U.S. FOOD & DRUG ADMINISTRATION

Careers in Government: FDA

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FDA Center for Biologics Evaluation and Research (CBER)

2021 SITC Cancer Immunotherapy Winter School Program,
Small group: Careers in Government
February 24, 2021.

Outline

- Brief history and facts of FDA
- Org chart– FDA
- Careers at FDA/CBER
  - Diverse career options at FDA
  - Chemistry, Manufacturing and Controls (CMC) reviewer
  - Research/reviewer
  - Pros v. cons of a career in government.

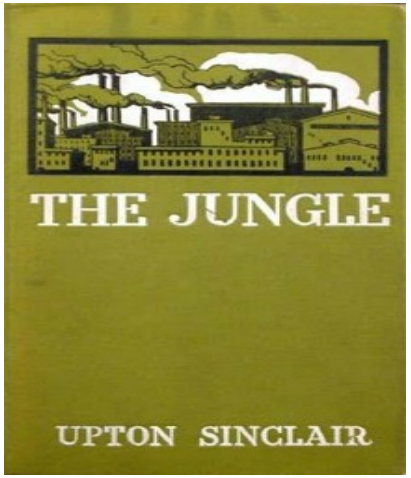
U.S. Food and Drug Administration (FDA)

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

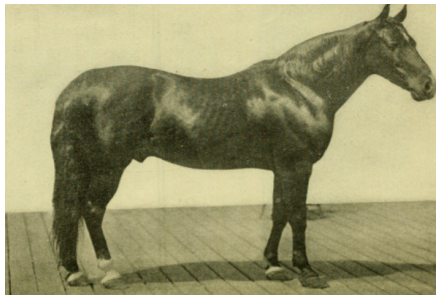
Brief history of FDA

- **Food and Drugs 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

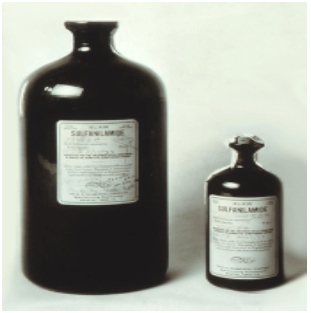
diphtheria anti-toxin



Jim, the horse

Brief history of FDA (continued…)

