Emerging Technology Program

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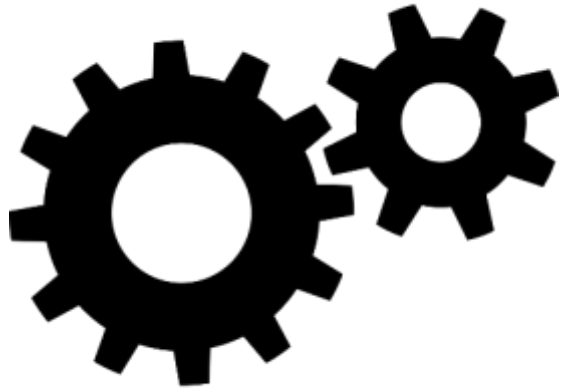
US FDA Center for Drug Evaluation and Research

Pharmaceutical Quality Symposium
October 17, 2019

Learning Objectives

- Learn the mission of the Emerging Technology Program
- Understand the scope of the Emerging Technology Program



Pharmaceutical Quality

A quality product of any kind consistently meets the expectations of the user.

Pharmaceutical Quality

A quality product of any kind consistently meets the expectations of the user.

Drugs are no different.


Patients expect safe and effective medicine with every dose they take.

Pharmaceutical quality is

assuring *every* dose is safe and effective, free of contamination and defects.

It is what gives patients confidence in their *next* dose of medicine.

Mission

Encourage and support the adoption of innovative technology to modernize pharmaceutical development and manufacturing through close collaboration with industry and other relevant stakeholders

Team

A small cross-functional Emerging Technology Team (ETT) with representation from all relevant FDA quality review and inspection programs (CDER/OPQ, CDER/OC, & ORA)

