

Brief history of FDA





Thalidomide Phocomelia

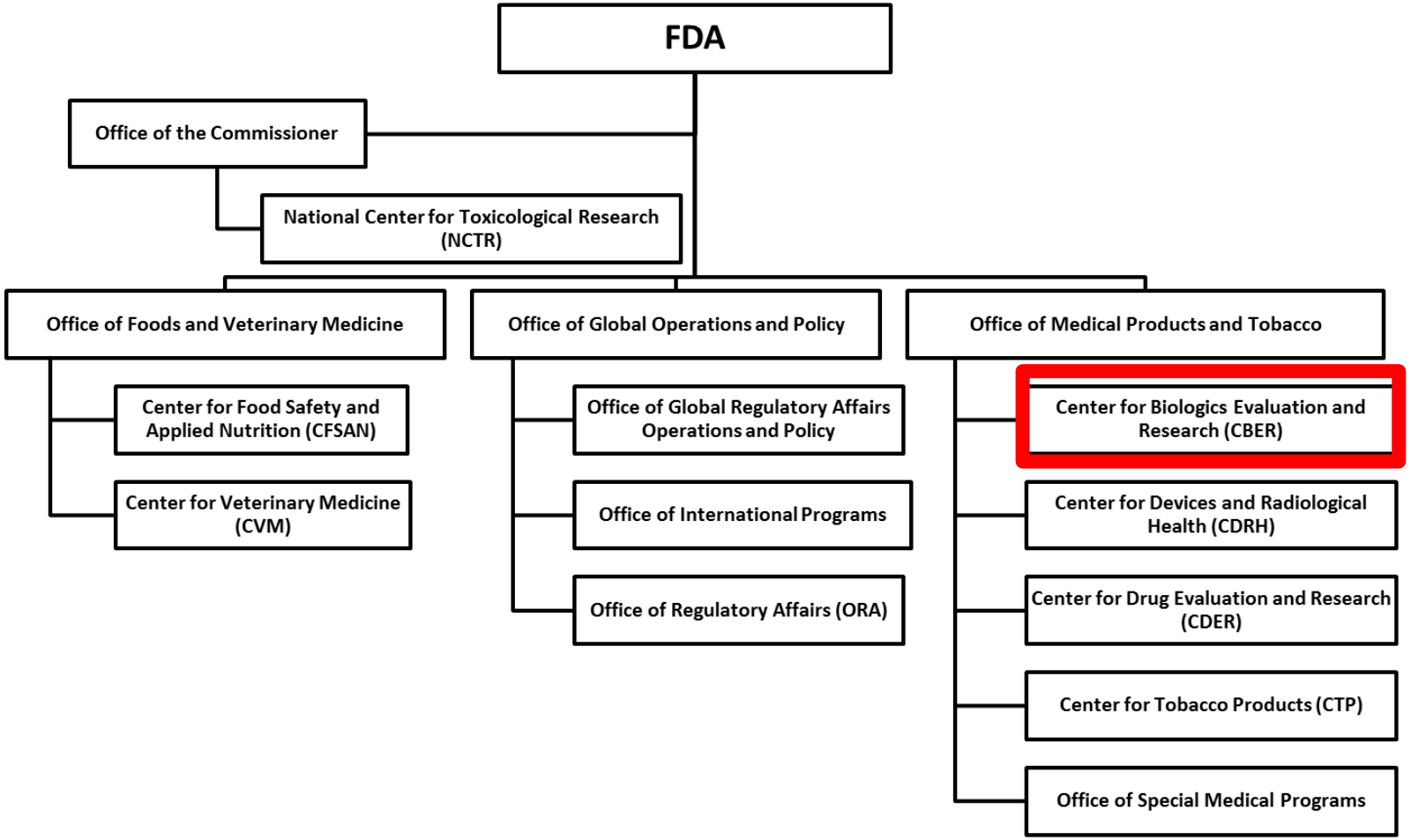
- An anti-emetic for morning sickness
- A teratogen causing birth defects
- Estimated 10,000 babies born with defects
- Dr. Frances Kelsey, a medical officer at FDA , kept the drug off the U.S. market by withholding its approval

- **Kefauver-Harris Drug Amendments to FD&C Act (1962):** Product must be effective.
  - For the first time, drug manufacturers are required to prove to FDA the effectiveness of their products before marketing them.