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



Elixir sulfanilamide disaster

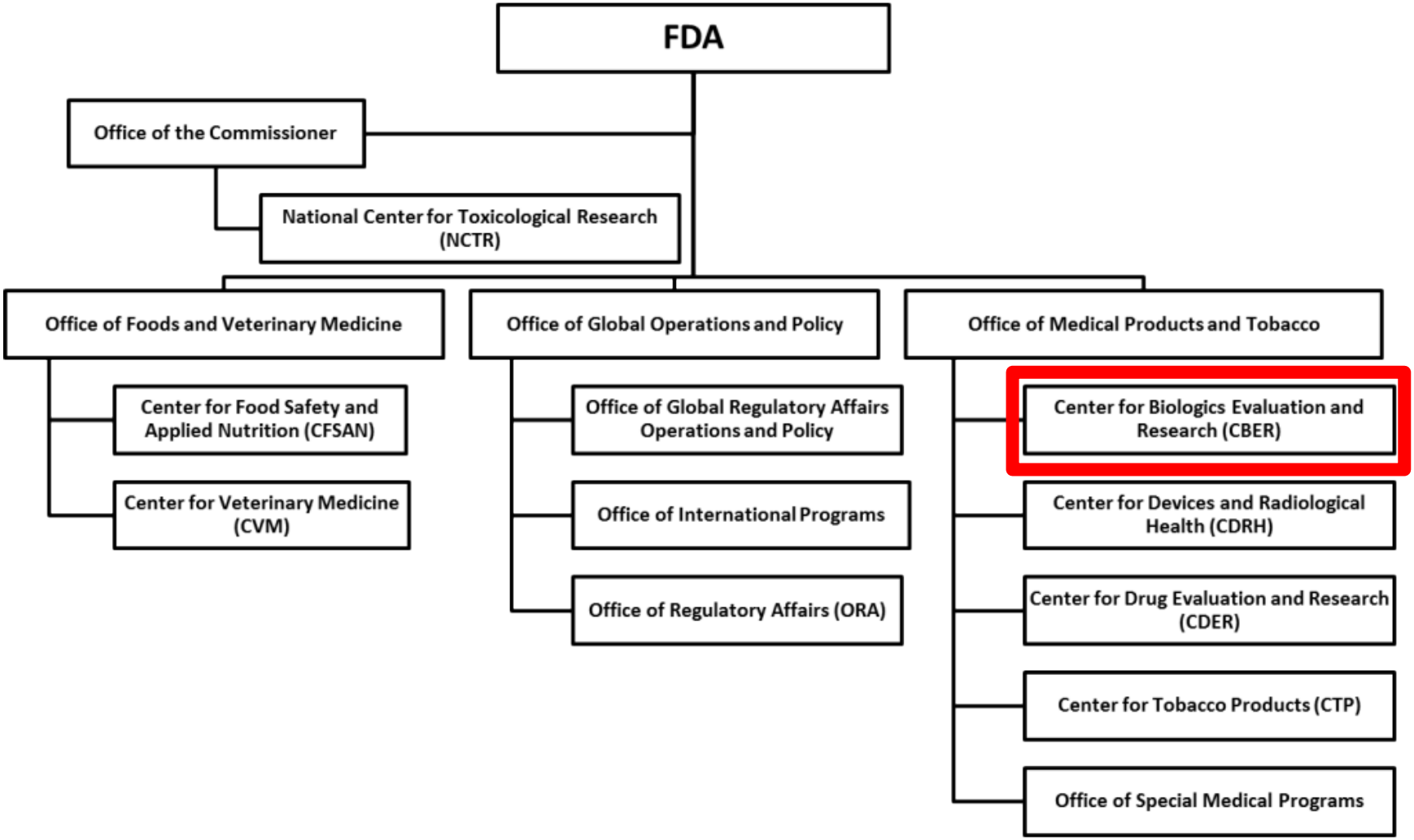
- Sulfanilamide using diethylene glycol (DEG) as a solvent
- No test for toxicity
- Death of over 100 people (many were children)

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."

