Ka Ke Half-life Cmax AUC AUMC and MRT

Experiment 7 - Practical Notes

Name: _____ Roll no.: _____ Date: _____

Aim

To analyse the assigned ka ke half-life cmax auc aumc and mrt experiment or teaching dataset.

Principle

A concentration-time profile provides observed and model-derived parameters. Estimating absorption/elimination constants requires an appropriate model and sufficient sampling.

Requirements

- Institution-assigned experimental method and coded in-vitro or supplied pharmacokinetic data.
- Calibrated analytical readings or supplied concentration table, calculator and plotting tools.

Procedure

1. Plot data

Plot concentration versus time and terminal log concentration versus time; identify observed Cmax and its sampling time.

2. Estimate Ke and half-life

Fit an appropriate terminal region and calculate Ke from its natural-log slope.

3. Assess Ka

For the assigned one-compartment first-order oral model, use the prescribed residual or fitting method; do not call the terminal slope Ka without justification.

4. Calculate areas

Use the assigned integration method for AUC and AUMC, showing measured and extrapolated components.

5. Report MRT

Divide AUMC by AUC on the same integration basis and state the route/model interpretation.

Observations and Record

Record component	Value
Observed Cmax / Tmax	_____
Terminal slope / Ke	_____
Ka and model	_____
AUC / AUMC	_____
Half-life / MRT	_____

Worked Example

The numbers below are illustrative; enter your own observations in the record.

- Ke = −slope of ln(C) versus t; t1/2 = ln(2)/Ke. For terminal log10(C), Ke = −2.303 × slope.
- Linear-trapezoidal AUC segment = (Ci + Ci+1)/2 × (ti+1 − ti). AUMC applies the same stated integration approach to tC.
- For monoexponential terminal extrapolation: AUCtail = Clast/Ke; AUMCtail = tlast Clast/Ke + Clast/Ke^2. MRT = AUMC/AUC.
- For the applicable first-order one-compartment oral model: Tmax = ln(Ka/Ke)/(Ka − Ke), when Ka and Ke differ.
- Examples: Ke = 0.2 h^{-1} gives t1/2 = 3.466 h. AUC = 40 mg·h/L and AUMC = 120 mg·h^2/L give MRT = 3 h. A segment from 0 h/0 mg/L to 1 h/4 mg/L gives 2 mg·h/L.

Result

Dataset / method: ____. Calculated outcome and units: ____. Comparison: ____. Assumption or limitation: ____.

Precautions

- Record units, sampling times, dilution and the assumptions of the selected model.
- Use supplied human/animal data or the approved in-vitro teaching method; no new human/animal dosing or surgical preparation is prescribed.
- Keep an illustrative calculation separate from the actual result and do not use it as an individual patient dosing instruction.

Viva Questions and Answers

1. Why state model assumptions?

The derived parameter is valid only when the data and model satisfy them.

2. What accompanies a pharmacokinetic result?

Its units, dataset, calculation method and relevant limitation.

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