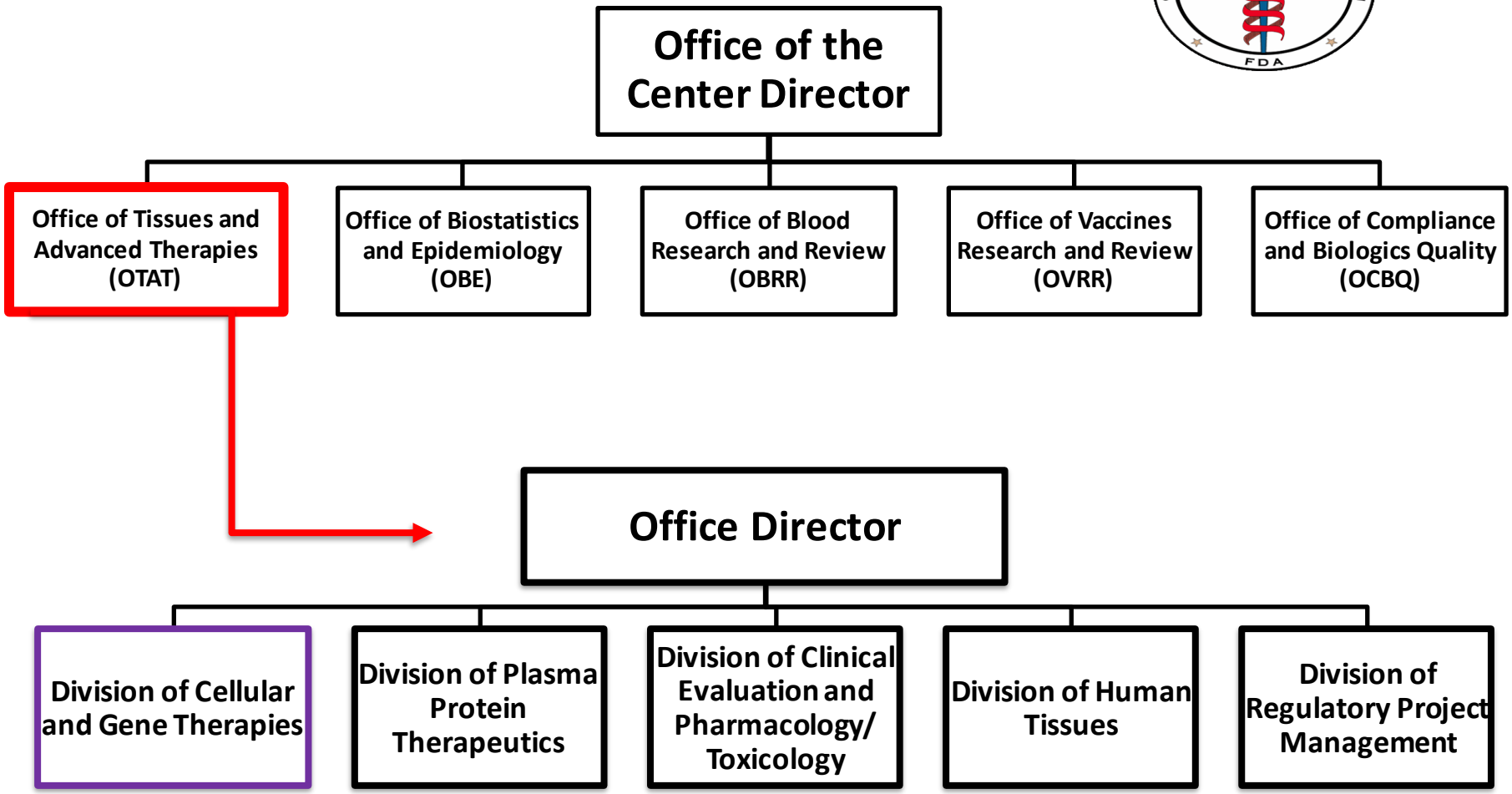
FDA Facts

- ~>15,000 scientists, inspectors, reviewers, researcher-reviewers, statisticians, physicians, veterinarians, administrators, legal and support staff.
- Regulates ~20 cents of every U.S. consumer dollar spent or $2.6 Trillion of the U.S. consumer market.
- Regulated firms employ ~1.5 million U.S. workers and products equal ~13% of U.S. manufacturing.

US Food and Drug Administration

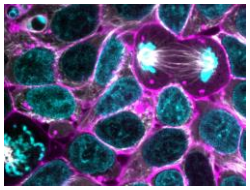


Center for Biologics Evaluation and Research (CBER)



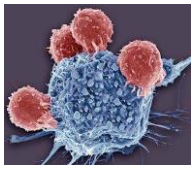
Diversity of OTAT-Regulated Products

- **Stem cells/stem cell-derived**
  - Adult (e.g., hematopoietic, neural, cardiac, adipose, mesenchymal)
  - Perinatal (e.g., placental, umbilical cord blood)
  - Fetal (e.g., neural)
  - Embryonic
  - Induced pluripotent stem cells (iPSCs)



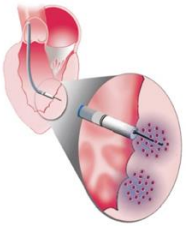
- **Functionally mature/differentiated cells** (e.g., retinal pigment epithelial cells, pancreatic islets, chondrocytes, keratinocytes)

- **Gene therapies**
  - Ex vivo genetically modified cells
  - Non-viral vectors (e.g., plasmids)
  - Replication-deficient viral vectors (e.g., adenovirus, adeno-associated virus, lentivirus)
