

Half-Life & Steady State

Nursing

Why regular dosing takes about five half-lives to plateau, and to wash out.

Each half-life removes half of what remains, so both plateau and washout take about five of them.

$5 \times t_{1/2} \approx 97\%$ of steady state

$t_{1/2}$ 6 h, regular dosing

5 × 6 hours

Plateau near 30 h

Drug stopped

Same arithmetic

~97% cleared by 5 $t_{1/2}$

Plateau needed sooner

Then maintenance

A loading dose

THE COMMON MISTAKE

✗ **Taking a trough level a few hours in.**

✓ **Sampling once steady state is reached.**

A level drawn before the plateau reflects the loading curve rather than the maintenance regimen, so it cannot be used to judge that regimen.

Educational reference. Sampling times, target ranges and loading practice are drug-specific and set by local therapeutic monitoring