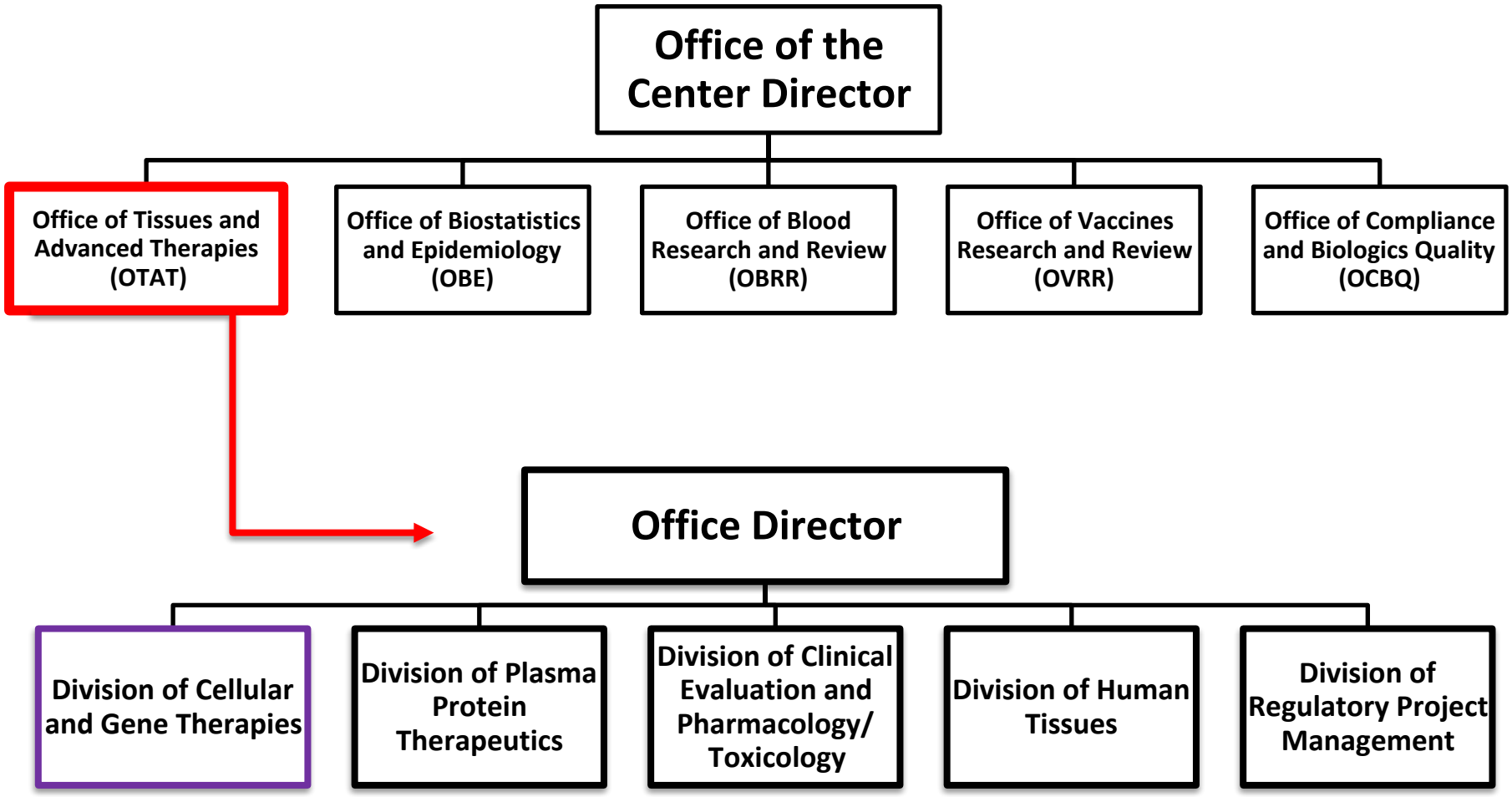
FDA Facts

- ~>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

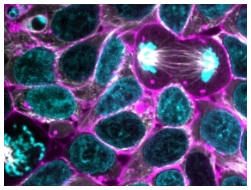


Center for Biologics Evaluation and Research (CBER)



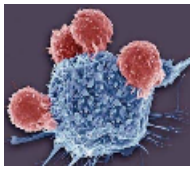
Diversity of OTAT-Regulated Products

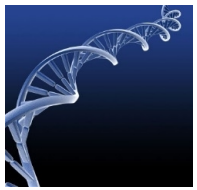
- **Stem cells/stem cell-derived**
  - Adult (e.g., hematopoietic, neural, cardiac, adipose, mesenchymal)
  - Perinatal (e.g., placental, umbilical cord blood)
  - Fetal (e.g., neural)
  - Embryonic
  - Induced pluripotent stem cells (iPSCs)



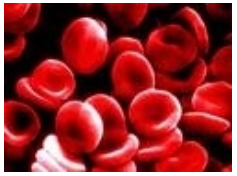
- **Functionally mature/differentiated cells** (e.g., retinal pigment epithelial cells, pancreatic islets, chondrocytes, keratinocytes)

- **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

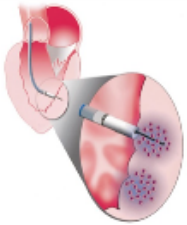




- **Blood products**
  - Coagulation factors
  - Fibrin sealants
  - Fibrinogen
  - Thrombin
  - Plasminogen
  - Immune globulins
  - Anti-toxins
  - Snake venom antisera