  - Replication-competent viral vectors (e.g., measles, adenovirus, vaccinia)
  - Microbial vectors (e.g., Listeria, Salmonella)
  - Gene edited/editing product



- **Blood products**
  - Coagulation factors
  - Fibrin sealants
  - Fibrinogen
  - Thrombin
  - Plasminogen
  - Immune globulins
  - Anti-toxins
  - Snake venom antisera

- **Devices and combination products**
  - Engineered tissues/organs
  - Selection devices for the manufacture or delivery of cells



- **Tissues**
- **Xenotransplantation**

Careers at FDA

- Medical officers, biologists, statisticians, engineers, pharmacists and pharmacologists, information technology, consumer safety officers, attorneys, chemists, microbiologists, social scientists, veterinarians, epidemiologists, and more…

- Hired as civilian employees under the General Schedule (GS) system but some (including medical officers, pharmacists or biologists) can be hired through the Public Health Service

- More information about each: https://www.fda.gov/AboutFDA/WorkingatFDA/CareerDescriptions/ucm112729.htm

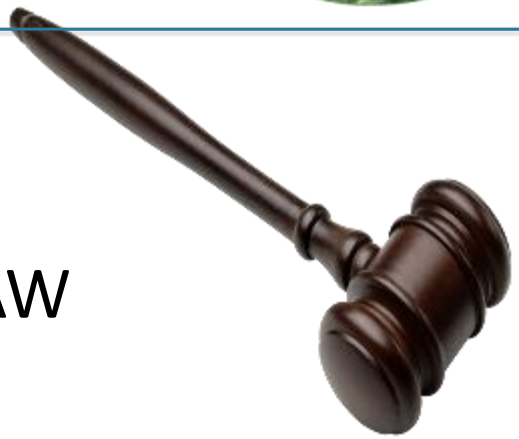
What is interesting about working at FDA?

the intersection of:

