PHARM.D • YEAR 4

Biopharmaceutics & Pharmacokinetic

CHAPTER 7

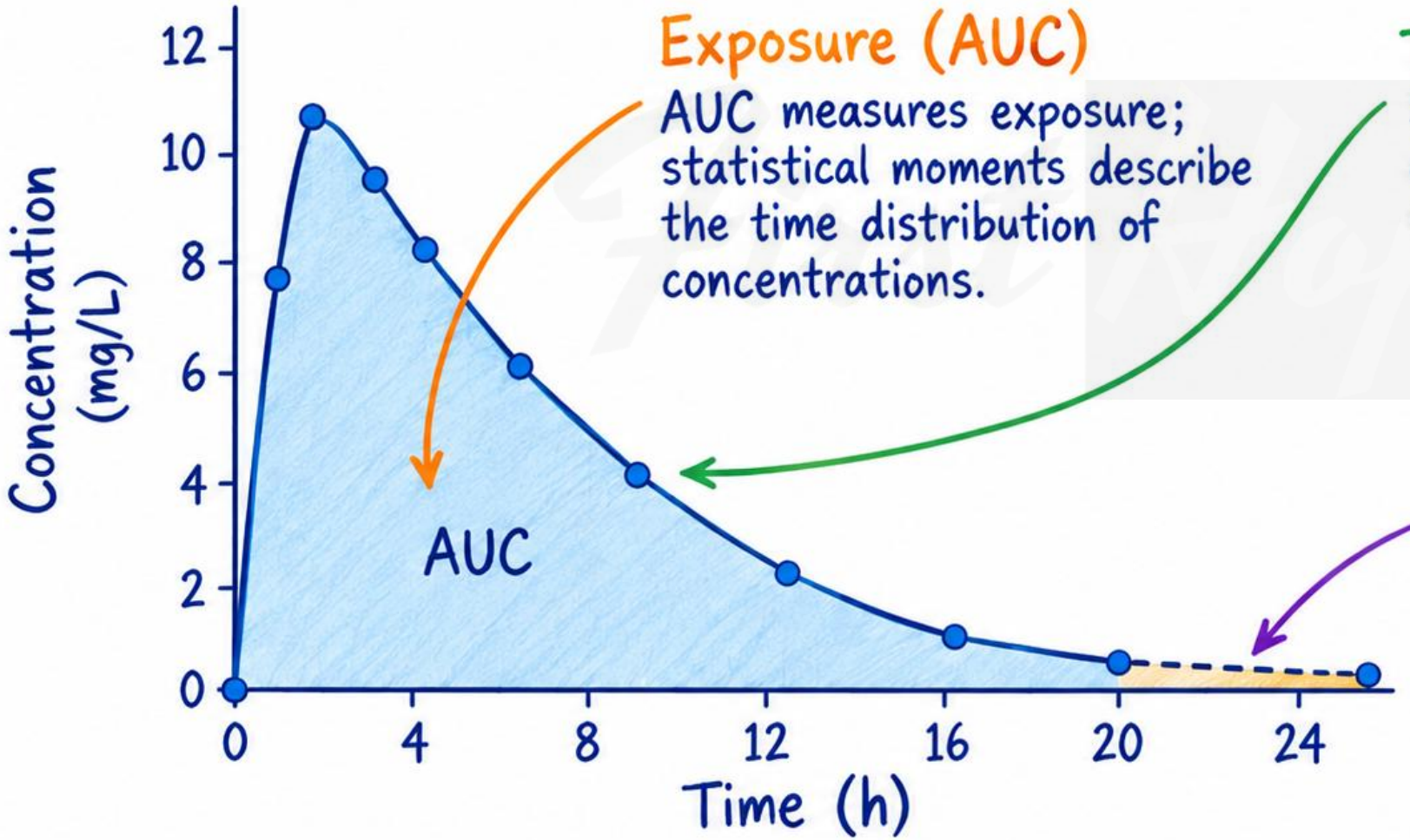
Noncompartmental Pharmacokinetics

PPT CHAPTER COVER



What is noncompartmental analysis?

