The development of a cell-based once-yearly monoclonal antibody therapeutic delivery platform

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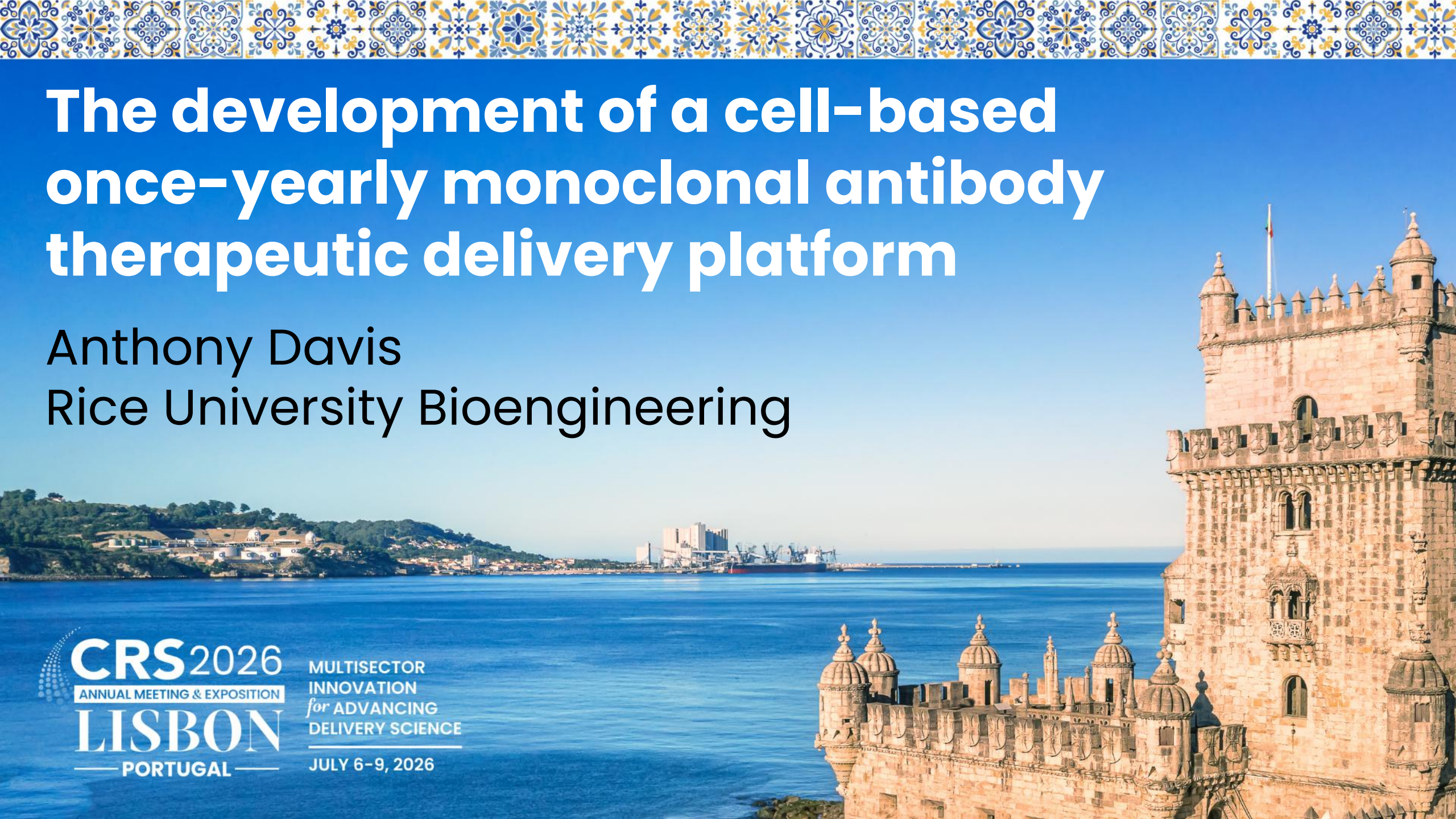


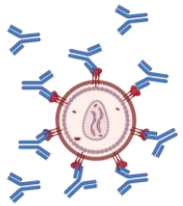
HIV and Malaria are deadly diseases; newly developed broadly neutralizing antibodies could be transformative, but need longer-term delivery options