- **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 can be found at: https://www.fda.gov/AboutFDA/WorkingatFDA/CareerDescriptions/ucm112729.htm
- https://www.fda.gov/about-fda/center-biologics-evaluation-and-research-cber/jobs-center-biologics-evaluation-and-research-cber
- https://www.fda.gov/about-fda/scientific-internships-fellowships-trainees-and-non-us-citizens/fdas-staff-fellowship-program
- https://www.usajobs.gov/

Desired Skillset for a Reviewer Careers at OTAT

- Strong scientific background (advanced degree)
  - Medicine, cell biology, virology, pharmacology, toxicology, gene editing, biomedical engineering, veterinary medicine, etc.,
  - Involvement in research projects investigating tissue-engineered, stem cell therapy, and/or gene therapy products
- Ability to analyze and interpret experimental data
- Excellent oral and written communication skills
- Proven ability to multi-task
- Proven ability to work in a multidisciplinary team

Chemistry, Manufacturing and Controls (CMC) Reviewer

- Recruited as biologist, microbiologist and bioengineers at GS13 level
- Ph.D. or equivalent doctoral degree in biological sciences appropriate to the position
- Post-doctoral experience or
- One year of specialized experience, equivalent to the GS-12 in the Federal service,
  - evaluating and deciding on the approvability of scientific research, human testing, and manufacture of human biological products including gene therapy, oncolytic virus, viral vectors, gene modified cell therapy, cell therapy, tissue engineering and cell scaffolds

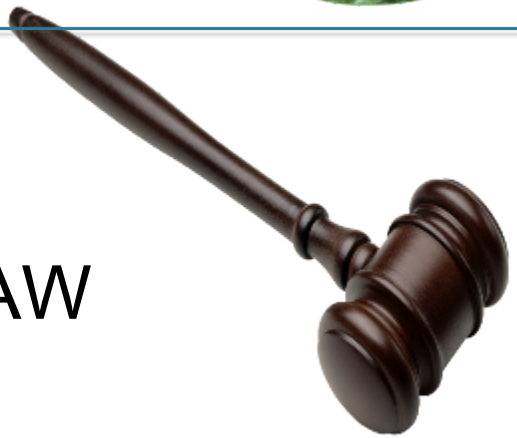
What is interesting about working at FDA?

the intersection of:

