

# Pharmacokinetics Compartment Models and Drug Concentration

Clinical Pharmacology Division

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## **Abstract**

Computational modeling of drug absorption, distribution, metabolism, and elimination using compartment models.

## **1 Introduction**

Pharmacokinetics describes the time course of drug concentration in the body.

## **2 One-Compartment Model**

$$\frac{dC}{dt} = -k_e C$$

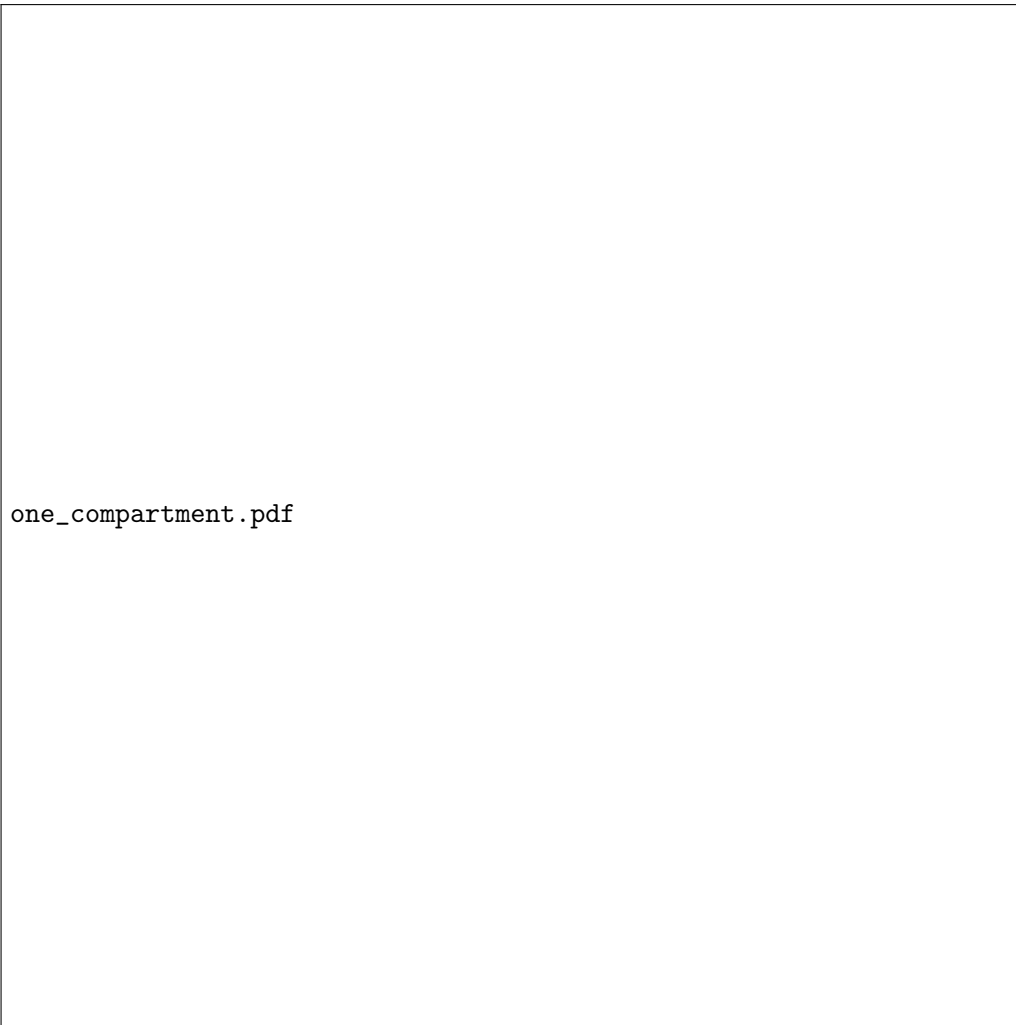


Figure 1: Drug concentration after IV bolus administration.

### 3 Oral Administration



Figure 2: Drug concentration after oral administration.

