**Figure 2. Statistical framework for estimating 50% inhibition.**

**(A-B)** Estimating 50% inhibition from simulated AAV neutralization assay data (coefficient of variation (CV) = 10%, true 50% inhibition set to 1/16).

**(A)** Neutralization curve with 50% inhibition estimated using three methods: Non-statistical (dilution below 50% mean response threshold), Linear-bootstrap, and Hill-MCMC. The dotted green curve represents the mean of raw samples, while the solid green curve shows the Hill-fit model. Vertical, dotted error bars indicate the 95% confidence interval for raw sample means, and the vertical solid error bars indicate the 95% credible intervals for Hill-MCMC fits. Dashed vertical arrows (cyan, brown, and pink) denote the ND50 estimates, with horizontal bars representing the corresponding uncertainty for the Linear-bootstrap and Hill-MCMC methods.

**(B)** Mean neutralization curves for 50 synthetic datasets (blue dotted curves), each with random noise (true ND50 set to 1/16). Dashed vertical arrows indicate the mean 50% inhibition estimates with each method. Horizontal bars represent the 95% confidence intervals of ND50 credible interval estimates (CI-of-CIs, Methods). The width of the interval is significantly smaller when the Hill-MCMC method is used.

**(C)** Neutralization curve obtained using coreTIA with an ADK9 antibody dose series. Visual elements represent the same concepts as on (A).

**(D-E)** Comparison of 50% inhibition estimates. Vertical error bars represent the credible intervals for the Linear-bootstrap and Hill-MCMC methods. No error bar is shown for the Non‐statistical method, as it yields only a single point estimate. (D) corresponds to synthetic data with a known true ND50, shown on (A). (E) corresponds to data shown on (C) with no known ground truth. A Bayesian threshold test with θ = 0 indicates strong evidence that the estimates differ, with the Hill-MCMC estimate being closest to the true 50% inhibition level. Here, θ = 0 means we are testing if the difference in ND50 estimates is zero vs. non‐zero. A posterior probability >0.95 that the difference is non‐zero indicates they differ significantly.

**(F)** Distribution of credible interval widths (log2 units) for pooled assay runs (human, n=33; macaque, n=35). Vertical dashed lines mark the 90th percentile thresholds for Linear-bootstrap (brown, ~0.50 log2 units) and Hill-MCMC (pink, θ = 0.3 log2 units). For comparing ND50 estimates with Hill-MCMC, its 90th percentile (θ = 0.3 log2 units) is adopted as the practical equivalence cutoff, meaning ND50 estimates differing by less than this value are considered effectively equivalent.

**(G-H)** Application of the practical equivalence threshold (θ = 0.3 log2 units) to ND50 comparisons from panels (A) and (C), respectively.

**(G)** ND50 estimates with Linear-bootstrap and Hill-MCMC methods remains significantly different for synthetic data with CV=10%.

**(H)** For ADK9 data (CV=0.027 at 0.2 ng/mL), ND50 estimates differ by less than the threshold (marked “ns” for not significant), indicating practical equivalence despite statistical significance at θ = 0. Asterisks (“\*”) denote differences exceeding the threshold.