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UV-Survival Curves and Dark-Repair Data

Practical 10 - Biological teaching-data practical

Aim

To analyse supplied UV-survival and dark-repair data.

Principle

A survival fraction compares recoverable viable counts after exposure with an appropriate unexposed control. Wavelength, measured dose, shielding and post-exposure handling affect interpretation.

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 nonpathogenic teaching data; do not design UV selection or cultivate unknown organisms.
3. Record measured UV exposure and the matched handling of light-protected and comparison groups.
4. Correct counts for dilution and sampled volume and normalise each time point to the appropriate control.
5. Plot log survival against measured exposure and compare repair conditions while acknowledging detection limits.
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

- Survival fraction = Nt/N0
- Log10 reduction = log10(N0/Nt)

Worked Example

Illustrative N0 = 1,000,000 and Nt = 1,000 give survival 0.001 and a 3-log reduction.

A zero recovered count is below the method detection capability, not a calculable infinite log reduction.

Result and Interpretation

- Explain survival and repair trends without attributing every count change to a specific molecular pathway.
- 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

Why measure UV dose?

Lamp time alone does not establish delivered energy.

Why control post-exposure light?

It can affect the comparison of repair conditions.

How is zero count reported?

With the method detection limit, not an infinite reduction.

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