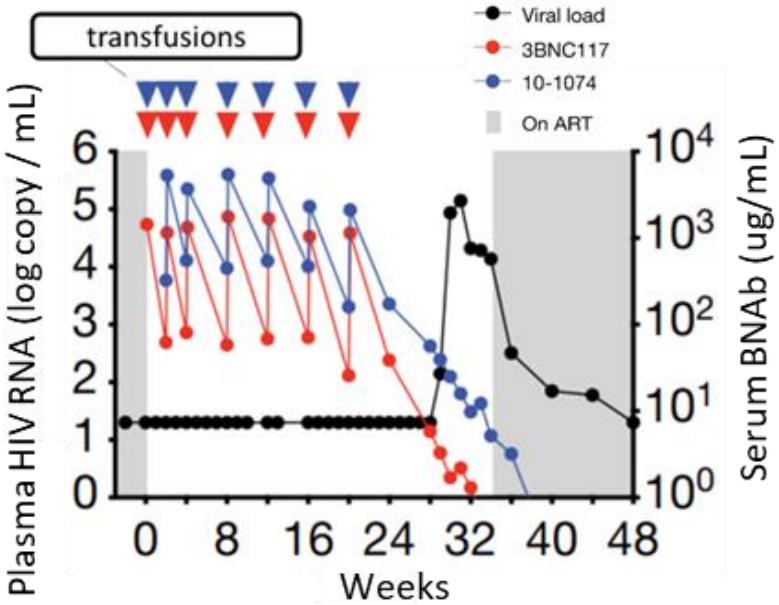
690,000 deaths annually

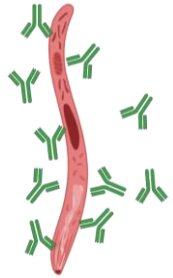
40.8 million people live with HIV

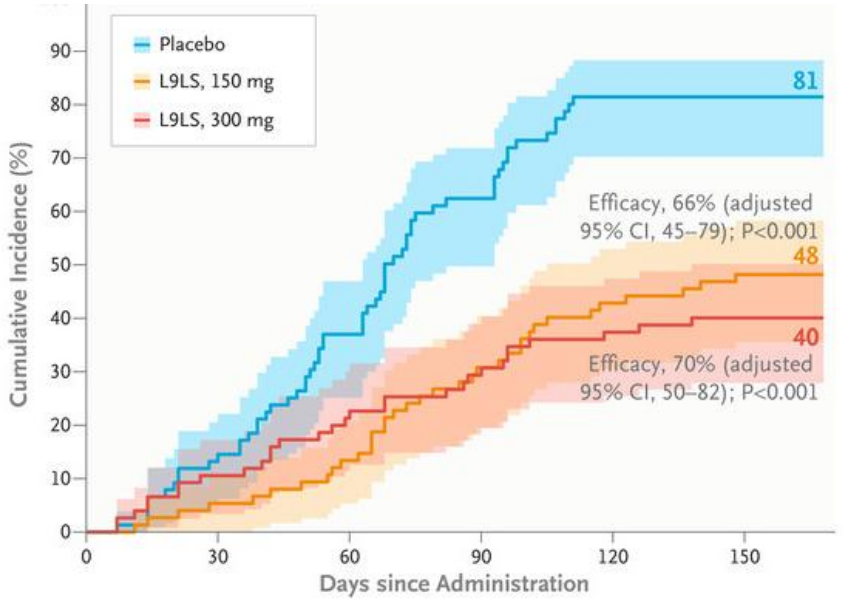
610,000 deaths annually

282 million new cases annually







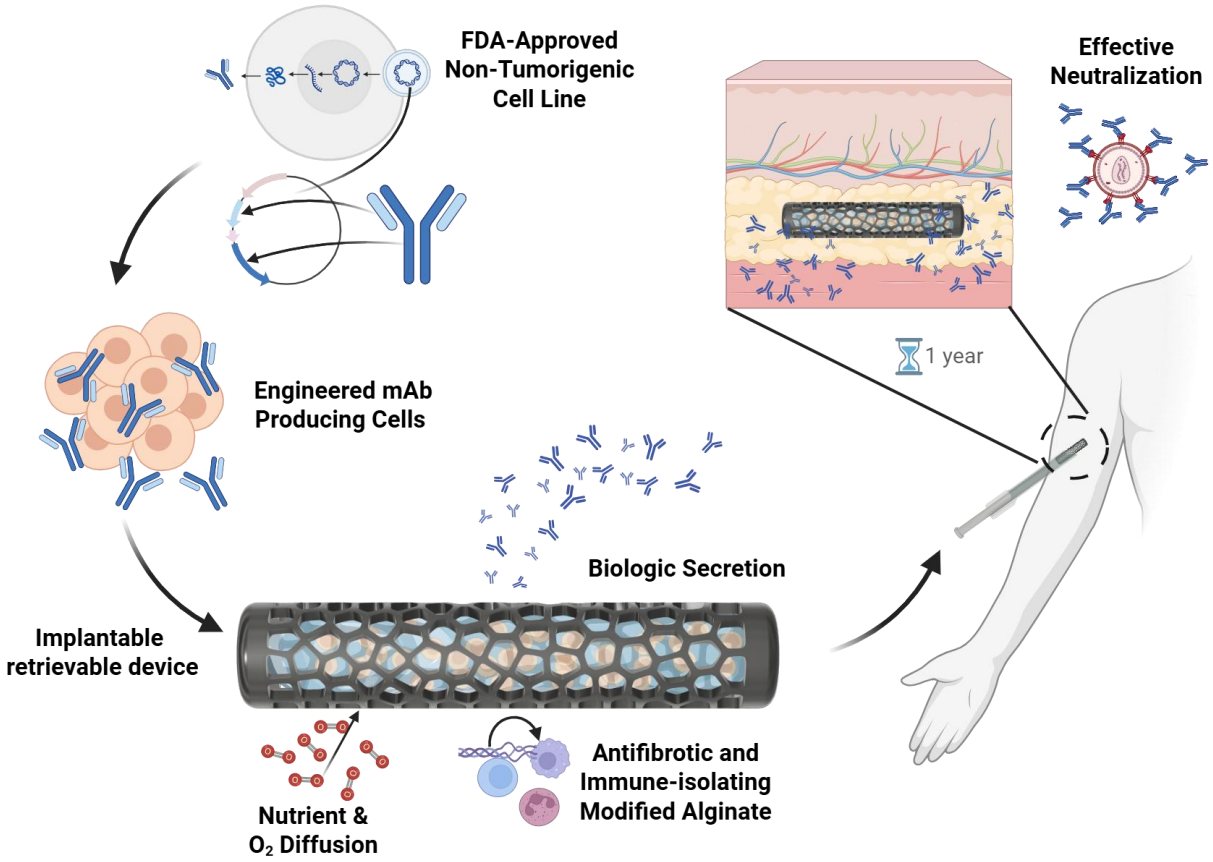


Source: UNAIDS 2024, WHO World Malaria report 2025, Blower et al. Lancet (2019), Gaebler, et al., Nature (2022), Kayentao et al. N Engl J Med (2024), Byrd et al JAIDS (2019) Gardner et al. AIDS (2008), Access to monoclonal antibodies in Africa: A call to action (2024) AIVI