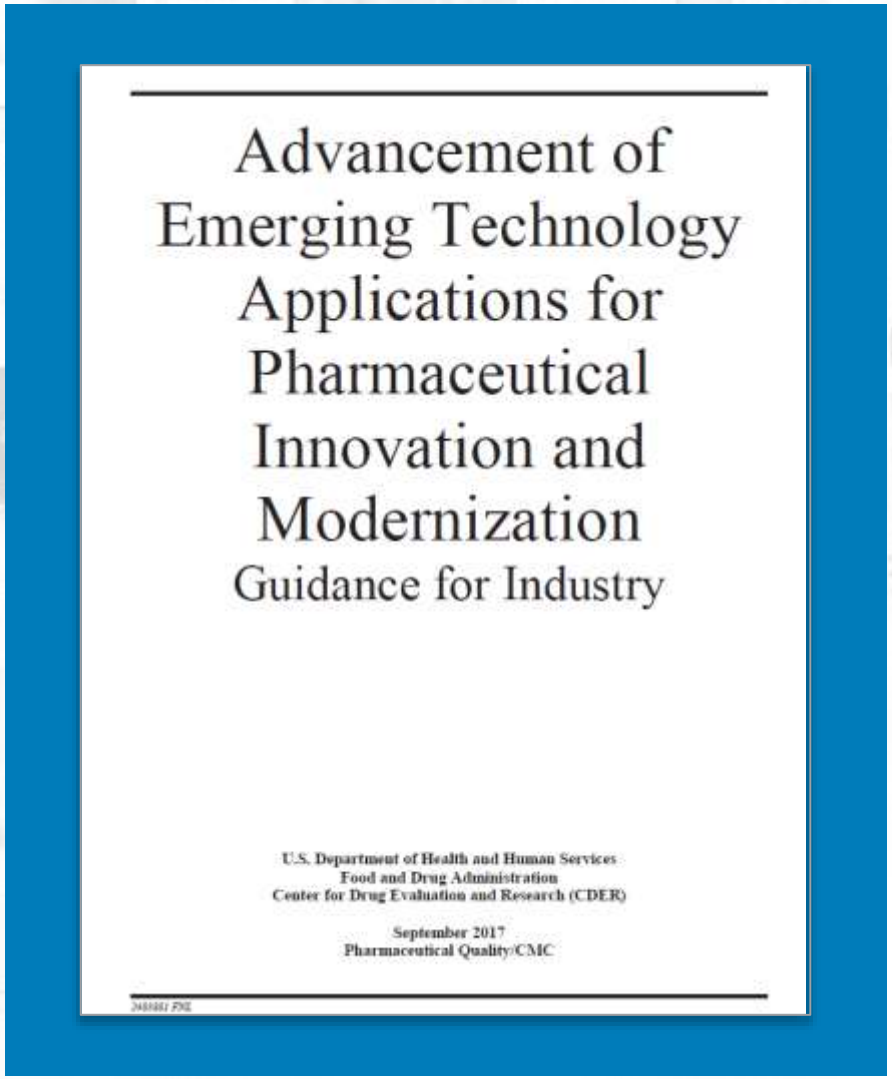
Team

Chair	**Sau (Larry) Lee | OPQ/OTR**
Project Manager	Cheryl Kaiser | OPQ/OPRO
Technical Manager	Sarah Rogstad | OPQ/OTR

Members

- Cyrus Agarabi | OPQ/OBP
- Nilou (Sarah) Arden | OPQ/OBP
- Raphael Brykman | OPQ/OS
- Sharmista Chatterjee | OPQ/OPF
- Merry Christie | OPQ/OBP
- Poonam Delvadia | OPQ/ONDP
- Raymond Frankewich | OPQ/ONDP
- Rick Friedman | OC
- Tara Gooen | OPQ/OPPQ
- Ying Zhang | OPQ/OPF
- Min Li | OPQ/ONDP
- Rapti Madurawe | OPQ/OPF
- Grace McNally | OPQ/OPPQ
- Riley Myers | OPQ/OBP
- Thomas O'Connor | OPQ/OTR
- Hasmukh Patel | OPQ/OLDP
- Bhagwant Rege | OPQ/OLDP
- Bryan Riley | OPQ/OPF
- Mohan Sapru | OPQ/ONDP
- Robert Tollefsen | ORA

