Analysis and Visualization of Pseudovirus Neutralization Assay Data

1. Introduction

Pseudovirus neutralization assays are widely used to assess the efficacy of antibodies in preventing viral entry into host cells. The assay measures luminescence, which is proportional to viral infection, in the presence of increasing antibody concentrations. Higher antibody neutralization leads to a decrease in luminescence, indicating inhibition of viral entry.

This report analyzes provided luminescence data to determine the neutralization potential of the antibody.

2. Methods & Assumptions

- The virus control (V) represents the maximum infection level and serves as a reference for 100% infection.
- The cell control (C) measures background luminescence and represents no infection.
- Antibody dilutions range from 0.01 to 100 µg/mL.
- **Formula for Normalized Infection (%)**:

  $$Normalized\ Infection\ = \left(\frac{RLU - C}{V - C}\right) \times 100$$

  where:

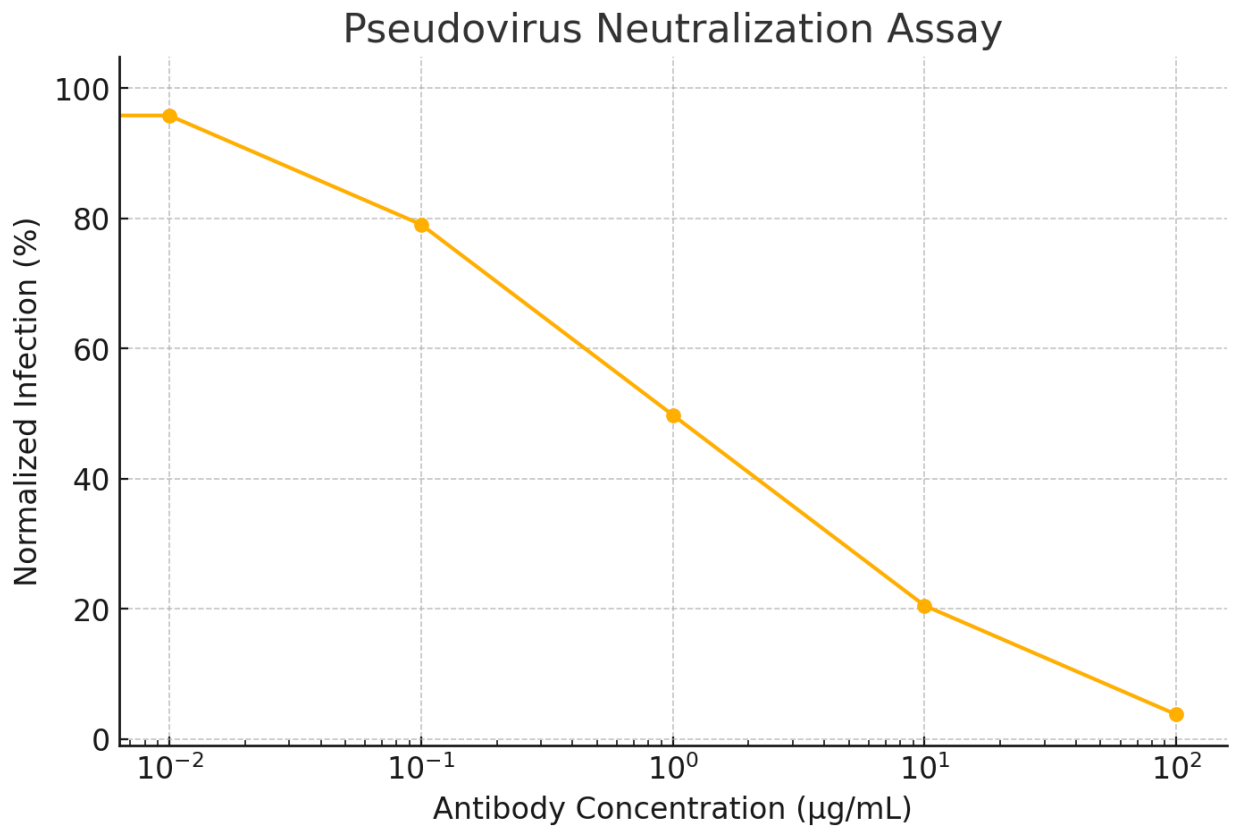
  - **RLU** = Observed luminescence for each antibody concentration.
  - **V** = Luminescence in virus control wells (120,000 RLU).
  - **C** = Luminescence in cell control wells (500 RLU).
- The data is plotted on a **logarithmic x-axis** to visualize the dose-response relationship.

3. Results

Antibody Concentration (µg/mL)	Luminescence (RLU)	Normalized Infection (%)
0 (Virus control)	120,000	100.00
0.01	115,000	95.82
0.1	95,000	79.08
1	60,000	49.79
10	25,000	20.50
100	5,000	3.75

Neutralization Curve

The neutralization curve below demonstrates a **dose-dependent decrease in infection** with increasing antibody concentration.



4. Discussion

- The virus control exhibited the highest luminescence, confirming viral infection in the absence of neutralization.
- The cell control had minimal luminescence, validating background signal measurement.
- The antibody showed **strong neutralization**, with infection decreasing to **<5% at 100 µg/mL**.
- The assay follows a typical **sigmoidal neutralization curve**, suggesting a threshold concentration for effective viral inhibition.
- The **IC50 (half-maximal inhibitory concentration)** can be estimated from the curve, aiding vaccine development.

5. Conclusion

This analysis demonstrates that the tested antibody effectively neutralizes the pseudovirus in a dose-dependent manner. Future studies can include **replicates and statistical validation** to determine precise neutralization potency.