Key Problem: Frequent mAb injections are burdensome and incompatible with LMICs

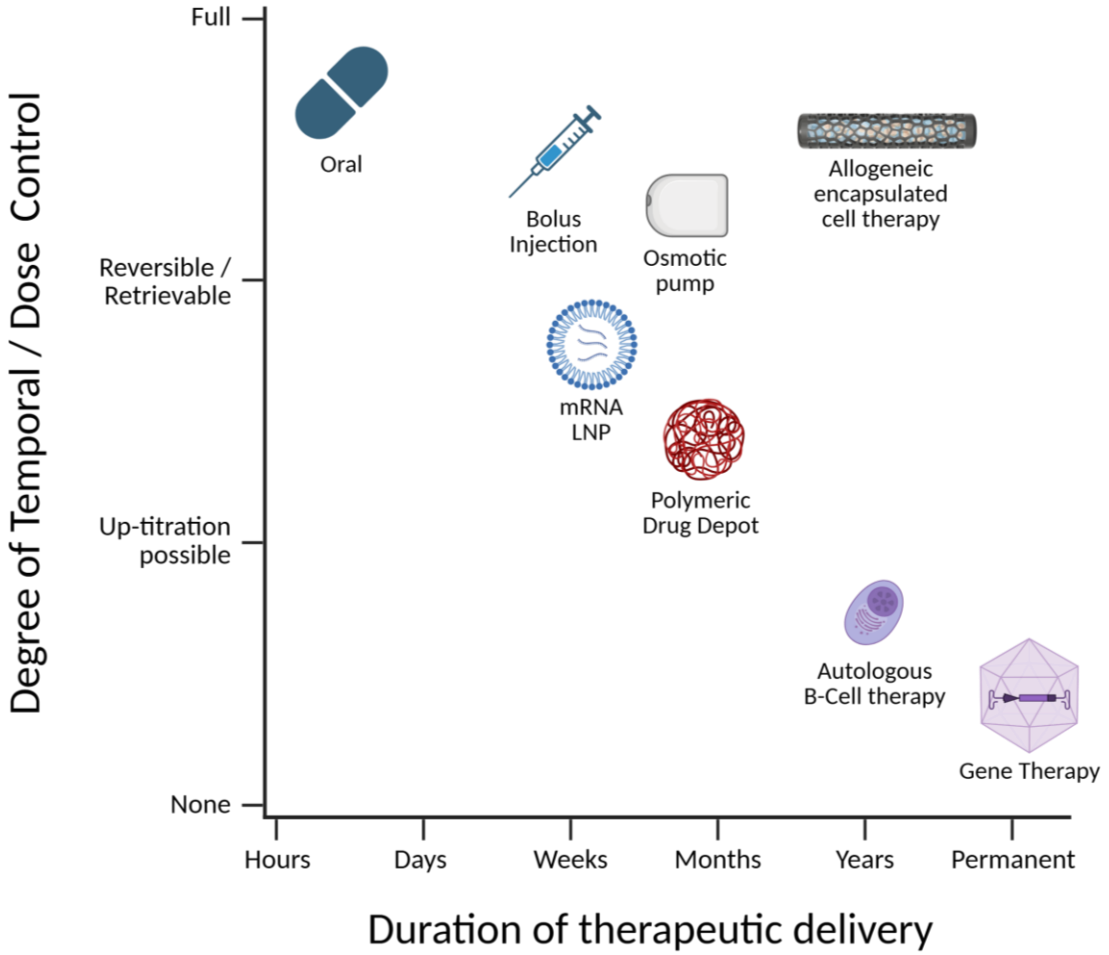
- Complex manufacturing and cold-chain logistics
- Low stability
- Weekly or Biweekly administration required
- High cost: US Annual mAb avg **$96,731**
- Frequent dosing schedules lead to lower adherence

Solution: A cell-based therapeutic for long-term antibody therapy

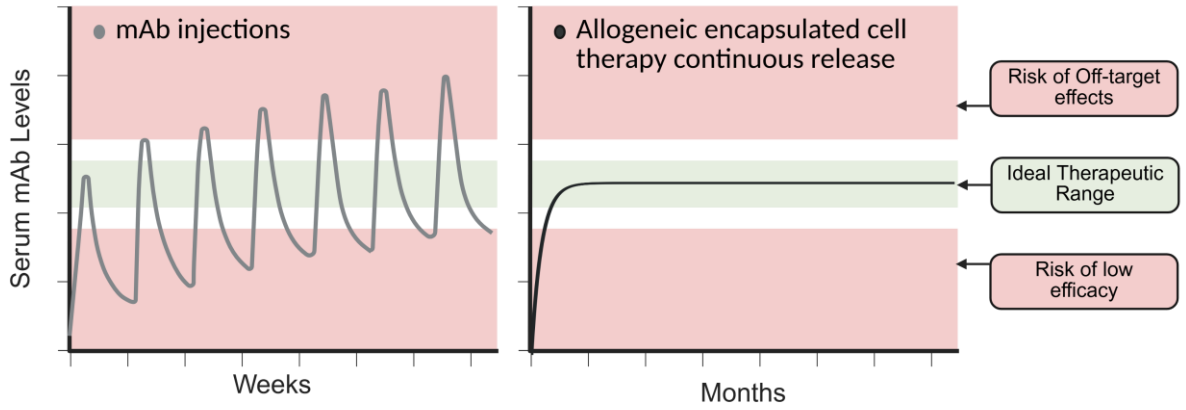


Source: Expanding access to monoclonal antibody-based products A global call to action 2023, Petrides et al. Bioengineering. 2014 , Hernandez et al. Am J Manag Care. 2018; Schematic created in Biorender

