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Oral Glucose Tolerance Data Analysis

Practical 15 - Pharmacology simulation and data practical

Aim

To analyse supplied oral-glucose-tolerance concentration-time data.

Principle

A glucose-tolerance curve describes the measured time-dependent response under a defined challenge. Baseline, timing, fasting and the original protocol influence interpretation; animal-model data are not human diagnostic thresholds.

Materials and Requirements

- Supplied anonymised teaching traces or datasets
- Study design, controls, units and instrument calibration records
- Ethics and welfare records where the original study involved animals
- Approved method or teaching-data pack and a dated record sheet

Procedure

1. Define the preparation or dataset, study question and method version. Record identities, units and the criteria to be used before examining the outcome.
2. Identify the study question, experimental unit, controls and original approval or data provenance. This notes exercise uses records or simulation; it is not authorisation to perform animal procedures.
3. Review supplied challenge, baseline and sampling-time records without performing live administration or blood collection.
4. Plot individual glucose-time profiles using consistent concentration and time units.
5. Calculate total AUC by the selected trapezoidal method and distinguish it from incremental AUC, stating treatment of values below baseline.
6. Compare independent groups with baseline and missing-data assessment.
7. Summarise independent experimental units, variability, exclusions and limitations; retain all original traces and data.
8. Retain the original observations and calculations. State deviations, missing information and the limits of the conclusion; do not replace measured values with expected results.

Observations and Record

Enter actual measurements or the supplied teaching data. Record the method, material identity, conditions and units.

Group / preparation	Condition / time	Raw endpoint	Derived result / interpretation
Vehicle / baseline	Record	Enter	Evaluate
Reference condition	Record	Enter	Evaluate
Test condition	Record	Enter	Calculate

Calculations

- Trapezoid area = (C1 + C2)/2 x (t2 - t1)

Worked Example

Illustrative times 0, 1, 2 h and glucose 5, 9, 6 mmol/L give total AUC = 7 + 7.5 = 14.5 mmol.h/L. Baseline-subtracted signed area is 14.5 - 5 x 2 = 4.5 mmol.h/L.

Result and Interpretation

- Report curves, chosen AUC convention and study-specific interpretation without making a patient diagnosis.

Precautions

- Apply replacement, reduction and refinement to study planning.
- Any live work requires the current institutional and Indian CCSEA/IAEC framework, trained staff and an approved protocol.
- Do not convert a teaching calculation into an unapproved animal or patient procedure.

Viva Questions and Answers

What distinguishes total and incremental AUC?

Incremental AUC uses a defined baseline subtraction convention.

Why retain actual sampling times?

Timing affects area estimates.

Can animal thresholds diagnose humans?

Human diagnosis requires the applicable clinical criteria and setting.

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