SCIENCE

MEDICINE

LAW

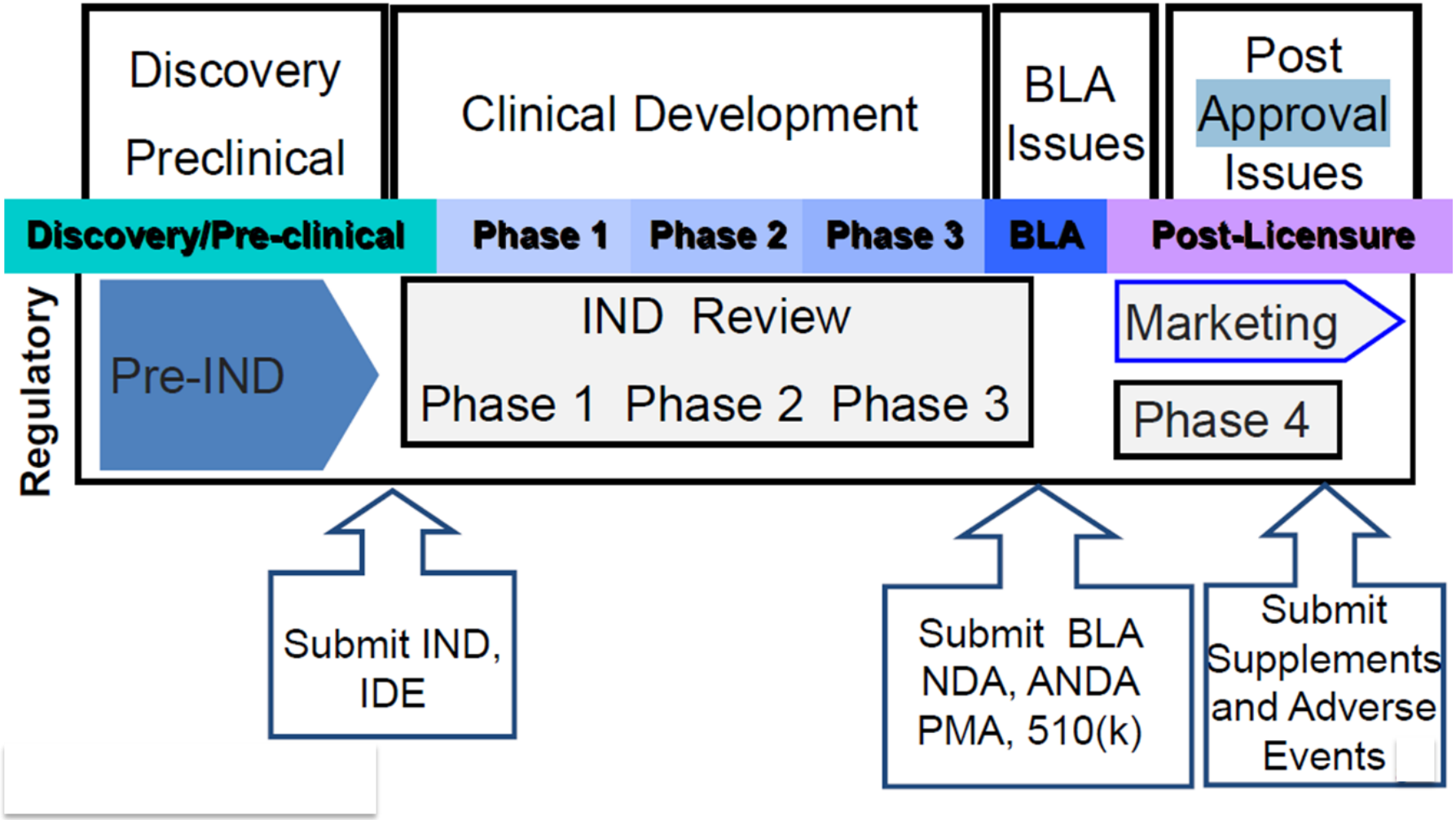


BUSINESS

Activities at OTAT and DCGT

- Reviews, evaluates and takes appropriate action on product applications and amendments or BLA supplements submitted by manufacturers of OTAT products
- Policy and regulatory guidance development
- Outreach activities and public-private partnerships
- Interaction with and education of stakeholders to facilitate development of safe and effective products through:
  - Advisory Committees
  - Talks, workshops
  - Seminars, panel discussions, round tables
  - Publications
- International activities
  - Interactions with other regulatory agencies around the world – ATMP Clusters
- Research