## 4 Two-Compartment Model

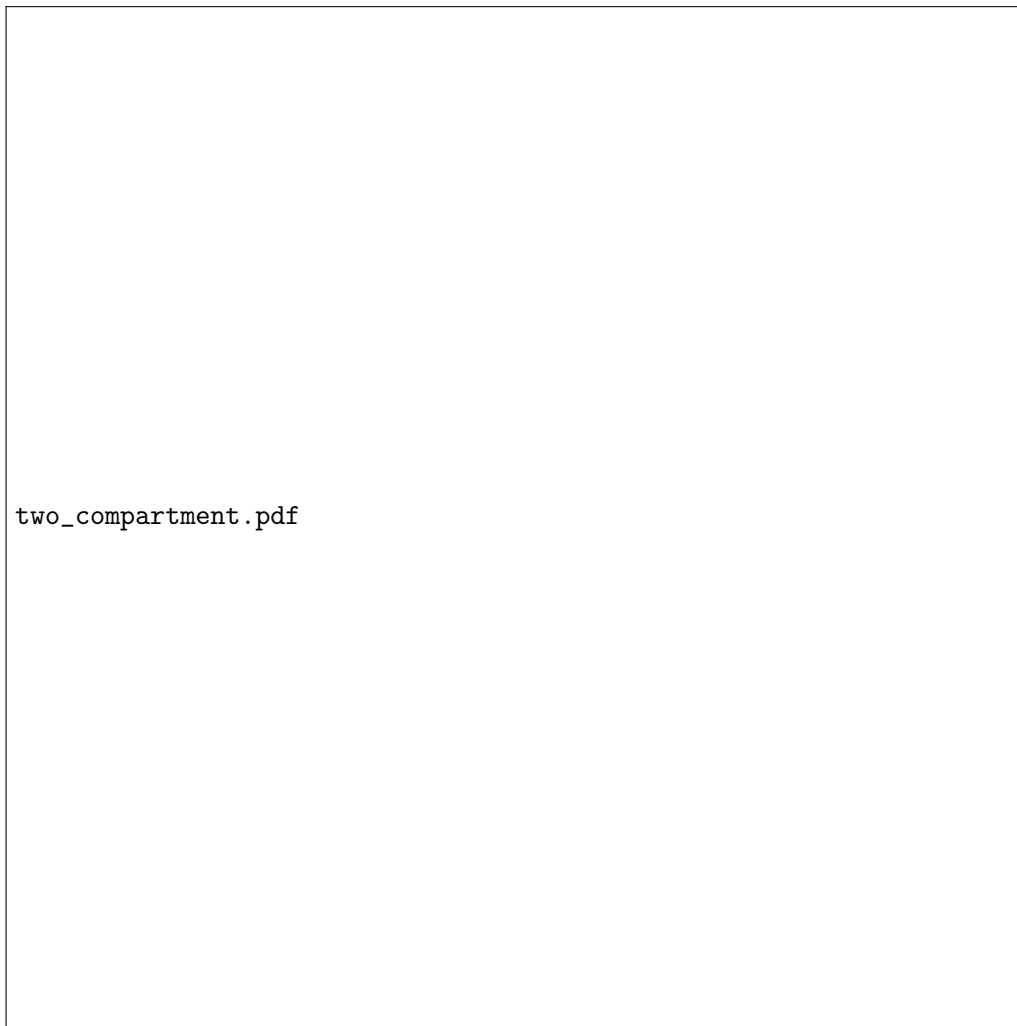


Figure 3: Two-compartment model showing distribution phase.

## 5 Multiple Dosing



Figure 4: Drug accumulation with repeated dosing.

## 6 Continuous Infusion

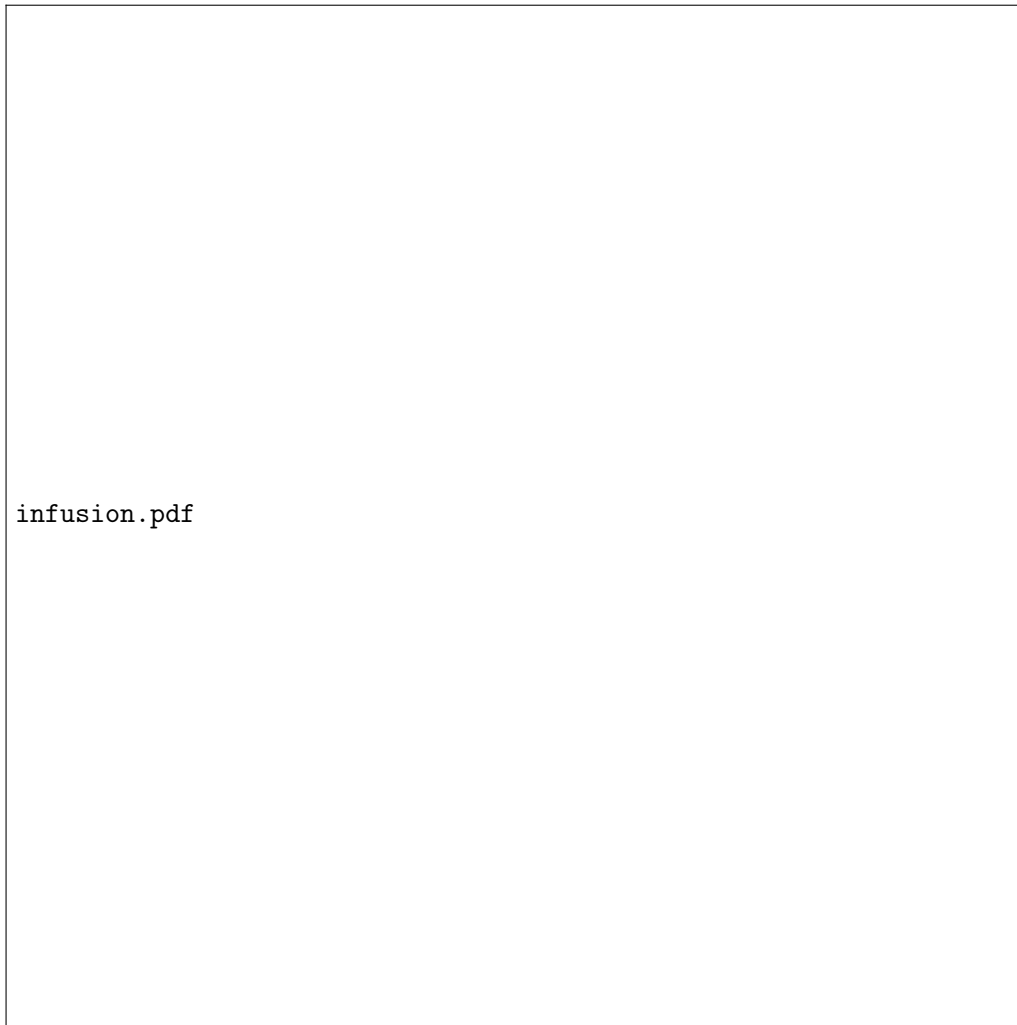


Figure 5: Drug concentration during continuous infusion.

## 7 Loading Dose



Figure 6: Comparison with and without loading dose.

## 8 Results

## 9 Conclusions

Compartment models provide essential tools for drug dosing optimization and therapeutic monitoring.