SCIENCE

MEDICINE

LAW

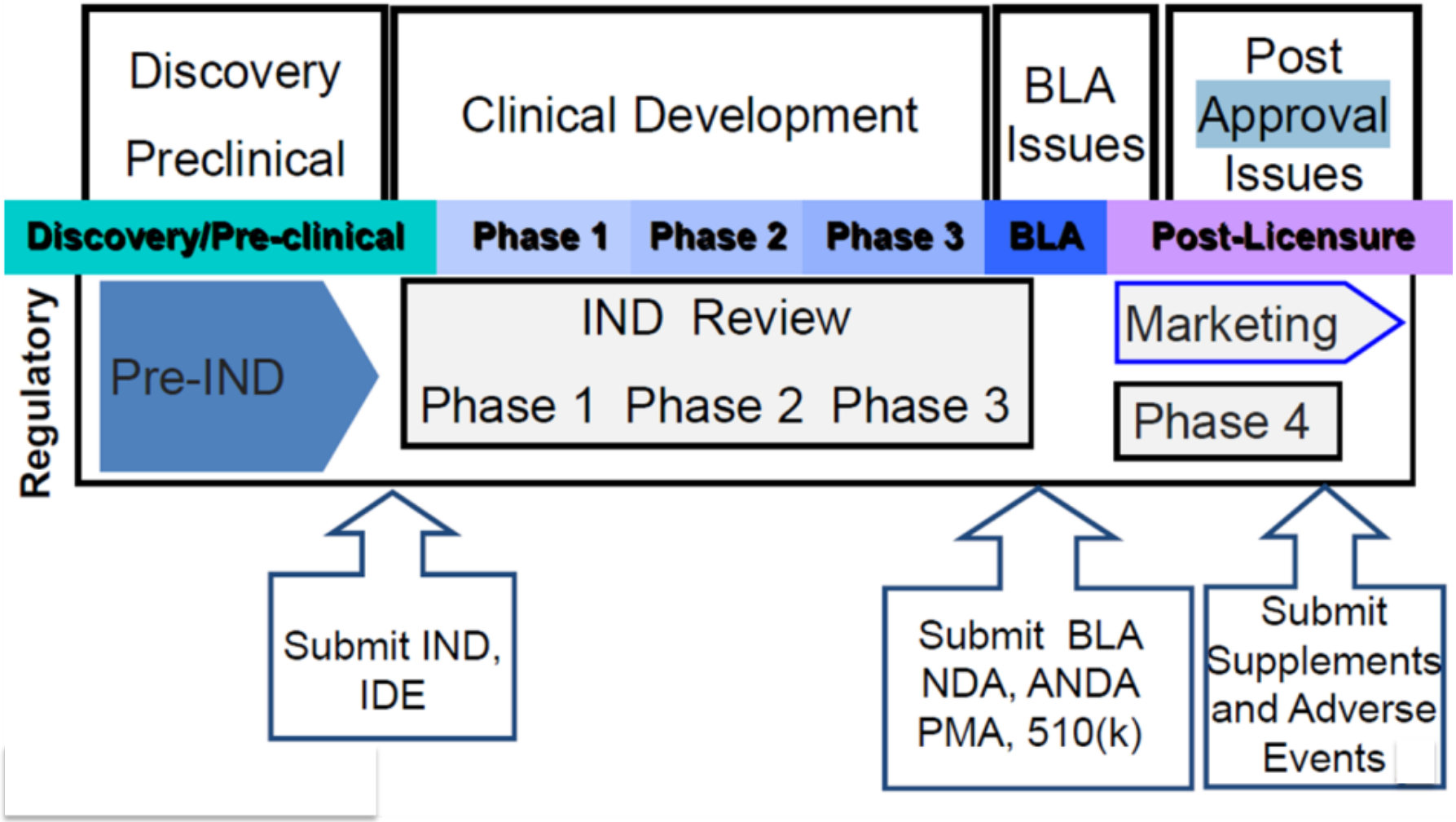


Commerce

Activities at OTAT and DCGT

- Reviews, evaluates, and takes appropriate action on product applications and amendments 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