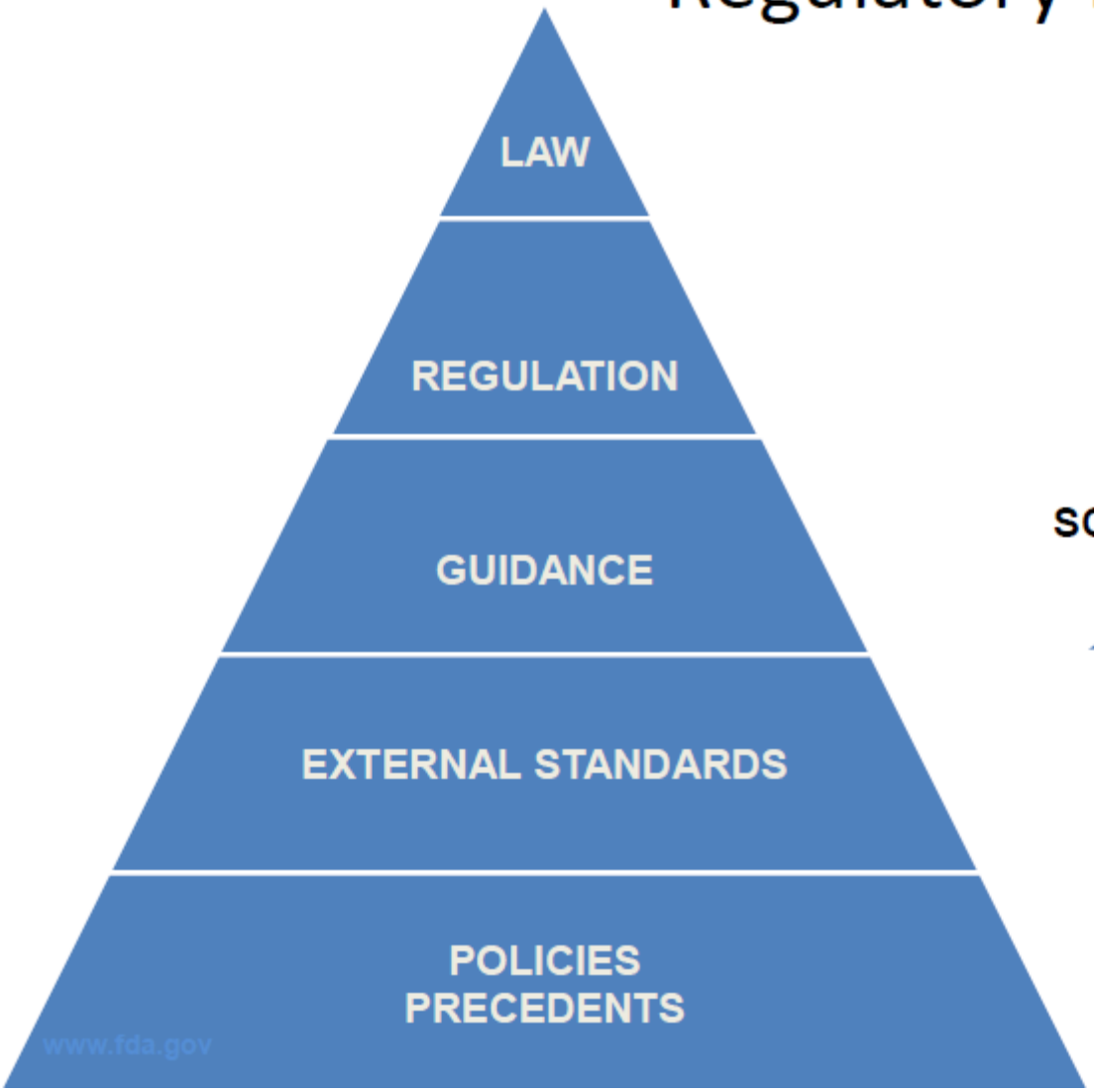
Regulatory Review: Overview of Product Life Cycle

