

Pharmacokinetics

Compartment Models and Drug Concentration

Clinical Pharmacology Division

November 24, 2025

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

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

one_compartment.pdf

Figure 1: Drug concentration after IV bolus administration.

3 Oral Administration



Figure 2: Drug concentration after oral administration.

4 Two-Compartment Model

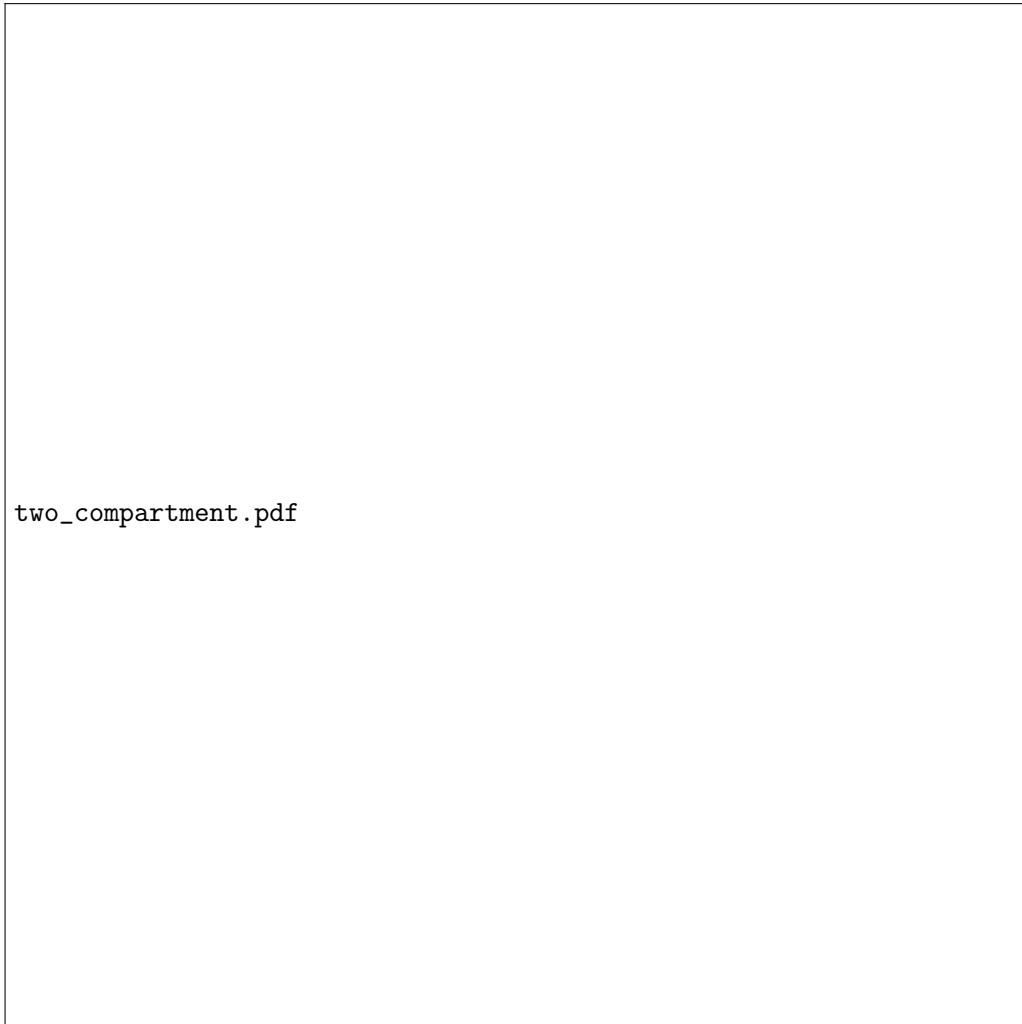


Figure 3: Two-compartment model showing distribution phase.

5 Multiple Dosing



Figure 4: Drug accumulation with repeated dosing.

6 Continuous Infusion

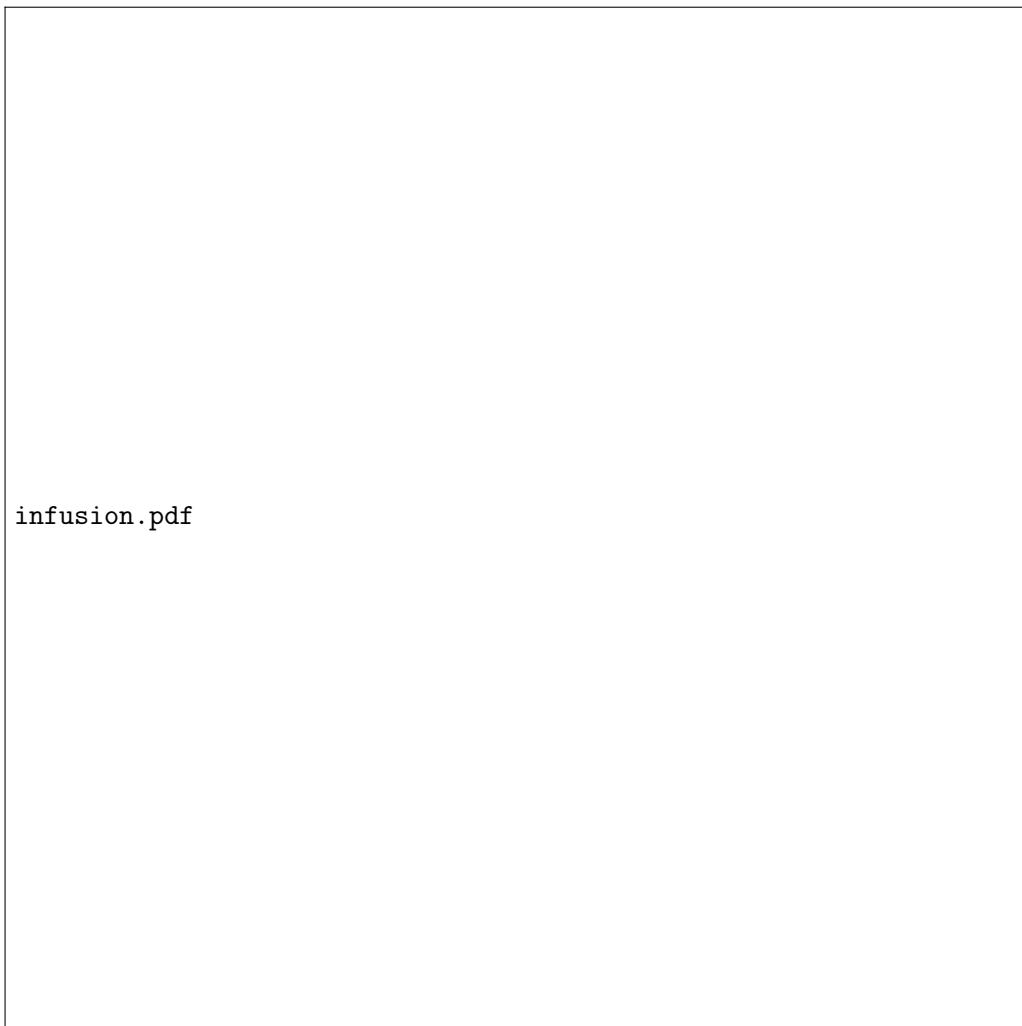


Figure 5: Drug concentration during continuous infusion.

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.