Establishing the Suitability of Model-Integrated Evidence to Demonstrate Bioequivalence for Long-Acting Injectable and Implantable Drug Products

Virtual Public Workshop
November 30th
2021

Agenda

FDA and the Center for Research on Complex Generics (CRCG) will host a free virtual public workshop on November 30, 2021: Establishing the Suitability of Model-Integrated Evidence to Demonstrate Bioequivalence for Long-Acting Injectable and Implantable Drug Products.

Model-integrated approaches are being increasingly applied by the drug industry to support and demonstrate bioequivalence (BE), especially for complex generic products (e.g., long-acting injectable drug products) for which in vivo BE studies are challenging to conduct[1]. These challenges are due, in part, to lengthy BE studies that use patient populations and often require multiple doses, potentially taking months for each patient to reach steady state. Model-integrated approaches have the potential to overcome some of these challenges and result in more efficient study designs to demonstrate BE.

This workshop engages experts in the field of modeling and simulation in the generic and new drug industries, academia, and relevant stakeholders to explore, identify and recommend best practices for the development and assessment of model-integrated approaches for BE assessment of long-acting injectables and implants. The workshop will focus on how model-integrated approaches support innovative study designs and data analyses and how they can be validated and verified. A collaborative development of best practices will contribute to the availability of more long-acting injectable and implantable generic drug products for the American public.

FDA and the Center for Research on Complex Generics—which is a collaboration between the University of Maryland School of Pharmacy and the University of Michigan College of Pharmacy—are dedicated to advancing programs that stimulate scientific dialogue, disseminate current insights about complex generics, and generate new knowledge in support of FDA's mission to promote and protect the public health by increasing access to safe and effective generic medicines.

GENERAL TOPICS THAT WILL BE THE FOCUS OF THE WORKSHOP:

- Current challenges in development and assessment of generic long-acting injectables and implantable drug products
- Recent research on the development of model-integrated bioequivalence approaches – innovative study designs and data analysis for bioequivalence assessment
- Application of model-integrated approaches to long-acting injectable and implantable drug products using population pharmacokinetic modeling
- Validation and verification for model-integrated bioequivalence approaches
- Consensus building on best practices for model-integrated bioequivalence approaches

[1] Zhao L, Kim MJ, Zhang L, Lionberger R. Generating Model Integrated Evidence for Generic Drug Development and Assessment. Clin Pharmacol Ther. 2019 Feb;105(2):338-349. doi: 10.1002/cpt.1282. Epub 2019 Jan 20. PMID: 30414386.