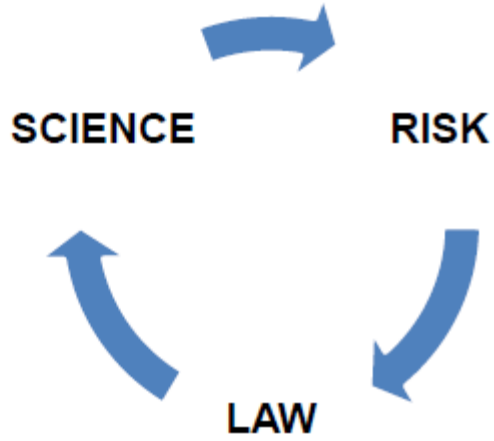


Team Approach to Regulatory Review

- Regulatory Project Manager
- **Chemistry, Manufacturing, and Controls**
- Pharmacology/Toxicology
- Clinical
- Statistical
- Consults as needed
- Facilities and Compliance

Regulatory Framework





New Slide

CMC Reviewer's Role ?

- Chemistry, Manufacturing, and Controls (CMC) Review
  - Product manufacturing and testing, scientific rationale
  - How do you make the product?
  - Processing and manufacturing
    - What do you use to make the product?
    - Cell or tissue source, viral or plasmid vector, etc.
  - Reagents and components
  - Equipment Qualification
  - What testing is performed to evaluate the safety, quality, and stability of the product?
- Participate in facility inspections as scientific and product expert

Researcher-Reviewer Career

- OTAT products are diverse and rapidly evolving hence, regulatory paradigms are evolving rather than established
- These novel products raise extraordinarily complex issues

- DCGT seeks to foster a cadre of Researcher Reviewer scientists who:
  - perform regulatory review and participate in the development of policy and guidance documents to promote product development and patient safety
  - perform research in key areas to support the FDA mission and help sponsors solve product development problems to advance products to the market place

Researcher Reviewer Career

- Principal Investigators (PIs) – tenured or tenure track researcher reviewers
- Staff Scientists – tenured researcher reviewers supporting PIs program: do both review and research
- Technicians: do primarily research, some do limited review work
- Staff Fellows, Commissioner's Fellows and IOTF Fellows: do both review and research work
- Postdoctoral Fellows funded as ORISE and other contract mechanisms: do primarily research

Note: Resources are provided to PIs

Current DCGT Research Areas

- Virology
  - Retroviruses, lentivirus, adenovirus, AAV
- Immunology
  - Immune responses to viral and plasmid vectors
- Cell and developmental biology
  - Control of differentiation in animal models
  - Cell fate and survival, stem cell biology
- Cancer biology/Immunology
  - Molecular biomarkers, cancer vaccines, immunotherapy, animal models
- Biotechnology
  - Genome editing, Advanced manufacturing, Genomics, flow cytometry, proteomics, transgenics, tissue engineering
- Microbiology of tissue safety: Pyrosequencing and WGS

Pros and Cons of Working in Government

Pros	Con
Diverse career interests and professional growth opportunities	Progress is slow
Chance to make long lasting impact- public good!	Complex rules and sometime rigid procedures to follow
Choices of locations	Slow hiring and Onboarding process
Work life balance	Significant turnover at the very top
Better worker protection	Slow wage growth and capped earning potential
It is busy everywhere (private or public sector)	

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FDA Headquarters

- **CBER website:** www.fda.gov/BiologicsBloodVaccines/default.htm
- **Phone:** 1-800-835-4709 or 240-402-8010
- **Consumer Affairs Branch**: ocod@fda.hhs.gov
- **Manufacturers Assistance and Technical Training Branch**: industry.biologics@fda.hhs.gov
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