Noncompartmental analysis summarises a concentration–time profile without choosing a fixed number of compartments.
Observed concentrations and sampling times are used to estimate exposure and other PK measures.



Exposure (AUC)

AUC measures exposure; statistical moments describe the time distribution of concentrations.

Time distribution

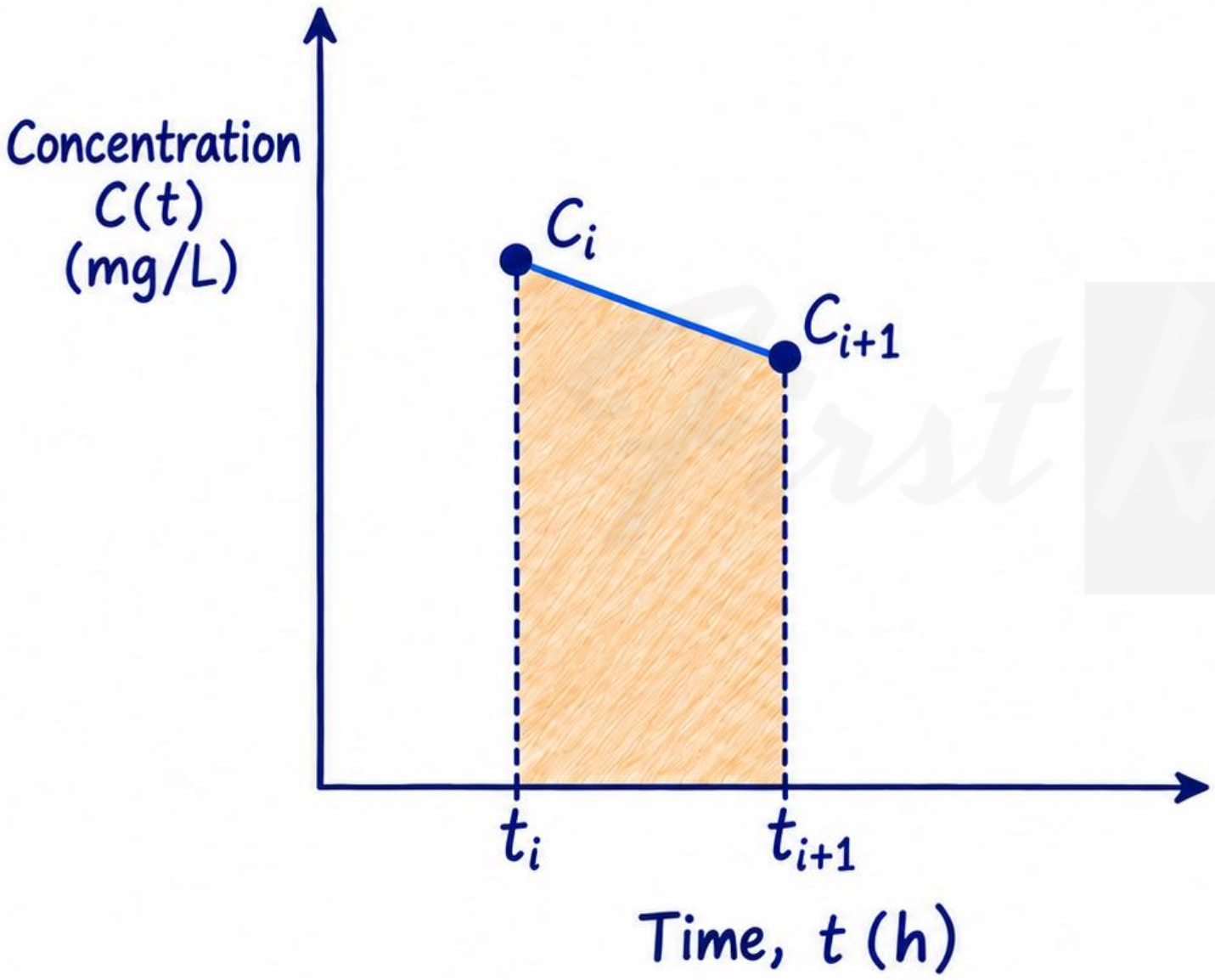
Statistical moments (e.g. MRT) describe the time distribution of concentrations.