Biologic Delivery Landscape comparison



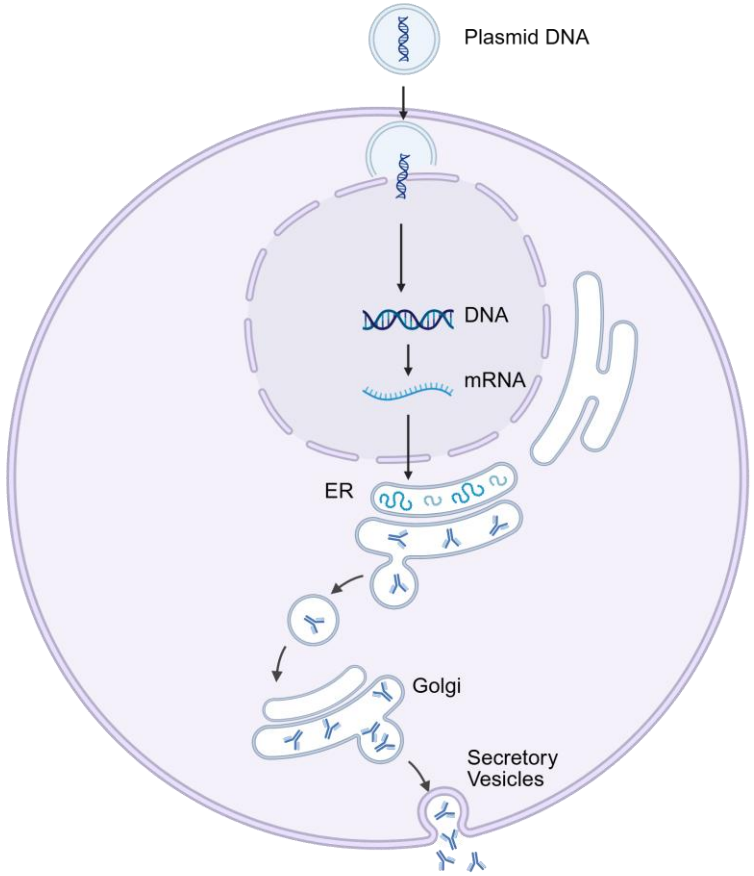
Pharmacokinetic profile

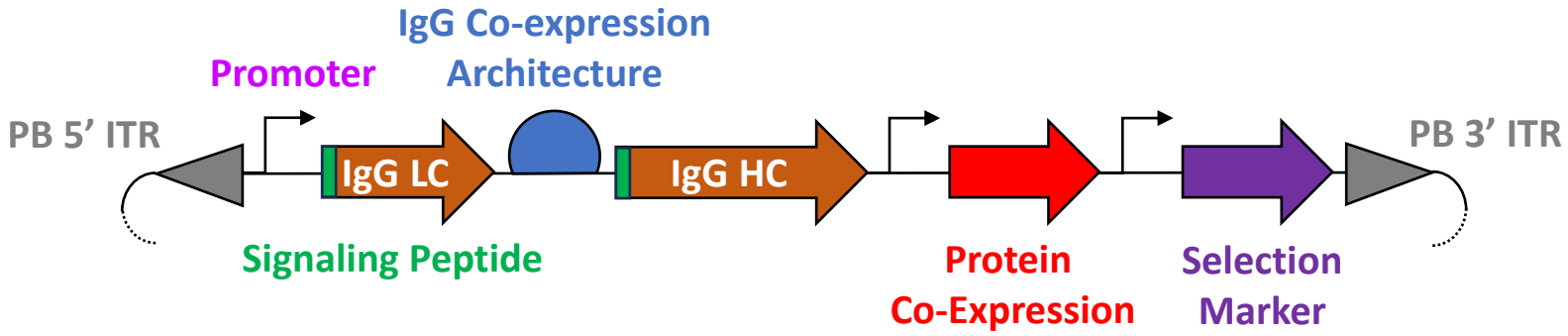


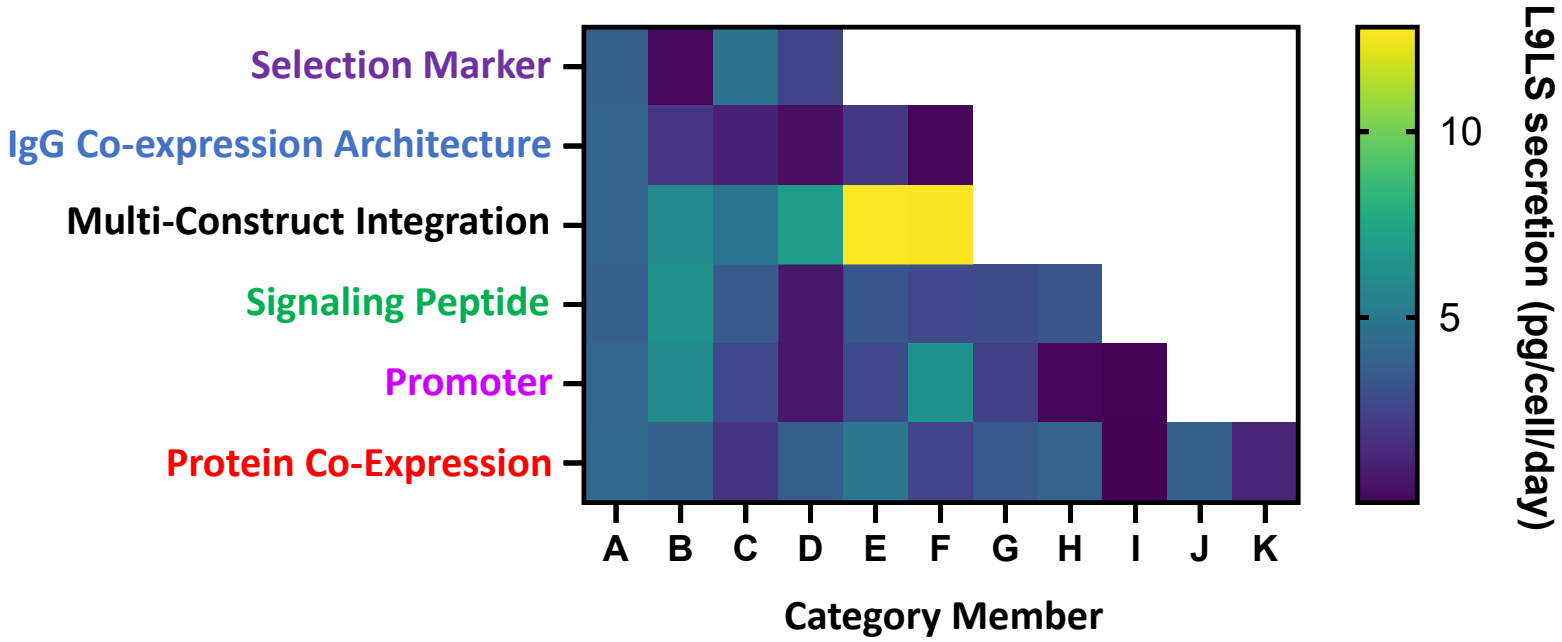
"increasing the effectiveness of adherence interventions may have a far greater impact on the health of the population than any improvement in specific medical treatments." – W.H.O, 2023

Source: Nahmad et al., Nat Biotechnol, 2022; Casazza et al., Nat Med, 2022; Rohner et al., Nat Biotechnol, 2022; Fakhari et al., JCR, 2015; Vidarsson et al., Front Immunol, 2014; Datta-Mannan et al., Drug Metab Dispos, 2020; Schematic created in Biorender

Screening genetic construct designs for engineering potent mAb secretion from ARPE-19 cells

