RoukenBio

FcRn-Mediated Recycling Assays: What They Measure and Why They Are Essential in Drug Development – References

1. Brambell FWR, Hemmings WA, Morris IG. A theoretical model of gamma-globulin catabolism. Nature. 1964;203:1352-1354.

2. Roopenian DC, Akilesh S. FcRn: the neonatal Fc receptor comes of age. Nat Rev Immunol. 2007;7(9):715-725.

3. Pyzik M, Kozicky LK, Gandhi AK, Blumberg RS. The therapeutic age of the neonatal Fc receptor Nat Rev Immunol. 2023;23:415–432. doi:10.1038/s41577-022-00821-1.

4. Bussel JB, et al. Neonatal Fc receptor - biology and therapeutics. N Engl J Med. 2025;392(16):1621–1635. doi:10.1056/NEJMra2312718.

5. Neuber T, Frese K, Jaehrling J, et al. Characterization and screening of IgG binding to the neonatal Fc receptor. mAbs. 2014;6(4):928-942. doi:10.4161/mabs.28744.

6. Grevys A, Nilsen J, Sand KMK, et al. A human endothelial cell-based recycling assay for screening of FcRn-targeted molecules. Nat Commun. 2018;9:621. doi:10.1038/s41467-018-03061-x.

7. Nath N, Godat B, Flemming R, Urh M. Deciphering the interaction between neonatal Fc receptor and antibodies using a homogeneous bioluminescent immunoassay. J Immunol. 2021;207:1211-1221. doi:10.4049/jimmunol.2100181.

8. Lobo ED, Hansen RJ, Balthasar JP. Antibody pharmacokinetics and pharmacodynamics. J Pharm Sci. 2004;93(11):2645-2668. doi:10.1002/jps.20178.

9. Wang W, Wang EQ, Balthasar JP. Monoclonal antibody pharmacokinetics and pharmacodynamics. Clin Pharmacol Ther. 2008;84(5):548-558. doi:10.1038/clpt.2008.170.

10. Mould DR, Meibohm B. Pharmacokinetics and pharmacodynamics of monoclonal antibodies and Fc-fusion proteins. Protein Cell. 2018;9(1):15-32. doi:10.1007/s13238-017-0408-4.

11. Mager DE, Jusko WJ. General pharmacokinetic model for drugs exhibiting target-mediated drug disposition. J Pharmacokinet Pharmacodyn. 2001;28(6):507-532. doi:10.1023/A:1014414520282.

12. He L, et al. An in vitro FcRn-dependent transcytosis assay as a screening tool for predictive assessment of nonspecific clearance of antibody therapeutics in humans. mAbs. 2019. doi:10.1080/19420862.2019.1605270.

13. Yeung YA, Leabman MK, Marvin JS, et al. Engineering human IgG1 affinity to human neonatal Fc receptor: impact of affinity improvement on pharmacokinetics in primates. J Immunol. 2009;182(12):7663-7671. doi:10.4049/jimmunol.0804182.

14. Dall'Acqua WF, Kiener PA, Wu H. Properties of human IgG1s engineered for enhanced binding to the neonatal Fc receptor. J Biol Chem. 2006;281(33):23514-23524. doi:10.1074/jbc.M604292200.

15. Vaccaro C, Zhou J, Ober RJ, Ward ES. Engineering the Fc region of immunoglobulin G to modulate in vivo antibody levels. Nat Biotechnol. 2005;23(10):1283-1288. doi:10.1038/nbt1143.

16. Ledgerwood JE, Coates EE, Yamshchikov G, et al Safety and pharmacokinetics of the Fc-modified HIV-1 human monoclonal antibody VRC01LS: A Phase 1 open-label clinical trial in healthy adults. PLoS Med. 2018;15:e1002493. doi:10.1371/journal.pmed.1002493.

17. Gjølberg TT, et al. Biophysical differences in IgG1 Fc-based therapeutics relate to their cellular handling, interaction with FcRn and plasma half-life. Commun Biol. 2022;5:832. doi:10.1038/s42003-022-03787-x.

18. Lyon RP, Bovee TD, Doronina SO, et al. Reducing hydrophobicity of homogeneous antibody-drug conjugates improves pharmacokinetics and therapeutic index. Nat Biotechnol. 2015;33(7):733-735. doi:10.1038/nbt.3212.

19. Kaempffe A, et al. Effect of conjugation site and technique on the stability and pharmacokinetic properties of antibody-drug conjugates. J Pharm Sci. 2021;110(12):3776–3785. doi:10.1016/j.xphs.2021.08.002.

20. Shen BQ, Xu K, Liu L, et al. Conjugation site modulates the in vivo stability and therapeutic activity of antibody-drug conjugates. Nat Biotechnol. 2012;30(2):184-189. doi:10.1038/nbt.2108.

21. ICH Q5E. Comparability of biotechnological/biological products subject to changes in their manufacturing process. International Council for Harmonisation. 2004.

22. Ulrichts P, Guglietta A, Dreier T, et al. Neonatal Fc receptor antagonist efgartigimod safely and sustainably reduces IgGs in humans. J Clin Invest. 2018;128(10):4372-4386. doi:10.1172/JCI97911.

23. Howard JF Jr, Bril V, Vu T, et al. Safety, efficacy, and tolerability of efgartigimod in patients with generalised myasthenia gravis: a multicentre, randomised, placebo-controlled, phase 3 trial. Lancet Neurol. 2021;20(7):526-536. doi:10.1016/S1474-4422(21)00159-9.

24. Garg A, Balthasar JP. Physiologically-based pharmacokinetic modeling to predict IgG tissue kinetics in wild-type and FcRn-knockout mice. J Pharmacokinet Pharmacodyn. 2007;34(5):687-709. doi:10.1007/s10928-007-9065-1.

25. Shah DK, Betts AM. Towards a platform PBPK model to characterize the plasma and tissue disposition of monoclonal antibodies in preclinical species and human. J Pharmacokinet Pharmacodyn. 2012;39(1):67-86. doi:10.1007/s10928-011-9232-2.