ETT Guidance and MAPP

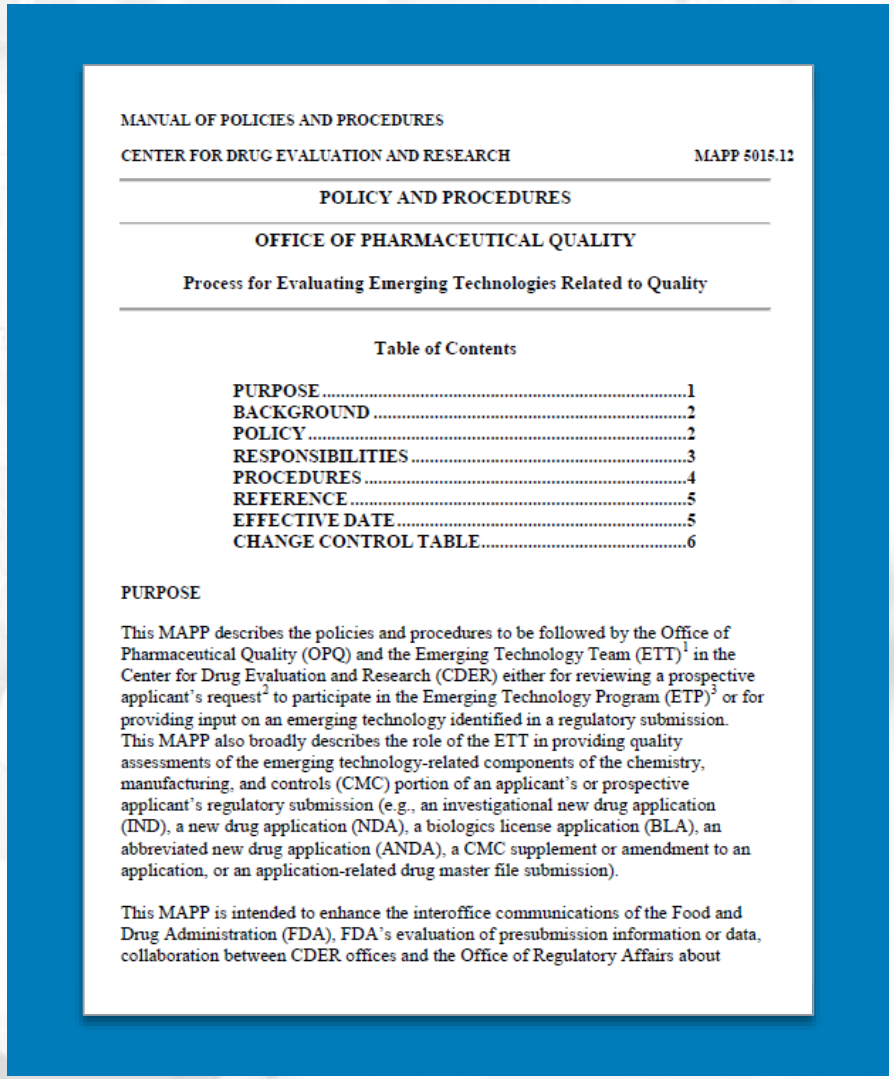


Advancement of Emerging Technology Applications for Pharmaceutical Innovation and Modernization

Guidance for Industry

U.S. Department of Health and Human Services
Food and Drug Administration
Center for Drug Evaluation and Research (CDER)

September 2017
Pharmaceutical Quality/CMC



MANUAL OF POLICIES AND PROCEDURES

CENTER FOR DRUG EVALUATION AND RESEARCH MAPP 5015.12

POLICY AND PROCEDURES

OFFICE OF PHARMACEUTICAL QUALITY

Process for Evaluating Emerging Technologies Related to Quality

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PURPOSE

This MAPP describes the policies and procedures to be followed by the Office of Pharmaceutical Quality (OPQ) and the Emerging Technology Team (ETT)[1] in the Center for Drug Evaluation and Research (CDER) either for reviewing a prospective applicant's request[2] to participate in the Emerging Technology Program (ETP)[3] or for providing input on an emerging technology identified in a regulatory submission. This MAPP also broadly describes the role of the ETT in providing quality assessments of the emerging technology-related components of the chemistry, manufacturing, and controls (CMC) portion of an applicant's or prospective applicant's regulatory submission (e.g., an investigational new drug application (IND), a new drug application (NDA), a biologics license application (BLA), an abbreviated new drug application (ANDA), a CMC supplement or amendment to an application, or an application-related drug master file submission).

This MAPP is intended to enhance the interoffice communications of the Food and Drug Administration (FDA), FDA's evaluation of presubmission information or data, collaboration between CDER offices and the Office of Regulatory Affairs about

Program Objectives

To serve as a centralized location for external inquiries on novel technologies

To provide a forum for firms to engage in early dialog with FDA to support innovation

To ensure consistency, continuity, and predictability in review and inspection

To engage international regulatory agencies to share learnings and approaches

To identify and evaluate potential roadblocks relating to existing guidance, policy, or practice

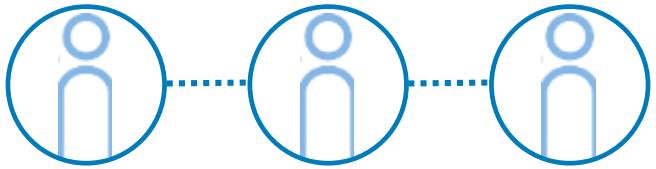
To facilitate knowledge transfer to relevant CDER and ORA review and inspection programs