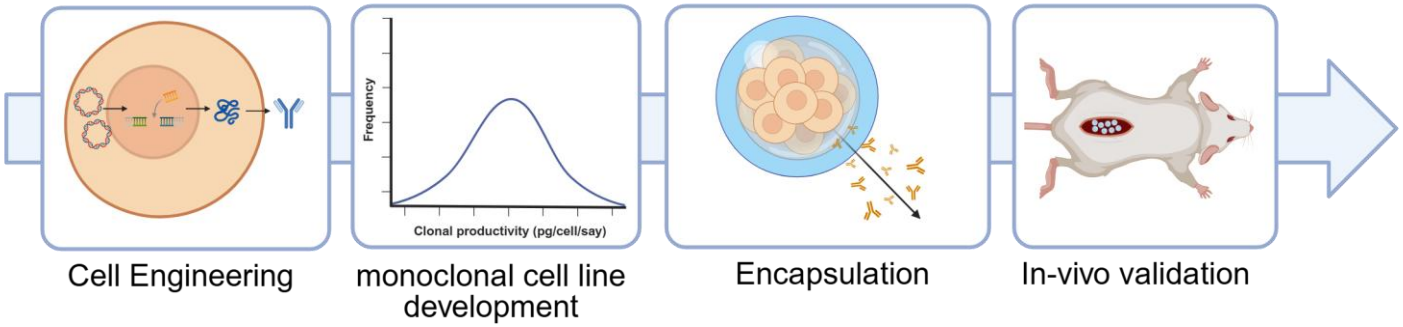




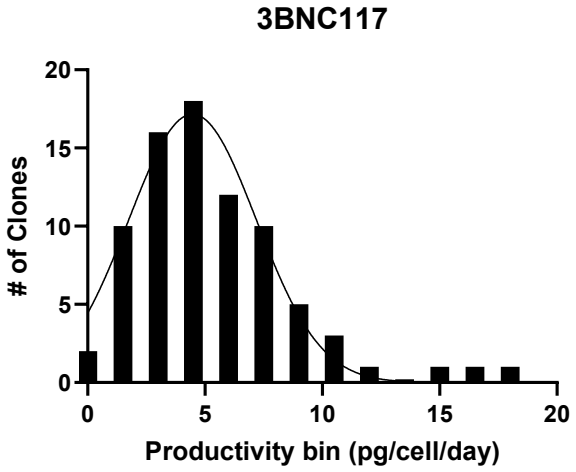


Source: Schematic created in Biorender

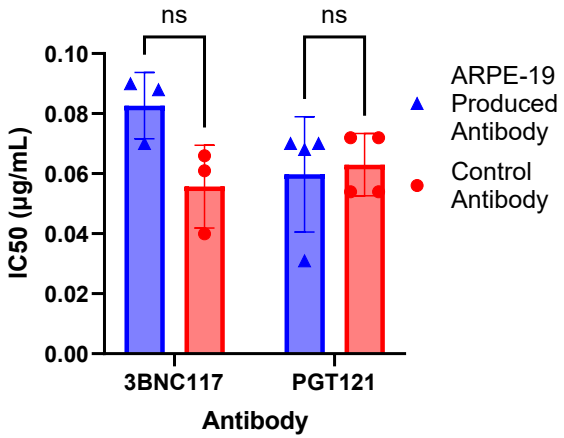
Engineering RPE cells for potent, stable, and functional mAb secretion



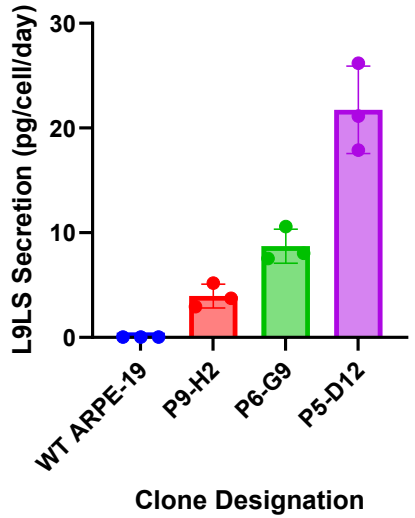
Clonal isolation and screening leads to productive and stable clones



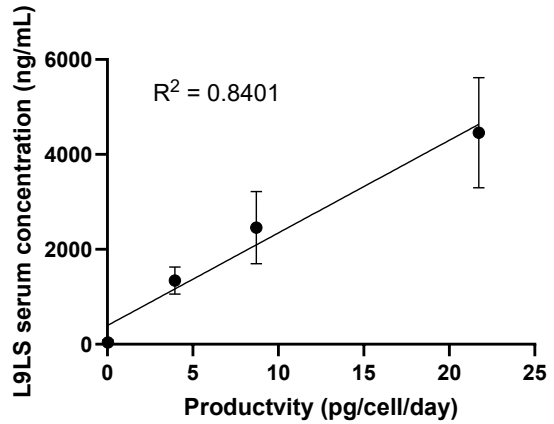
Anti-HIV mAb bioactivity verified



Encapsulated clonal secretion

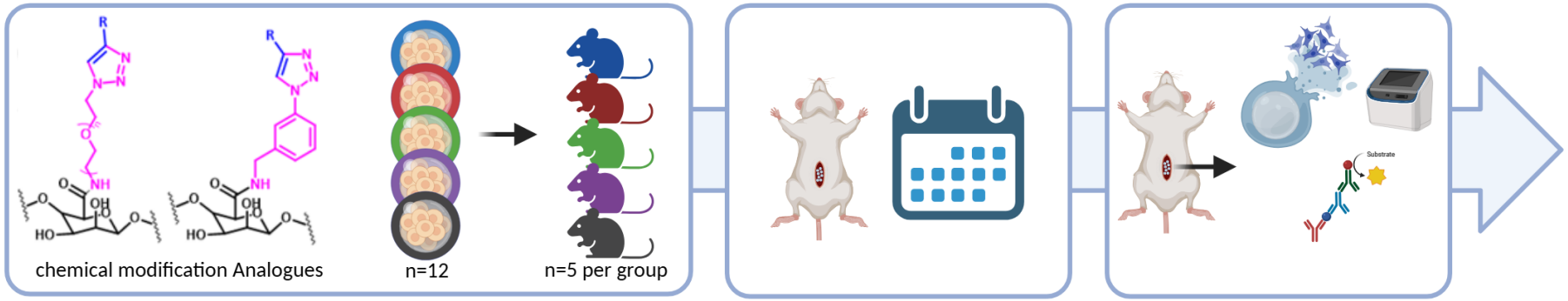


In vitro secretion rate correlates with in vivo titer

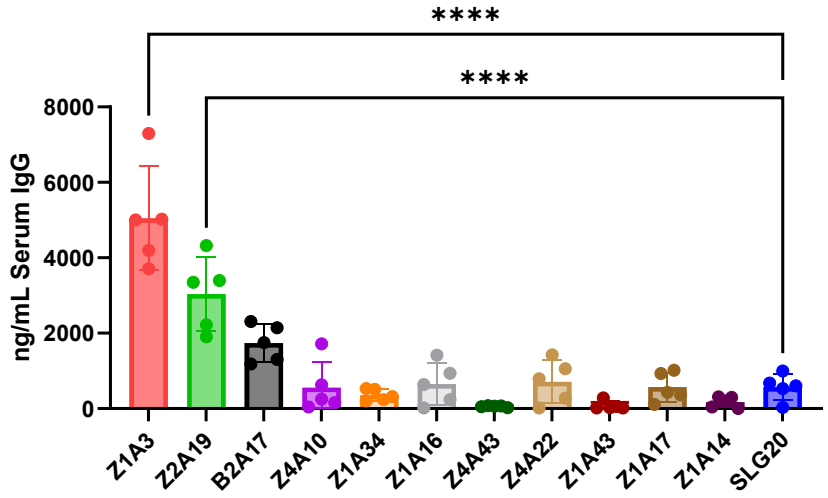


Source: Fell*, Davis*, Pandey* et al. BioRxiv (2026), Schematic created in BioRender

