

# In vitro dissolution testing and in silico modeling for orally administered drug products

Created on: 08-04-2020 - Last modified on: 08-04-2020

## SCOPE OF THE METHOD

<b>The Method relates to</b>	Human health
<b>The Method is situated in</b>	Basic Research, Education and training, Regulatory use - Routine production, Translational - Applied Research
<b>Type of method</b>	In silico
<b>This method makes use of</b>	Animal derived cells / tissues / organs

## DESCRIPTION

### Method keywords

PBPK modeling

in vitro dissolution testing

intestinal absorption

oral absorption

### Scientific area keywords

Biopharmaceutics  
drug products  
pharmacometrics  
pharmacokinetics  
pharmacodynamics

### **Method description**

Performing biopredictive dissolution tests in *in vitro* models that are frequently used in pharmaceutical and academic institutions and using these *in vitro* dissolution data as input for PBPK models to predict the systemic exposure of the drug in humans/patients.

### **Lab equipment**

Dissolution beakers ;  
Stirrers ;  
Sampling material ;  
Biorelevant media ;  
PBPK software packages.

### **Method status**

Published in peer reviewed journal

## **PROS, CONS & FUTURE POTENTIAL**

### **Advantages**

3R principle for sure! Also, these tests are much faster and less expensive compared to clinical trials as traditionally done during the drug development process.

### **Challenges**

Not all physiological variables are integrated in *in vitro* dissolution methods which may result in sometimes false predictions in the end!

### **Modifications**

Doing more clinical studies in the hospital with the focus on exploring human GI

physiology so we have more information to optimize *in silico* and *in vitro* models.

### **Future & Other applications**

Especially in regulatory science, this approach may lead to easier and faster drug product approvals. In the current setting, the time from drug discovery until marketing access takes about 12 years on average. This could significantly be reduced if regulatory authorities revise their guidelines.

## **REFERENCES, ASSOCIATED DOCUMENTS AND OTHER INFORMATION**

### **References**

Hens B, Masuy I, Deloosse E, Mols R, Tack J, Augustijns P. Exploring the Impact of Real-Life Dosing Conditions on Intraluminal and Systemic Concentrations of Atazanavir in Parallel with Gastric Motility Recording in Healthy Subjects [published online ahead of print, 2020 Feb 27]. *Eur J Pharm Biopharm.* 2020;S0939-6411(20)30055-2.

doi:10.1016/j.ejpb.2020.02.014

Bermejo M., Hens B., Dickens J., Mudie D., Paixão P., Tsume Y., Shedden K., Amidon G.L. A Mechanistic Physiologically-Based Biopharmaceutics Modeling (PBBM) Approach to Assess the In Vivo Performance of an Orally Administered Drug Product: From IVIVC to IVIVP, 2020, *Pharmaceutics*, 12 (1)

Cristofolletti R., Hens B., Patel N., Esteban V.V., Schmidt S., Dressman J.. Integrating drug- and formulation-related properties with gastrointestinal tract variability using a product-specific particle size approach: case example ibuprofen. *J Pharm Sci.* 2019

Hens B., Kataoka M., Ueda K., Gao P., Tsume Y., Augustijns P., Kawakami K., Yamashita S. Biopredictive in vitro testing methods to assess intestinal drug absorption from supersaturating dosage forms. *JDSST.* 2019

Yu A.M., Koenigsknecht M., Hens B., Baker J.R., Wen B., Jackson T.L., Pai M.P., Hasler W.L., Amidon G.L., Sun D. Mechanistic Deconvolution of Oral Absorption Model with Dynamic Gastrointestinal Fluid to Predict Regional Rate and Extent of GI Drug Dissolution. *The AAPS J.* 2019

Hens B, Corsetti M, Bermejo M, Löbenberg R, González PM, Mitra A, Desai D, Chilukuri DM, Aceituno A. "Development of Fixed Dose Combination Products" Workshop Report: Considerations of Gastrointestinal Physiology and Overall Development Strategy. The AAPS Journal

### Associated documents

[Hens et al. posaconazole-final.pdf](#)

[FinalArticleASA.pdf](#)

### PARTNERS AND COLLABORATIONS

#### Organisation

**Name of the organisation** KU Leuven

**Department** Department of Pharmaceutical and Pharmacological Sciences

**Country** Belgium

**Geographical Area** Flemish Region

*Coordinated by*



*Financed by*