To help establish scientific standards and policy, as needed

Contact us: CDER-ETT@fda.hhs.gov

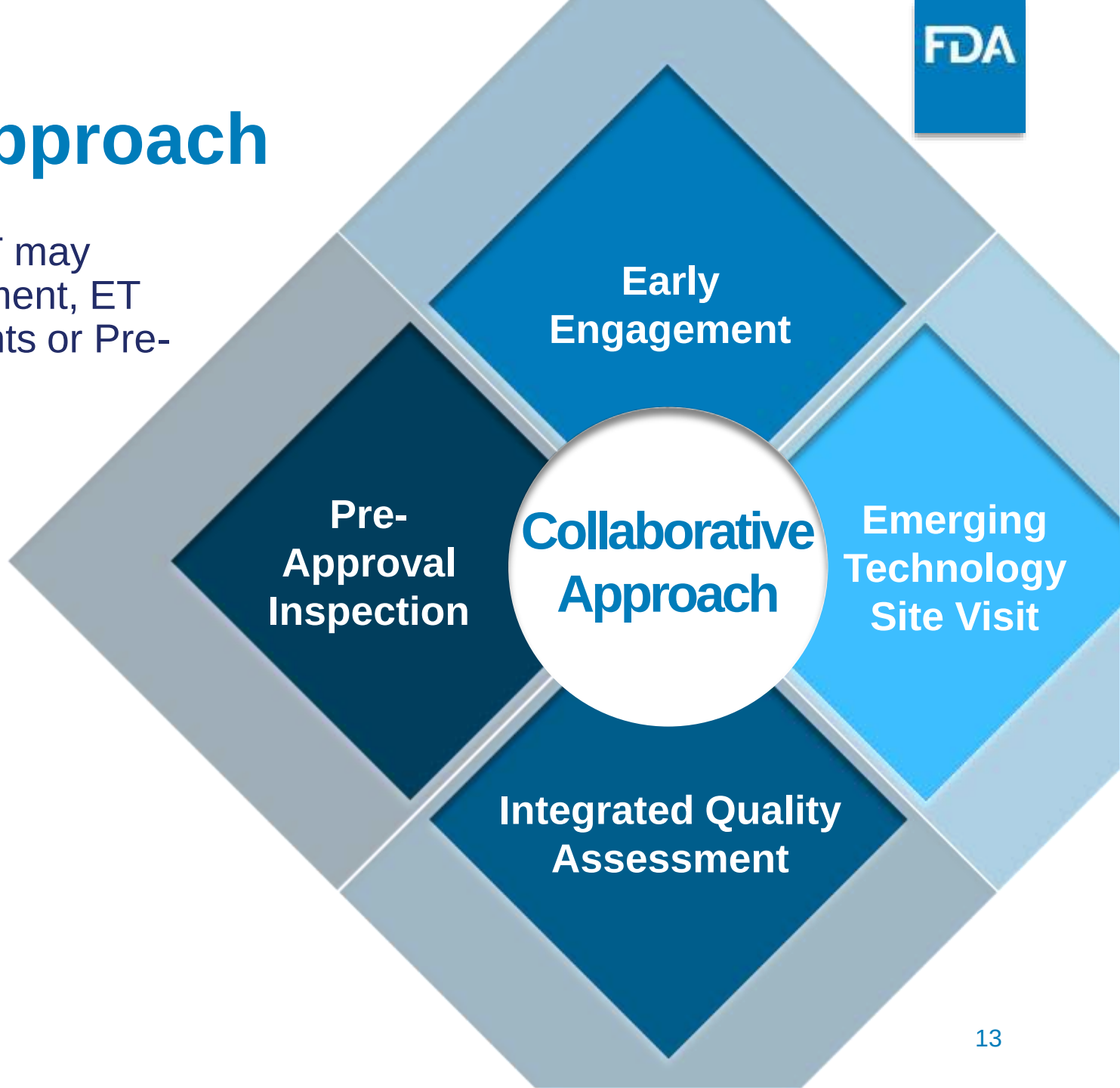
ETT Collaborative Approach

Over the course of an ETP project, ETT may employ a combination of early engagement, ET site visits, integrated quality assessments or Pre-Approval Inspections



The same ETT representative(s) will be involved in the entire process

The composition of a review team will likely remain the same throughout the entire process



ETT Collaborative Approach

Early Engagement (Pre-submission)

Face-to-face meeting(s) with ETT involvement – provided upfront scientific input under the Emerging Technology Program

Emerging Technology Site Visit

Participation by OPQ (including the ETT member(s)) and/or ORA members

Integrated Quality Assessment (IQA)

Interdisciplinary team with experts in Drug Substance, Drug product, Process/Facility, Biopharm, and/or Inspection

ETT member as an Application Technical Lead (ATL) or co-ATL to lead the IQA team when the ET impacts most part of a CMC section

Pre-Approval Inspection (PAI)

Conducted by team members from OPQ (including the ETT Member(s)) and ORA.