$$MRT = \frac{\int_0^\infty t\,C(t)\,dt}{\int_0^\infty C(t)\,dt}$$

Assumptions and limitations

The method is not assumption-free: sampling quality, terminal extrapolation and the interpretation of clearance and volume still matter.
NCA does not explain every physiological mechanism.

AUC: area under the concentration curve



$$AUC_{0-\infty} = \int_0^{\infty} C(t)\,dt$$

For a linear trapezoid between adjacent samples:

$$AUC_i = \left[\frac{C_i + C_{i+1}}{2}\right] \times (t_{i+1} - t_i)$$

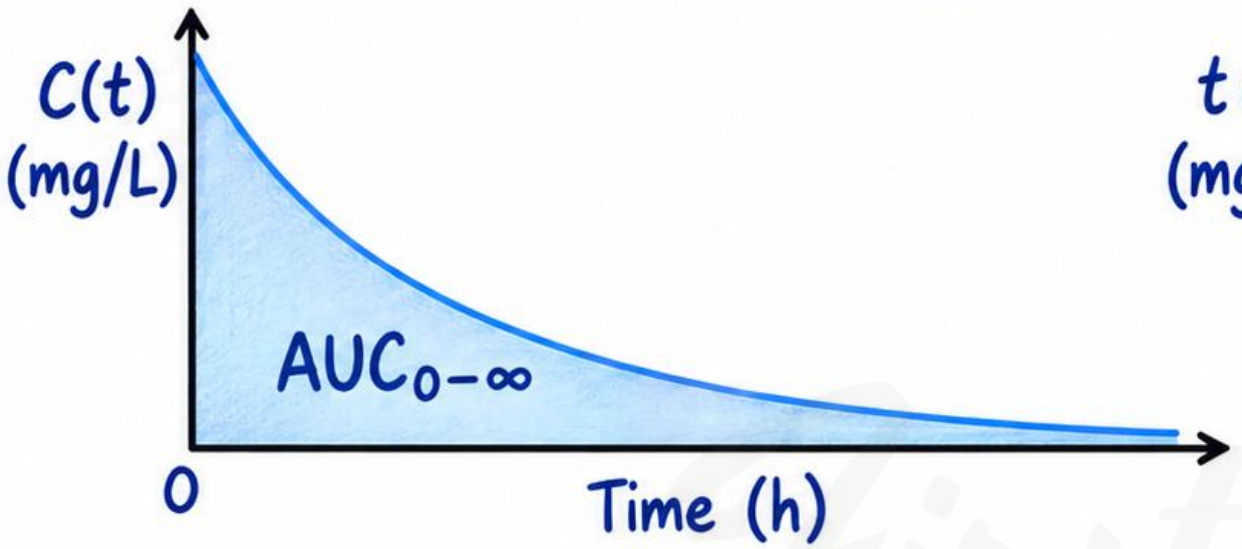
Add the interval areas over the observed sampling period.

