IN-DEPTH UNDERSTANDING OF TABLET DISSOLUTION USING COMPUTATIONAL FLUID DYNAMICS

Introduction

Tablet dissolution testing is one of the most important quality tests for oral solid dosage forms because it is linked to bioavailability. Since dissolution testing takes a long time (e.g., 60 mins), models play a key role in process design and control of tablet manufacturing. Most of existing studies focus on dissolution behavior itself and use simple mechanistic models, e.g., similar with Fick's first law of diffusion. Yet, fluid dynamics in a dissolution vessel is critical to the dissolution behavior.

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BACKGROUND

C&B

LANGUAGE

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Methodology

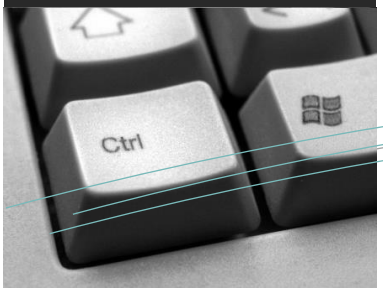
Computational fluid dynamics (CFD) is used and integrated with mechanistic models of tablet dissolution in continuous direct compression process. CFD will be used to predict dynamics in a dissolution vessel and key physical properties, e.g., mass transfer coefficients. The analytical results as well as CFD will be combined with mechanistic models of tablet dissolution (e.g., the Noyes-Whitney equation) to improve the applicability of the model. The student will be involved in CFD using experimental data to find optimal conditions of dissolution testing and predict physical properties needed for mechanistic models of dissolution testing.

Figure 1 – A vessel used for dissolution testing of tablets

Objectives of the thesis

The aim of this project is to use CFD for the simulation of dissolution testing of pharmaceutical tablets. The student may join experimental works using industrial-scale equipment at the Faculty of Pharmaceutical Science.

This topic is a part of the project in collaboration with pharmaceutical companies, e.g., Janssen pharmaceutica and AstraZeneca, and the student will have the chance to present their work to the project partners.



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