ETT Collaborative Approach: Early Engagement

01

Start during early technology development even without a drug candidate identified

02

Follow procedures described in the ET guidance to request participation in the ET program

03

Develop five-page proposal

- Describe the technology and explain why it is novel or unique
- Describe how it improves products
- Summarize development plan and implementation roadblocks
- Develop submission timeline

The sponsor must justify how the proposed emerging technology meet two criteria:

(1) Pharmaceutical Novelty
(2) Product Quality Advancement

Email proposals to: CDER-ETT@fda.hhs.gov

Progress in Emerging Technology

Approval of a first regulatory application utilizing 3D printing technologies

- Aprecia (Spritam, 2015)

Approvals of applications utilizing continuous manufacturing (CM)

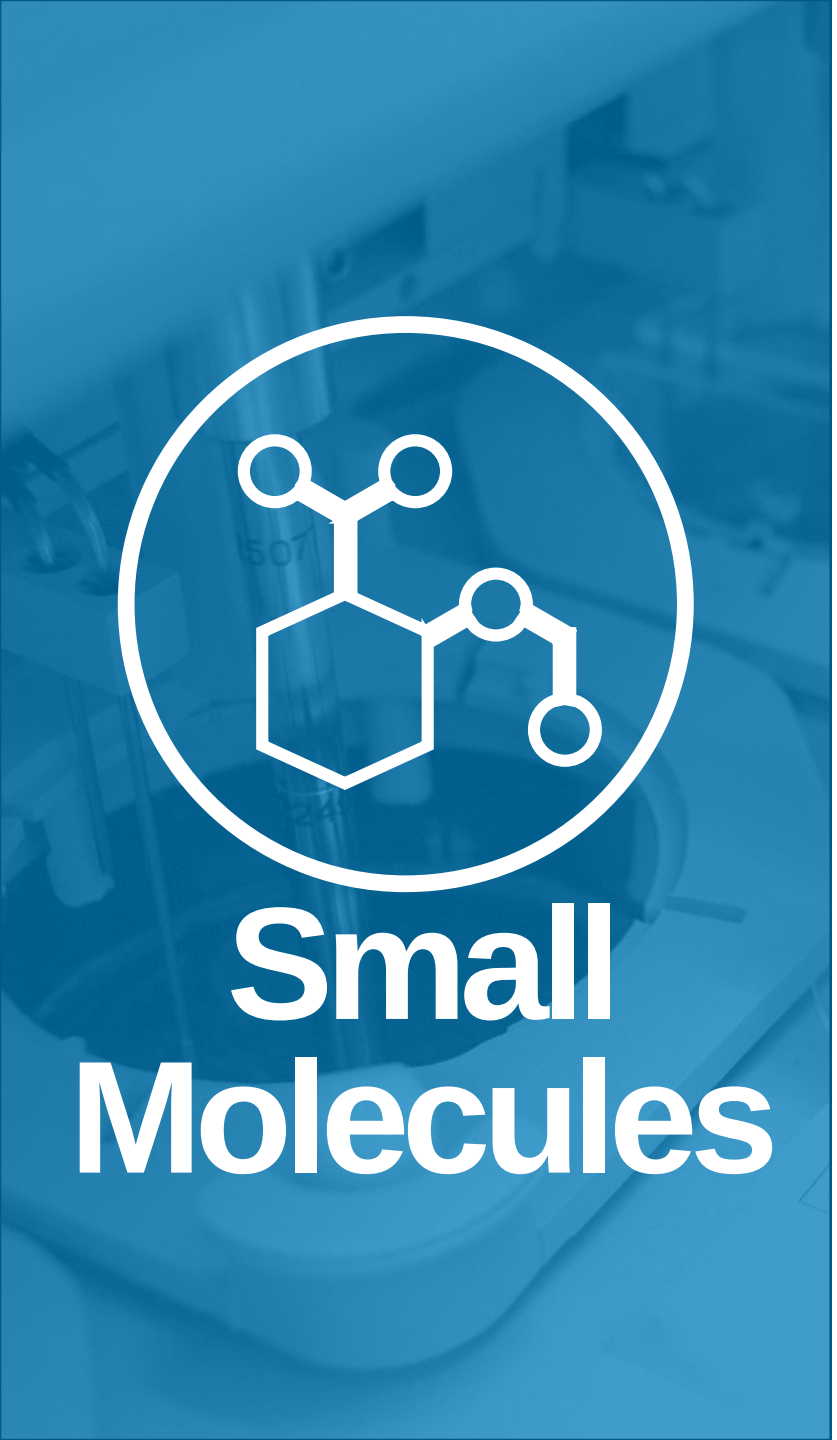
- Vertex ORKAMBI (lumacaftor/ivacaftor, 2015)
- Janssen Prezista (darunavir, 2016)
- Eli Lilly Verzenio (abemaciclib, 2017)
- Vertex Symdeko (tezacaftor/ivacaftor and ivacaftor, 2018)
- Pfizer Daurismo (glasdegib, 2018)