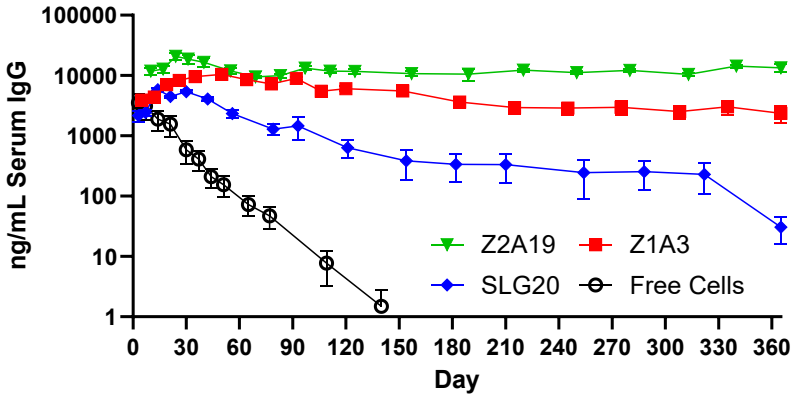
Anti-fibrotic small molecule screen finds lead formulation that allows for year long mAb Delivery



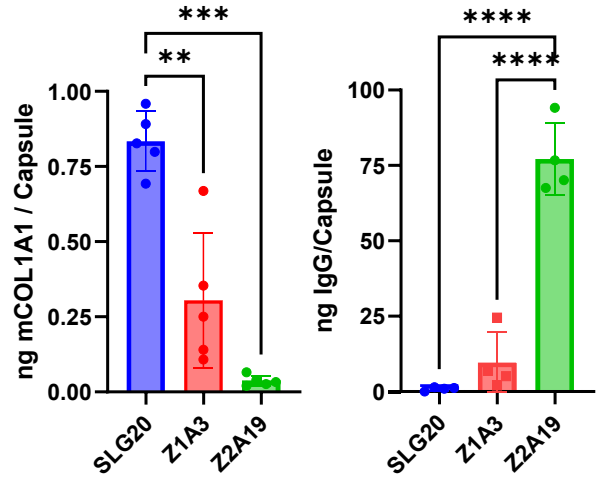
60 day material screen



1 year durability



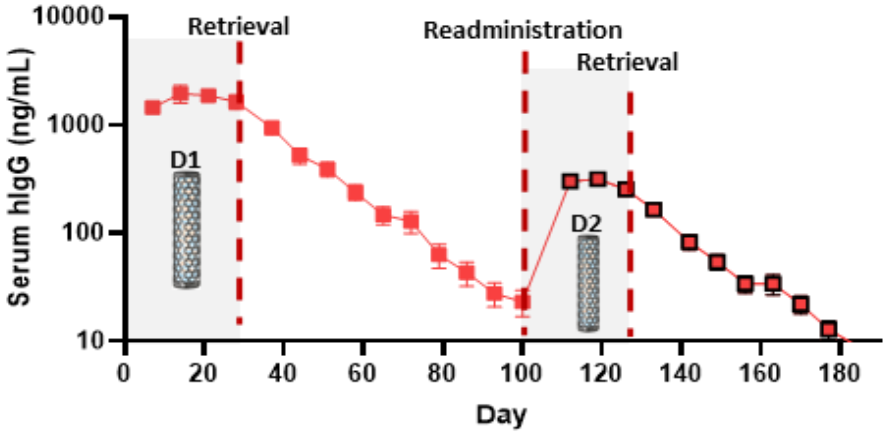
Explanted capsule analysis



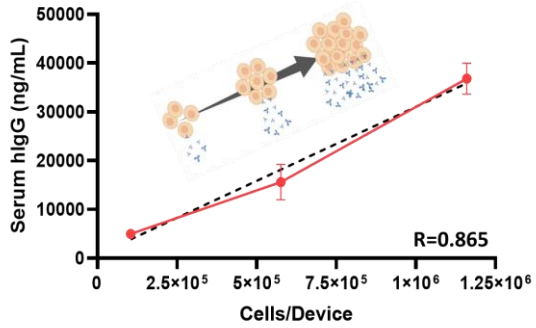
Source: Fell*, Davis*, Pandey* et al. BioRxiv (2026), Schematic created in BioRender

Developed retrievable device form-factor shows tunable mAb delivery over time and enables on demand therapy termination and adjustment and durability over 1 year

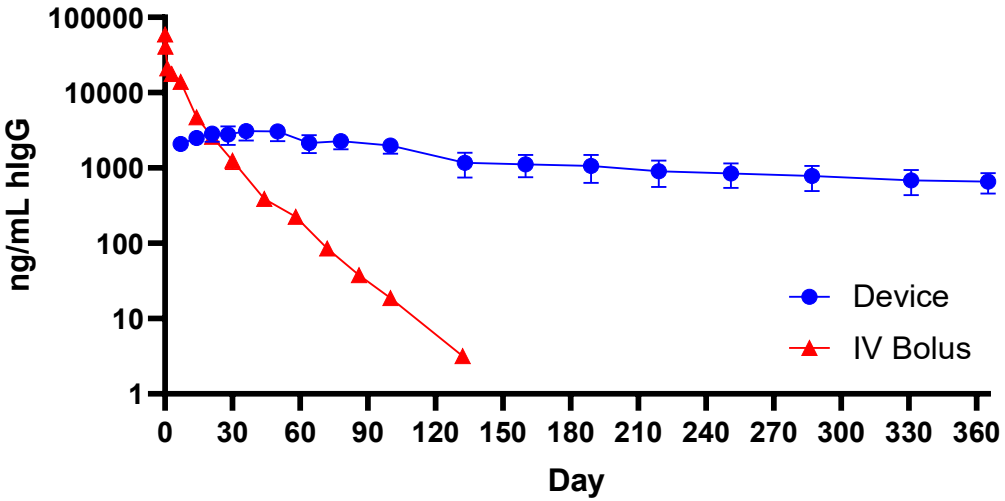
Device retrieval and re-administration with demonstration of dose change

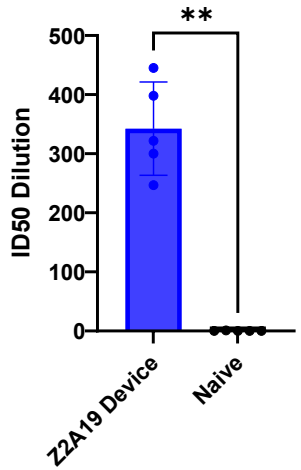


mAb serum concentration is linearly correlated with encapsulated cell number

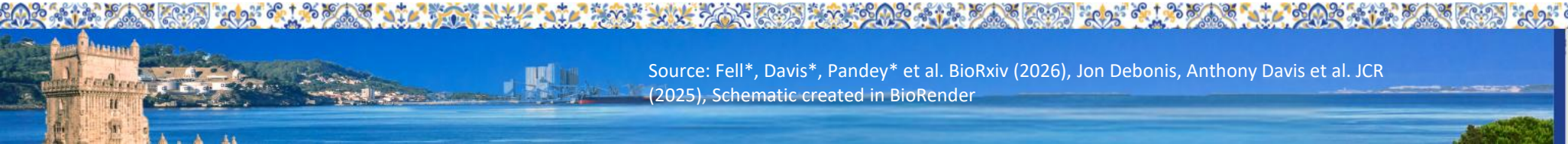


Device form factor retains year-long durability and mouse serum from device-implanted mice neutralizes HIV pseudo-virus