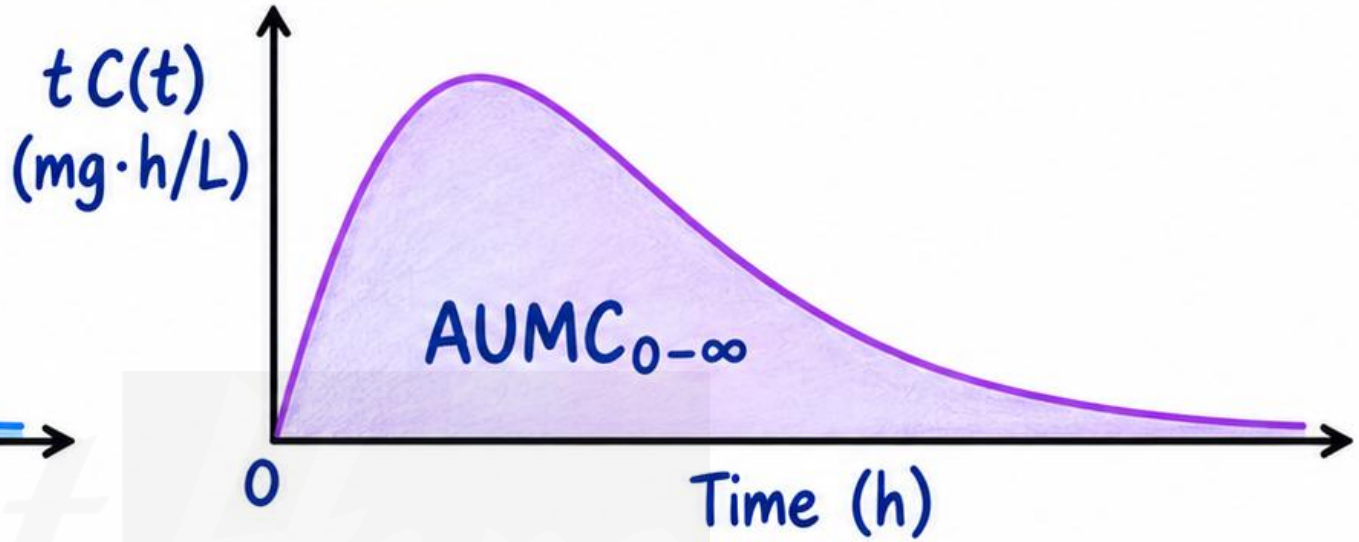
If concentration is mg/L and time is h, AUC is mg·h/L.

Other validated integration rules may be used; state the chosen method.

Sparse sampling near the peak or terminal phase can distort the estimate.

AUMC and mean residence time





The first-moment curve plots time × concentration against time.

$$AUMC_{0-\infty} = \int_0^{\infty} t\,C(t)\,dt$$

For an IV bolus under suitable linear disposition:

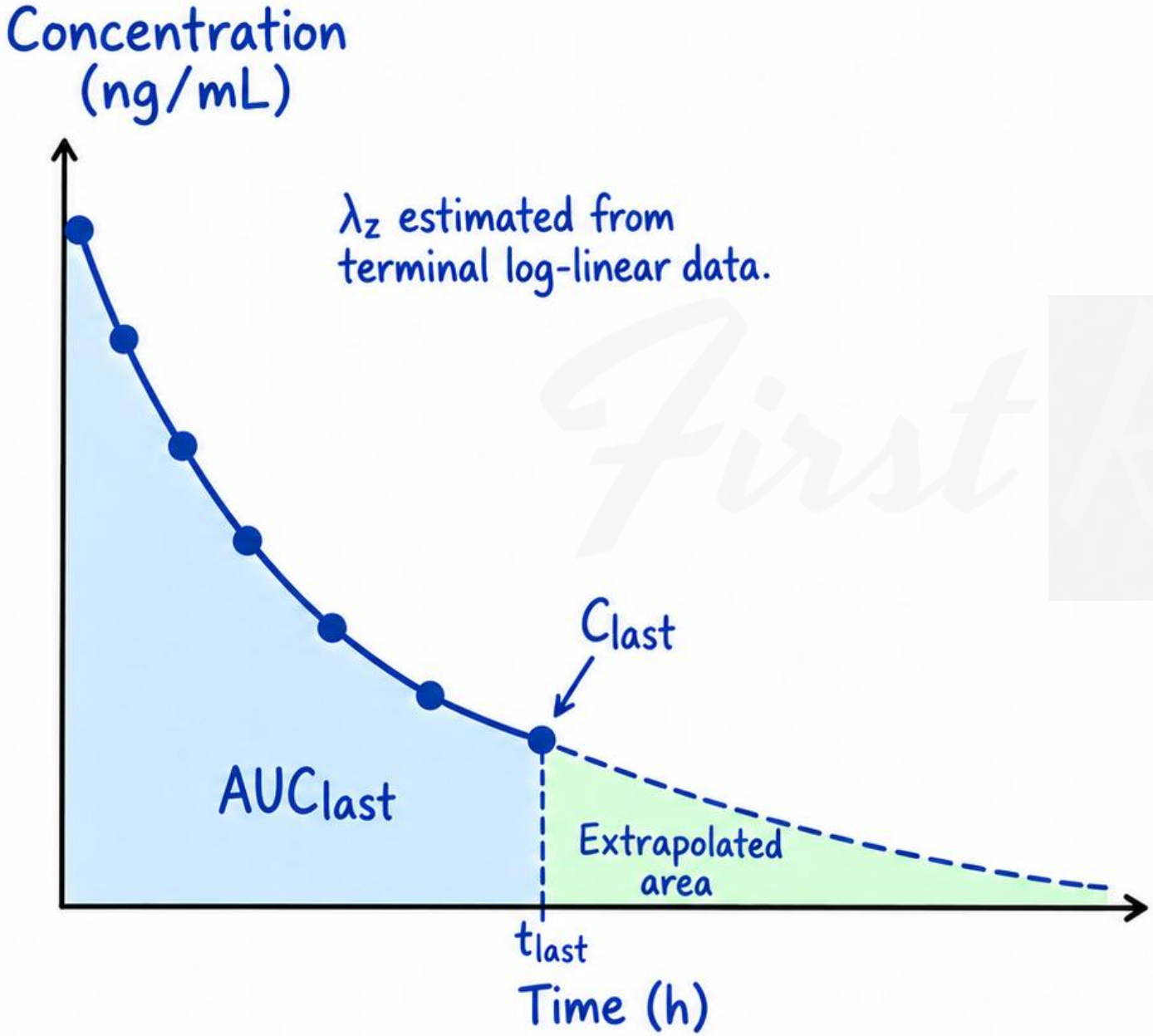
$$MRT_{IV} = \frac{AUMC_{0-\infty}}{AUC_{0-\infty}}$$

AUMC units: $mg \cdot h^2/L$. MRT units: h.

Later concentrations receive greater weight in AUMC, so poor terminal sampling can strongly affect MRT.

Use areas with matching integration limits.

Terminal extrapolation



Estimate λ_z from an appropriate terminal log-linear segment.

$$AUC_{0-\infty} = AUC_{last} + \frac{C_{last}}{\lambda_z}$$

$$AUMC_{0-\infty} = AUMC_{last} + \frac{t_{last} C_{last}}{\lambda_z} + \frac{C_{last}}{\lambda_z^2}$$

C_{last} is the last quantifiable concentration at t_{last}.

λ_z has units of inverse time.

Report how much area is extrapolated; a large tail makes the estimate less reliable.

Selecting a terminal segment requires scientific judgement, not just the highest regression fit.

First Hope

FREE PREVIEW

Click here to visit our website

PHARMACY PREMIUM NOTES

Complete subject and semesters are available on FirstHope app only.

Scan or click here

Click here to get the app >

Available on Google Play

JOIN THE FIRSTHOPE COMMUNITY

Join our Telegram channel

Click here to join Telegram >

Scan or click here

@FirstHopeNotes

Instagram

@firsthope.official

Click here to follow >

YouTube channel

FirstHope-Pharmacy / Live streams

Click here to watch >

WhatsApp channel

Follow FirstHope on WhatsApp

Click here to join >

FirstHope website

firsthope.co.in

Click here to visit >

B.Pharm / D.Pharm / M.Pharm / Pharm.D

Preview notes. Complete subjects and semesters in the FirstHope app.