Requests accepted to the ET program since launching in late 2014

- Received over 100 ETT proposals and accepted less 50% of these proposals to the program

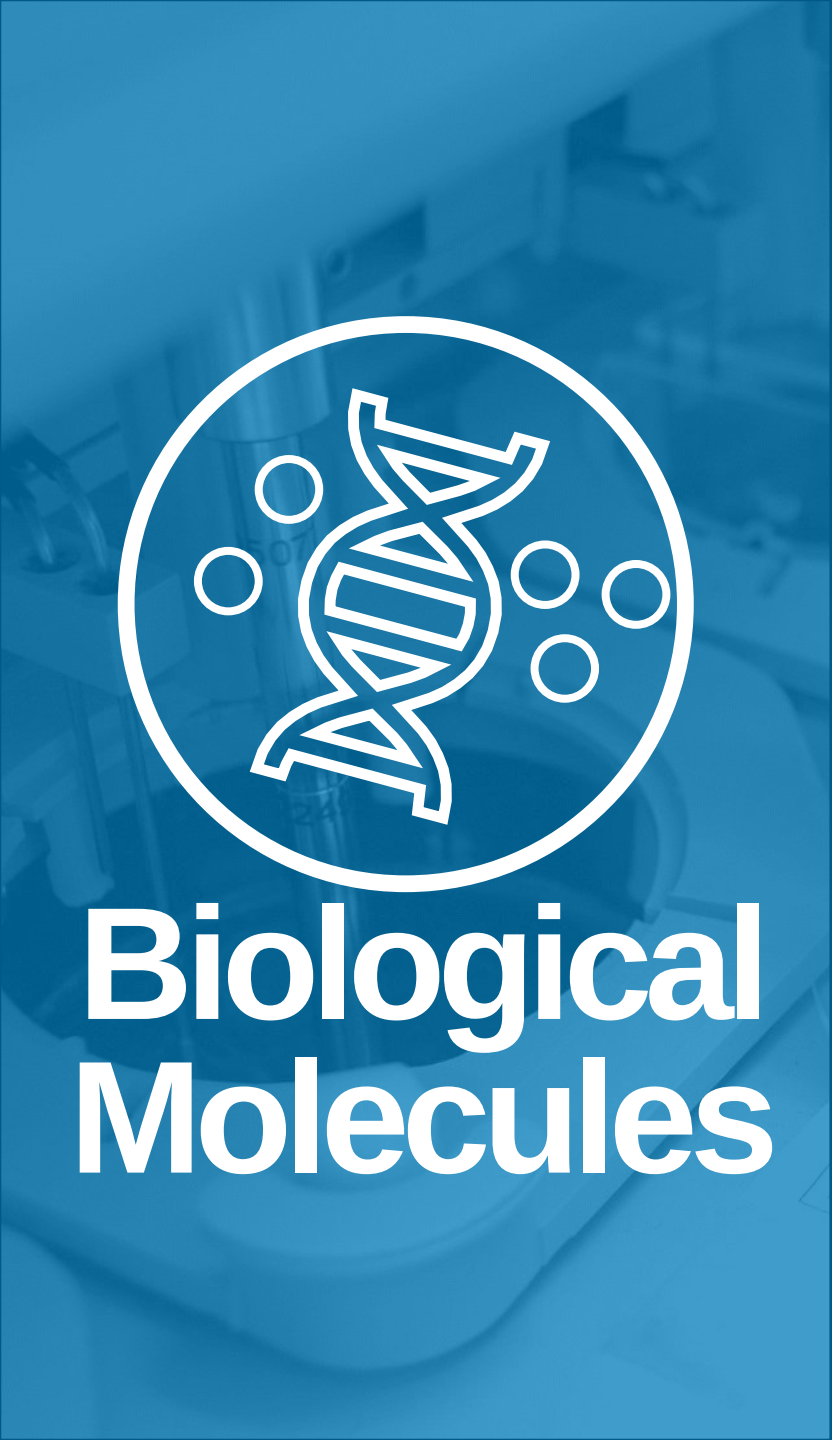
For ETT Activities visit the ETP website:

https://www.fda.gov/AboutFDA/CentersOffices/OfficeofMedicalProductsandTobacco/CDER/ucm523228.htm