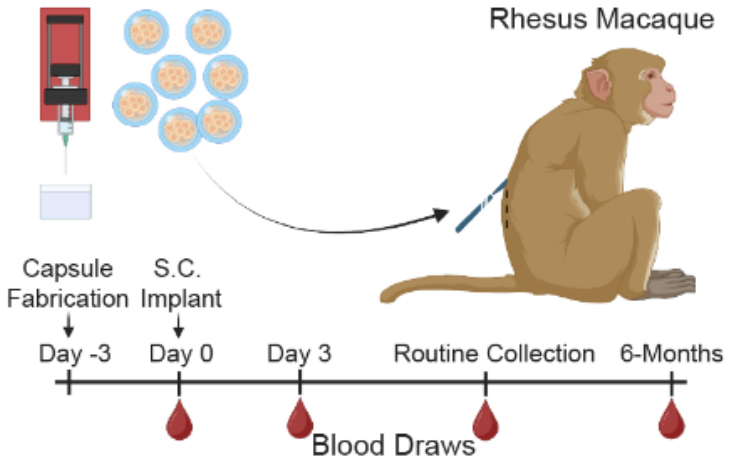
Device compatible with sutureless implantation



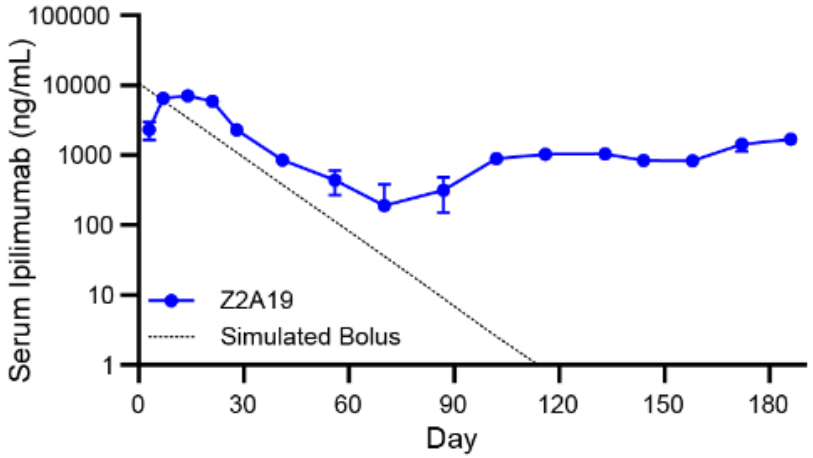
Source: Fell*, Davis*, Pandey* et al. BioRxiv (2026), Jon Debonis, Anthony Davis et al. JCR (2025), Schematic created in BioRender

Platform successfully maintains mAb serum levels in a non-human primate for > 6 months.

