An intensified perfusion process for production of a therapeutic monoclonal antibody was developed and scaled to 100 L clinical and 500 L commercial scales. The baseline process was developed in 10 L benchtop bioreactors with stainless steel alternating tangential flow (ATF) cell retention systems. The process consisted of a 12 day growth phase followed by a 48 day harvest phase. Cell densities of >120 Mvc/mL were sustained with high culture viability. Productivities of >3 g/L·d were maintained throughout the harvest phase. The process was successfully scaled up to a 100 L single use bioreactor with dual ATF6 filters for clinical manufacturing. To verify that the process would perform similarly at commercial manufacturing scale, a proof of concept run was conducted in a 500 L single use bioreactor with dual ATF10 filters. Biomass concentration, culture viability, and productivity were comparable across scales. A full 60 day campaign in a 500 L bioreactor would generate over 70 kg of product in the clarified harvest. These studies demonstrate that intensified perfusion processes developed in benchtop bioreactors can be successfully reproduced at scales relevant for manufacturing.