Predicting food effects of Mucinex® 12hr using the dynamic gastric model (DGM)

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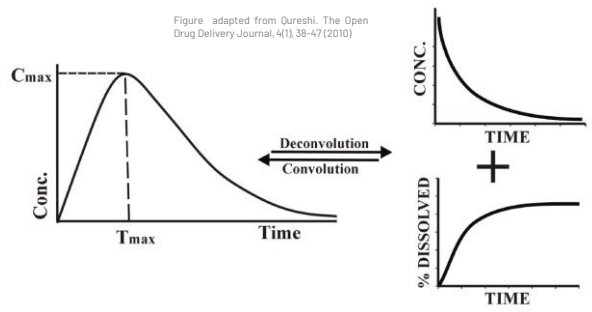
FASTED STATE EXPERIMENTS

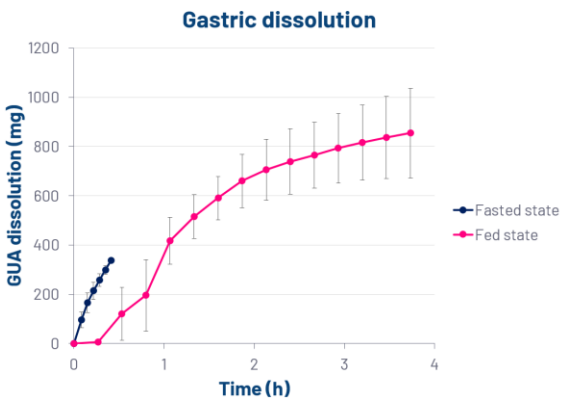
- One Mucinex® 12hr tablet (1200 mg guaifenesin) added to the DGM along with 240 mL tap water
- 29 min processing time with dynamic addition of gastric acid and enzymes
- Samples of ~40 mL ejected from the DGM every 4 min
- DGM sample transferred to a duodenal module along with concentrated FaSSIF pH 6.5
- Aliquots of 1 mL taken from DGM/duodenal samples and analyzed (HPLC-UV) for dissolved drug content

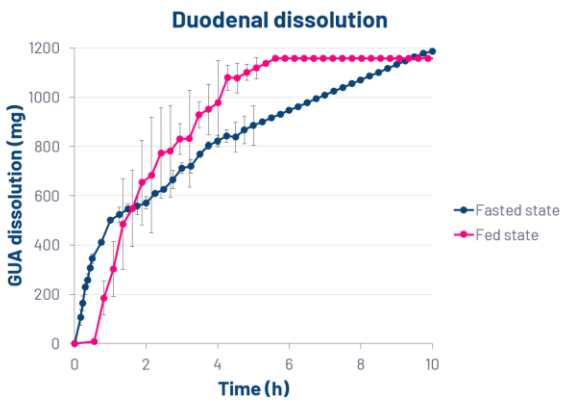
FED STATE EXPERIMENTS

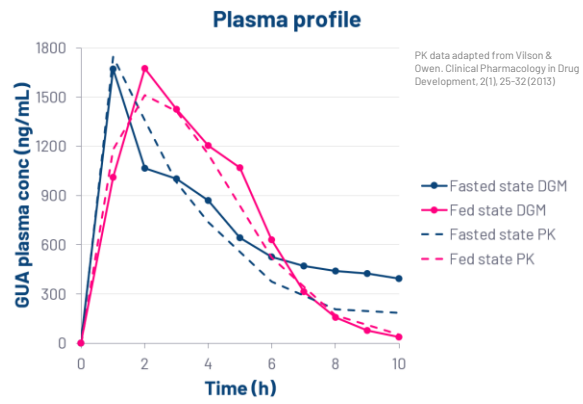
- Chewed high-fat FDA meal and one Mucinex® 12hr tablet added to the DGM along with 240 mL tap water
- 257 min processing time with dynamic addition of gastric acid and enzymes
- Samples of ~70 mL ejected from the DGM every 16 min
- DGM sample transferred to a duodenal module along with concentrated FeSSIF pH 5.8
- Aliquots of 1 mL taken from DGM/duodenal samples and analyzed (HPLC-UV) for dissolved drug content



DGM → **+SIF** → **Duodenal module** → **+Analysis** → **IVIVC**







PK data adapted from Vilson & Owen. Clinical Pharmacology in Drug Development, 2(1), 25-32 (2013)

DATA ANALYSIS

- Simple convolution of duodenal dissolution data
- Guaifenesin PK parameters:
  - Oral bioavailability (BA) 100%
  - Plasma half-life ($T_{1/2}$) 60 min
  - Volume of distribution (V_d) 300 L (~4 L/kg)

Albrecht et al. Multidisciplinary Respiratory Medicine, 12(1), 1-11 (2017).

RESULTS & CONCLUSIONS

- The negligible food effect observed for Mucinex® 12hr observed *in vivo* was also reflected *in vitro*
- The convoluted duodenal dissolution data was predictive of PK parameters C_{max}, T_{max} and AUC.
- The DGM-duodenal module can be used to study (food) effect of oral drug products with good predictability

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