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Enzyme Inhibition and Induction Data

Practical 28 - Biological teaching-data practical

Aim

To distinguish enzyme inhibition from induction in supplied activity data.

Principle

Inhibition can reduce measured catalytic activity without reducing enzyme abundance. Induction concerns an increase in expression or functional capacity over an appropriate time course. Activity alone may not distinguish them.

Materials and Requirements

- Approved nonpathogenic teaching system or supplied anonymised dataset
- Laboratory risk assessment, controls and raw-data worksheet
- 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. Use supplied approved-system records with immediate activity and expression or protein measurements.
3. Identify time course, concentration, viability, vehicle and suitable reference controls.
4. Calculate residual activity and fold expression on their respective normalised bases.
5. Assess whether the evidence supports inhibition, induction, toxicity or an unresolved combination.
6. 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.

Preparation / control	Condition / method	Raw observation	Calculated / interpreted result
Negative / vehicle control	Specify	Record	Evaluate
Positive / reference control	Specify	Record	Evaluate
Test replicates	Specify	Record	Calculate

Calculations

- Residual activity (%) = corrected test activity / corrected vehicle activity x 100
- Expression fold = normalised test expression / normalised control expression

Worked Example

Illustrative immediate activity falls from 100 to 40 units (40% residual), while a separate later expression measure rises from 1.0 to 2.0 (twofold).

These findings can coexist and do not establish an in-vivo interaction magnitude.

Result and Interpretation

- State the endpoint and time basis and avoid extrapolating a clinical interaction from one assay.
- Report biological and technical replication separately and explain control performance.

Precautions

- Use only the approved biological system, containment and decontamination procedure.
- A teaching dataset does not authorise live animal, human-tissue or unknown-organism work.
- Keep original images and observations; avoid selecting only favourable fields or bands.

Viva Questions and Answers

Can inhibition and induction coexist?

They can affect different endpoints or time scales.

Why measure viability?

Toxicity can reduce apparent enzyme activity.

Does increased transcript guarantee increased activity?

Protein expression and function need separate assessment.

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