FDA Experience: Emerging Technologies

- CM of drug substance
- CM of drug product
- End-to-end CM
- Pharmacy-on-demand
- Model-based control strategy for continuous manufacturing
- Continuous aseptic spray drying
- 3D printing manufacturing
- Ultra long-acting oral formulation



FDA Experience: Emerging Technologies

- Controlled ice nucleation for lyophilization processes
- Comprehensive product testing using a single multi-attribute assay (multi-attribute method)
- Continuous manufacturing for a downstream process
- End-to-end integrated bioprocess
- Pharmacy on demand (small manufacturing platform for continuous bioprocesses)

Multiple Technologies

FDA Experience: Emerging Technologies

- Closed aseptic filling system
- Isolator and robotic arm for aseptic filling
- Novel container and closure system for injectable products

Getting Ready for ETT Meetings

Regulatory Agencies

- Willing to learn / understand and recognize potential of new technologies with an open mind
- Make science- and risk-based assessments and decisions
- Be transparent to industry and not afraid to ask questions
- Multi-disciplinary approach (collaborative)

Industry

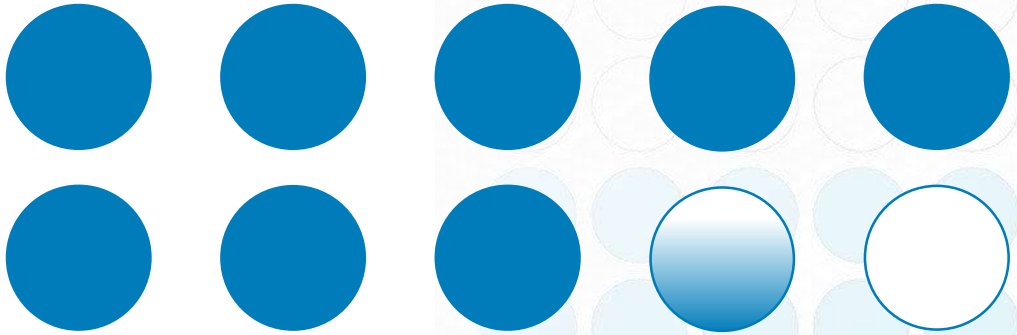
- Be transparent and willing to share with the agency early
- Not afraid to receive and answer many questions from the agency
- View regulators as part of your team

We are getting there!

Industry Feedback

Overall Score

Past and current ETP participants provided feedback and overall satisfaction ratings of 8.9 out of 10



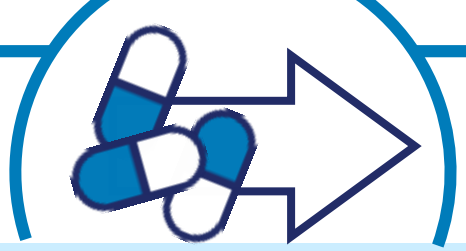
Categories

ETP participants feedback fell into three categories:

Value Process Awareness

Acknowledgements

Emerging Technology Team



OPQ Leadership

Industry Partners

Challenge Question

- Under the Emerging Technology Program:
  Can you request a meeting with FDA without identifying the drug molecule or product associated with the proposed new technology?

- **YES**

Challenge Question

- What is the unique feature of the Emerging Technology Program?
  - **The sponsor can ask for FDA feedback during early technology development without identifying the drug molecule or product associated with the proposed new technology**
  - **An ETT member will be involved in the pre-submission meeting(s), ETT site visit, application review and pre-approval inspection**
  - **All of the above**

Challenge Question

- How many continuous manufacturing applications have been approved under the Emerging Technology Program?
  - **1**
  - **2**
  - **3**
  - **5**
  - **6.02×10^{23}**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U.S. FOOD & DRUG
ADMINISTRATION
Thank You!