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8:30 AM – 8:40 AM	**CRCG Welcome Remarks**	
	James Polli, PhD	Co-Director, CRCG
	Anna Schwendeman, PhD	Co-Director, CRCG
8:40 AM – 8:50 AM	**Opening Remarks**	
	Robert Lionberger, PhD	Director, ORS, OGD, CDER, FDA
Session 1:	**Challenges in Life Cycle Management of Long-Acting Injectable and Implantable Drug Products**	
8:50 AM – 9:05 AM	**Model-Integrated Evidence for Bioequivalence Assessment of LAIs – From a Generic Drug Perspective**	
	Miyoung Yoon, PhD	Acting Team Lead, DQMM, ORS, OGD, CDER, FDA
9:05 AM – 9:20 AM	**Modeling and Simulation to Support Appropriate Use of Long-Acting Antipsychotics**	
	Hao Zhu, PhD	Acting Director, DPM, OCP, OTS, CDER, FDA
9:20 AM – 9:35 AM	**Industry Perspective: Regulatory Challenges in Development of Generic Long-Acting Injectables**	
	Ameya Kohojkar, MS, RAC	Associate Director, Regulatory Affairs, Generics, TEVA Pharmaceuticals
9:35 AM – 9:50 AM	**Industry Perspective: Incorporation of BE Modeling and LAI Development Challenges**	
	Michael Fitzgerald, PhD	Head of Injectable Formulation Development, Viatris
9:50 AM – 10:05 AM	***Coffee Break***	
Session 2:	**Current Status of The Model-Integrated Bioequivalence for Long-Acting Injectable and Implantable Drug Products**	
10:05 AM – 10:25 AM	**Model-Integrated Methods and Innovative Study Designs for Generic LAI Product Development and Regulatory Assessment**	
	Andrew Hooker, PhD	Prof., Dept. of Pharmacy, Uppsala Univ.
10:25 AM – 10:45 AM	**Model-Integrated BE Approaches for Long-Acting Injectables**	
	Murray Ducharme, PharmD, FCCP, FCP	President & CEO, Learn and Confirm Inc./Prof. Associé, Pharmacie, Univ. of Montreal
10:45 AM – 11:00 AM	***Coffee Break***	
Session 3:	**Examples of Model-Integrated Bioequivalence for Long-Acting Injectable and Implantable Drug Products – Focus on Best Practice Development**	
11:00 AM – 11:25 AM	**Accelerating LAI Generic Development Using Model-Integrated Bioequivalence**	
	Joga Gobburu, PhD	Prof. & Director, Center for Translational Medicine, Univ. of Maryland Baltimore
11:25 AM – 11:50 AM	**Novel Model-Integrated Designs for Bioequivalence Studies of LAI Products: A Complete Framework with the MonolixSuite**	
	Géraldine Ayral, PhD	VP Application, Simulations Plus, Lixoft Division
11:50 AM – 12:15 PM	**A Model-Integrated Pathway to Explore Bioequivalence of LAI Products: Studies Using Paliperidone Palmitate**	
	Parmesh Gajjar, BA (Hons), MMath, PhD	Principal Scientist, Seda Pharmaceutical Development Services
12:15 PM – 1:00 PM	***Lunch Break***	
Session 4:	**Live Panel Discussion**	
1:00 PM – 2:00 PM	**Live Panel Discussion Part 1: Response to Speakers**	
Moderator:	**Lanyan (Lucy) Fang, PhD**	Deputy Director, DQMM, ORS, OGD, CDER, FDA
Panelists:	**Robert Lionberger, PhD**	Director, ORS, OGD, CDER, FDA
	Anna Schwendeman, PhD	Co-Director, CRCG
	Miyoung Yoon, PhD	Acting Team Lead, DQMM, ORS, OGD, CDER, FDA
	Hao Zhu, PhD	Acting Director, DPM, OCP, OTS, CDER, FDA
	Ameya Kohojkar, MS, RAC	Associate Director, Regulatory Affairs, Generics, TEVA Pharmaceuticals
	Michael Fitzgerald, PhD	Head of Injectable Formulation Development, Viatris
	Andrew Hooker, PhD	Prof., Dept. of Pharmacy, Uppsala Univ.
	Murray Ducharme, PharmD, FCCP, FCP	President & CEO, Learn and Confirm Inc./Prof. Associé, Pharmacie, Univ. of Montreal
	Joga Gobburu, PhD	Prof. & Director, Center for Translational Medicine, Univ. of Maryland Baltimore
	Géraldine Ayral, PhD	VP Application, Simulations Plus, Lixoft Division
	Parmesh Gajjar, BA (Hons), MMath, PhD	Principal Scientist, Seda Pharmaceutical Development Services
	Bing Li, PhD	Associate Director for Scientific Innovation, OB, OGD, CDER, FDA
	Liang Zhao, PhD	Director, DQMM, ORS, OGD, CDER, FDA
	Raja Velagapudi, PhD	Executive Director for Clinical Development, Sandoz Inc.
	Yu Chung Tsang, PhD	CSO, Biopharmaceutics & Biostatistics, Apotex
2:00 PM – 2:15 PM	**Coffee Break**	
2:15 PM – 3:15 PM	**Live Panel Discussion Part 2: In Depth Discussion of Model-Integrated Evidence Approach and Audience Q & A**	
Moderator:	**Same as Part 1**	
Panelists:	**Same as Part 1**	
3:15 PM – 3:30 PM	**Workshop Summation and Closing Remarks**	
	Liang Zhao, PhD	Director, DQMM, ORS, OGD, CDER, FDA

Appendix of Abbreviations

BA	Bachelor of Arts
BE	Bioequivalence
CDER	Center for Drug Evaluation and Research
CEO	Chief Executive Officer
CSO	Chief Scientific Officer
CRCG	Center for Research on Complex Generics
Dept	Department
DPM	Division of Pharmacometrics
DQMM	Division of Quantitative Methods and Modeling
FCCP	Fellow of the American College of Clinical Pharmacy
FCP	Fellow of the College of Clinical Pharmacology
FDA	United States Food and Drug Administration
GDUFA	Generic Drug User Fee Amendments
Hons	Honours
LAI	Long-Acting Injectable
MIE	Model-integrated evidence
MMath	Master of Mathematics
MS	Master of Science
OB	Office of Bioequivalence
OCP	Office of Clinical Pharmacology
OGD	Office of Generic Drugs
ORS	Office of Research and Standards
OTS	Office of Translational Sciences
PharmD	Doctor of Pharmacy
PhD	Doctor of Philosophy
PK	Pharmacokinetics
Prof	Professor or Professeur
RAC	Regulatory Affairs Certification
Univ	University
VP	Vice President