FDA's Study of Alternative Assays
Case Study: Microphysiological Systems (MPS)

RADM Hinton, Chief Scientist, FDA

FDA's Office of the Chief Scientist (OCS)

- Established to forge the cross-agency efforts needed to address the rapid changes in vital areas of science, technology, and our globalized economy
- OCS works closely with FDA's product centers, providing strategic leadership and support for FDA's regulatory science and innovation initiatives
- A few highlights
  - Intramural collaborations
  - Extramural collaborations
  - Funding mechanisms
  - Cross-agency scientific working groups

Focus Areas of Regulatory Science (FARS)

- 2021: Advancing Regulatory Science at FDA: Focus Areas of Regulatory Science
  - Published January 11, 2021
- FARS are organized across each of four initiatives
  - Public Health Emergency Preparedness and Response
  - Increasing Choice and Competition through Innovation
  - Unleashing the Power of Data
  - Empowering Patients and Consumers
- FARS-related research conducted through intramural and extramural research programs identified by FDA centers and offices

Alternative Methods Working Group (AMWG)

- Established through OCS in the Office of Commissioner
- Cross-cutting representation
- Objectives include
  - Discussing alternative methods activities across FDA
  - Interacting with U.S. Federal and global partners
- Current focus is MPS
- For updates and comments:
  - FDA Alternative Methods website
  - alternatives@fda.hhs.gov

FDA's Alternative Methods Report

Released January 5, 2021

History of FDA's Involvement with MPS

- 2010: FDA and NIH Common Fund awarded grant money to Wyss Institute to develop a heart-lung micromachine
- 2011: DARPA approached FDA's OCS requesting to work together to develop a human body on a chip for medical countermeasures
  - DARPA funded MPS research and involved FDA from the beginning of the MPS program to help ensure that regulatory challenges of reviewing drug safety and efficacy are considered during development of the MPS platform
- 2012: NCATS funded the Tissue Chip Development Program
  - FDA has been a partner throughout the program

FDA Internal Research- FDA User Group

FDA scientists are developing in-house MPS and collaborating with several external partners

FDA signs collaborative agreement with CN Bio Innovations to use Organs-on-Chips to improve drug development and evaluation

POSTED OCT 2017

London, UK, October 26 2017: CN Bio Innovations Limited announced today that it has entered into a Research Collaboration Agreement with the US Food and Drug Administration's (FDA) Center for Drug Evaluation and Research.

Center for Drug Evaluation and Research

Center for Biologics Evaluation and Research

Original Report

Adaptation of a Simple Microfluidic Platform for High-Dimensional Quantitative Morphological Analysis of Human Mesenchymal Stromal Cells on Polystyrene-Based Substrates

SLAS Technology
2017, Vol. 22(6) 646–661

DOI: 10.1177/2472630317726050
journals.sagepub.com/home/jla
SAGE

Johnny Lam[1], Ross A. Marklein[1], Jose A. Jimenez-Torres[2], David J. Beebe[2], Steven R. Bauer[1], and Kyung E. Sung[1]

TISSUSE Emulating Human Biology

National Center for Toxicological Research

Human iPSC-based Cardiac Microphysiological System For Drug Screening Applications

Anurag Mathur[1,2], Peter Loskill[1,2], Kaifeng Shao[1], Nathaniel Huebsch[4,5], SoonGweon Hong[1], Sivan G. Marcus[1], Natalie Marks[1], Mohammad Mandegar[4,5], Bruce R. Conklin[4,5], Luke P. Lee[1,3] & Kevin E. Healy[1,2]

Center for Food Safety and Applied Nutrition

FDA and Emulate sign a Collaborative Agreement – October 29, 2020

FDA Encourages Development of New Testing Methodologies

- Novel approaches that may be acceptable for regulatory use
- A few points to consider
  - Regulator familiarity with techniques
  - Standard definitions
  - Context of use

Context of Use Qualification

- Beyond analytical validation, what steps need to be taken to enable regulatory use, without proving utility each time?
- Concept of “qualification”
- Inextricable to qualification is concept of “context of use”

FDA Encourages Stakeholder Dialogue

- Venues include
  - AMWG webinars, see FDA Alternative Methods webpage
  - Meetings such as this NASEM meeting
  - Other joint meetings on MPS
  - By email: alternatives@fda.hhs.gov
  - Pre-IND/IDE meetings with FDA regulators
  - Critical Path Innovation Meetings

Continued Communication and Collaboration


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