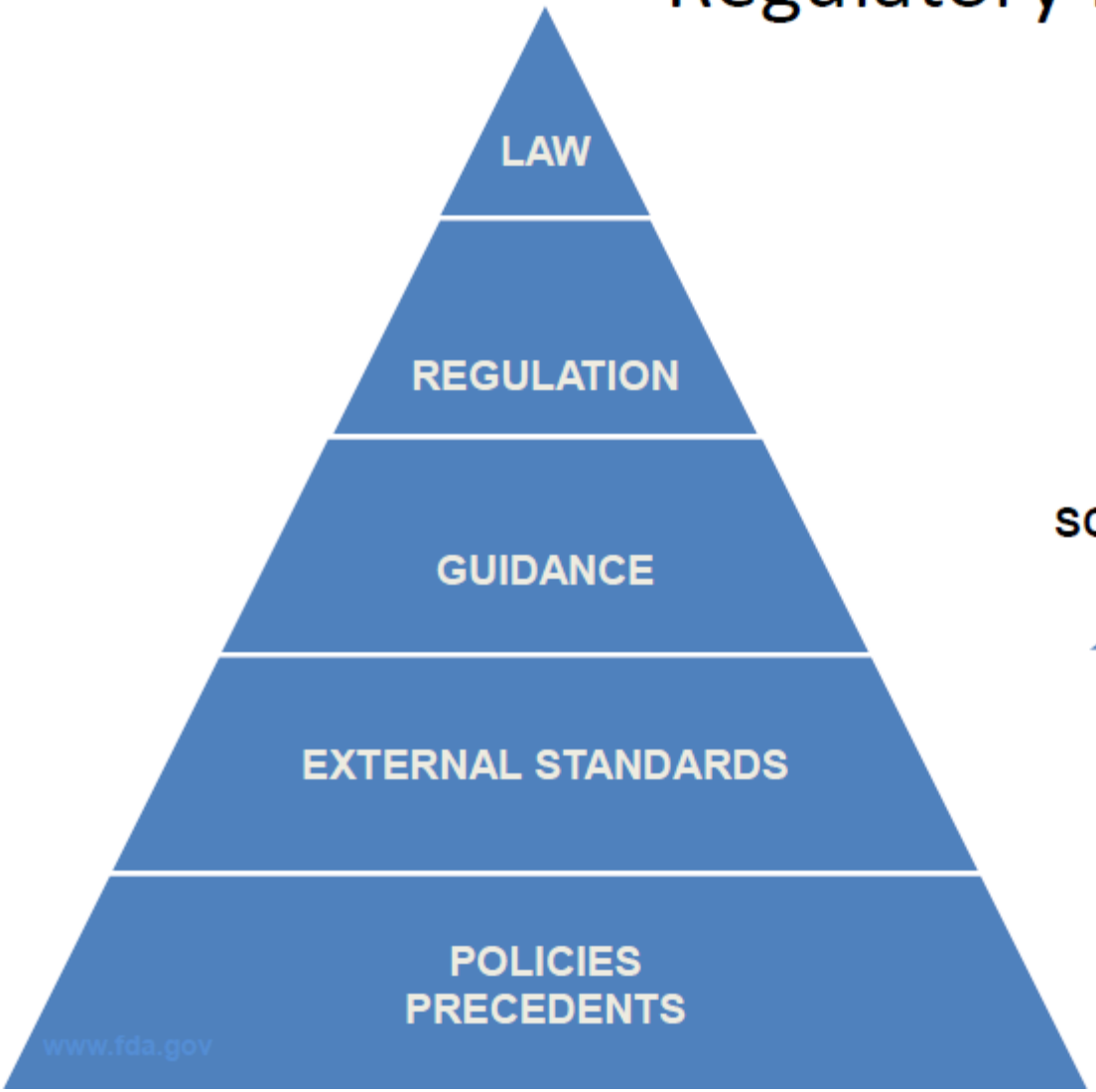
Regulatory Review: Overview of Product Life Cycle

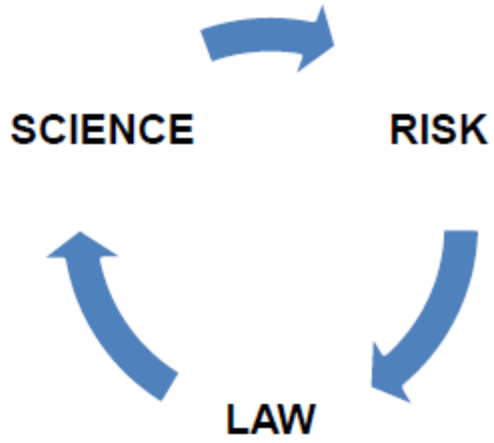


Team Approach to Regulatory Review

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

Regulatory Framework





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: 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, adeno associated viruses (AAVs)
- 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 whole genome sequencing (WGS)

Pros and Cons of Working in Government

Pros	Con
Diverse career interests and professional growth opportunities	Strict statutory deadlines
Chance to make long lasting impact- public good!	Complex rules and sometimes rigid procedures to follow. Requires adaptation to bureaucracy
Choices of locations depending on Agency	Slow hiring and onboarding process
Work life balance	Significant turnover at the very top (political appointee level)
Better worker protection	Capped earning potential compared to private sector
Predictable wage growth (GS scale)	
It is busy everywhere (private or public sector)	

Contact Information

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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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