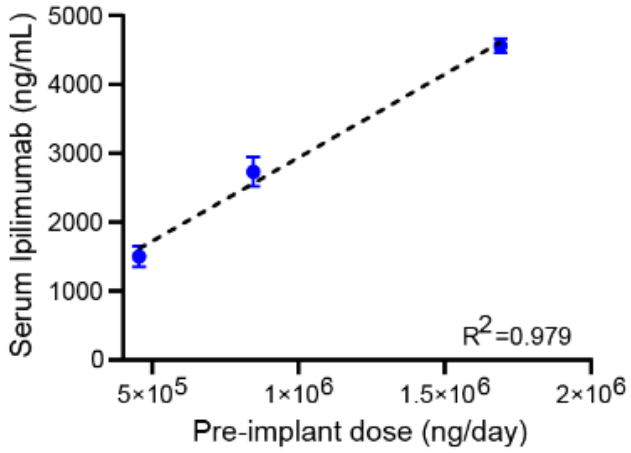
Experimental Design



Ipilimumab Serum titers over time

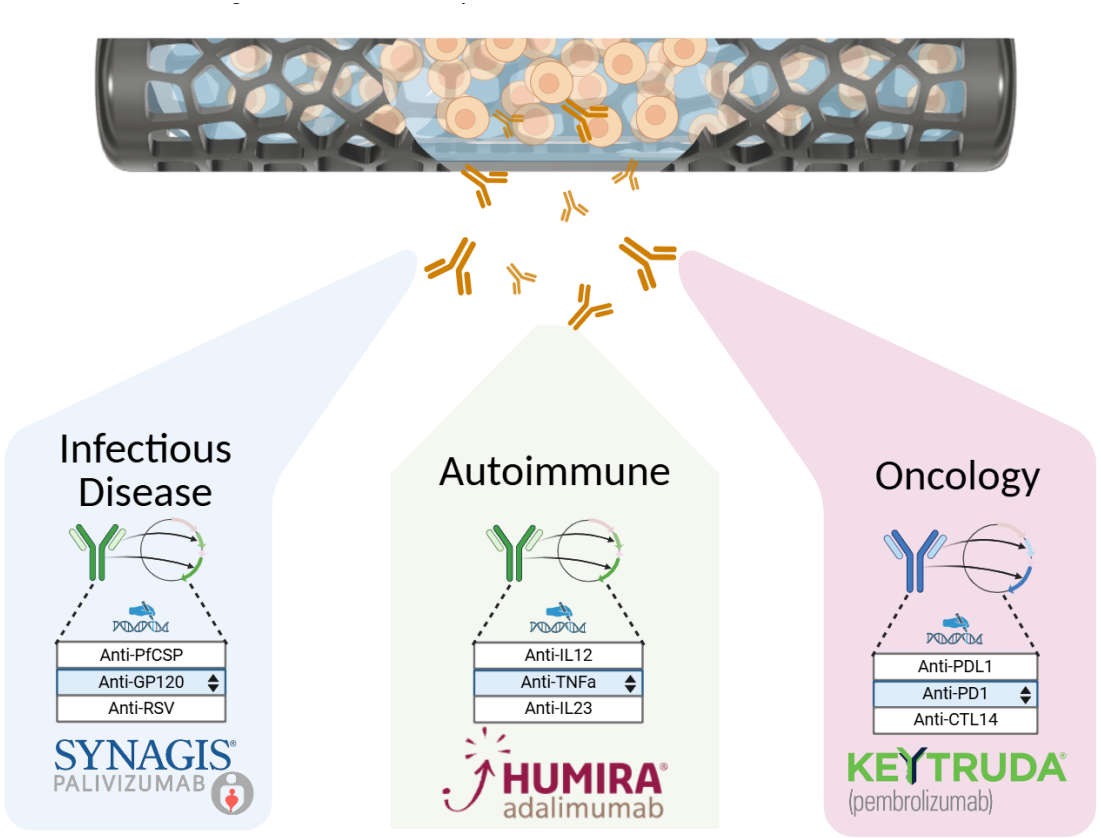


Serum titer is proportional to dose delivered

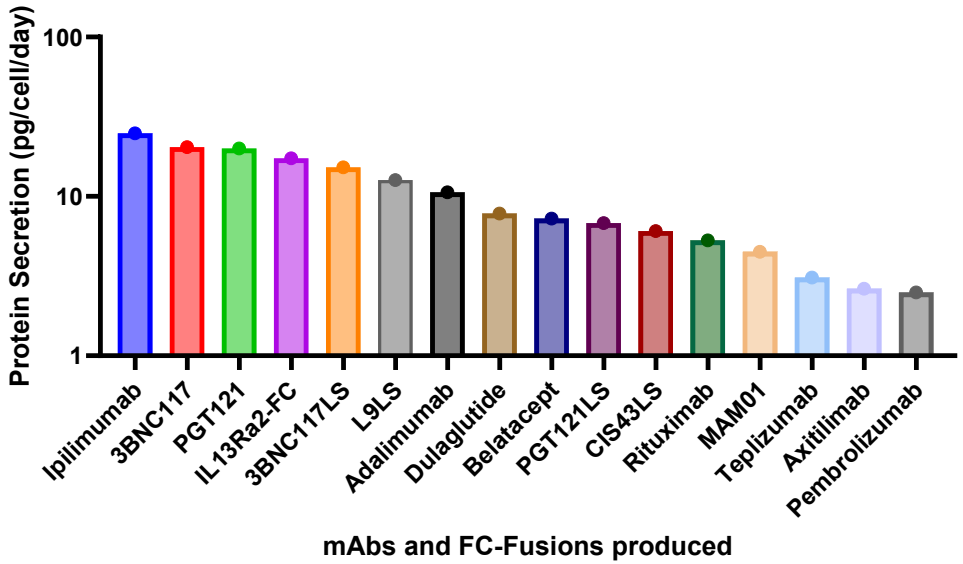


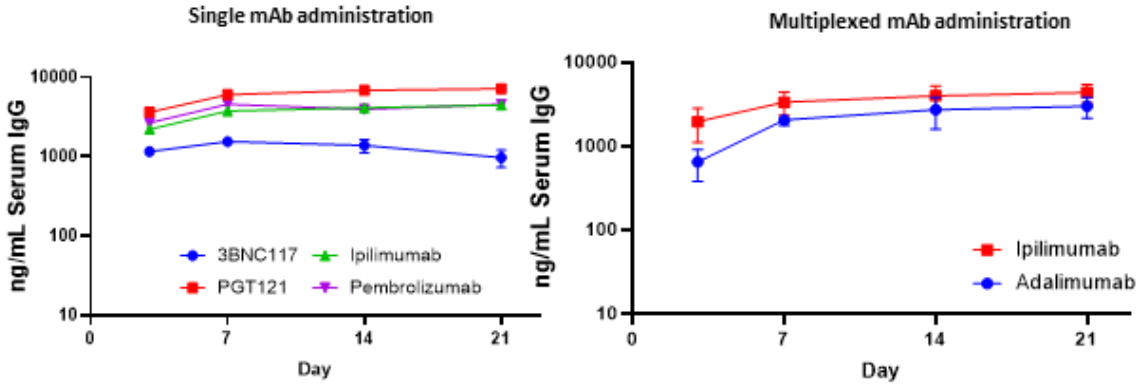
Source: Fell*, Davis*, Pandey* et al. BioRxiv (2026), Schematic created in BioRender

Future Outlook: Expand the platform to other indications



Over 190 mAbs are FDA approved or under review





Source: Fell*, Davis*, Pandey* et al. BioRxiv (2026), Schematic created in BioRender

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Dr. Tyler Guinn


Chancellor Smith


Nathan Brown

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Department of Bioengineering

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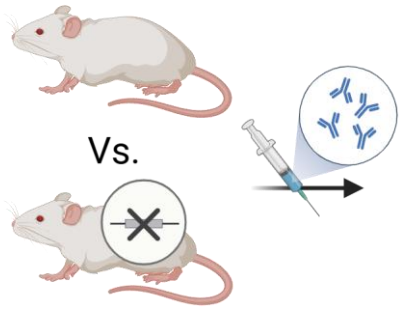
Biotech Launch Pad

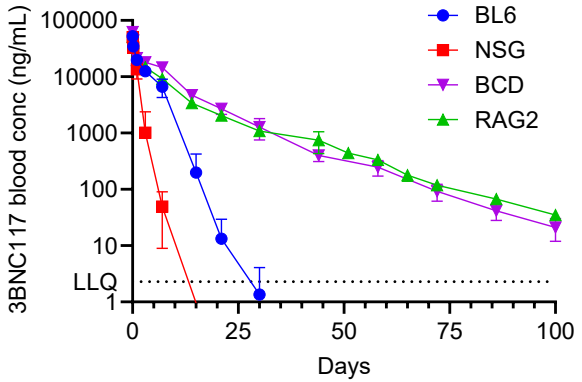
Veiseh Lab Members
Diehl Lab Members
Rice Shared Equipment Authority
Baylor College of Medicine Cores
Dr. Michael Seaman Lab
Collaboration for Aids Vaccine Discovery

Appendix

Pharmacokinetic studies and modeling are used to find a rodent model that is predictive of human pharmacokinetics

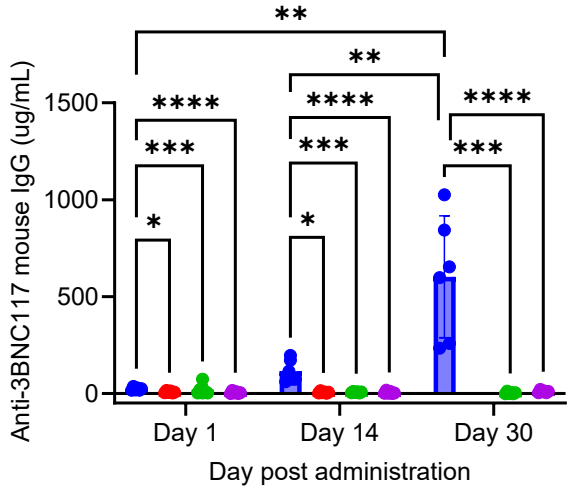


IV bolus injection of 3BNC117

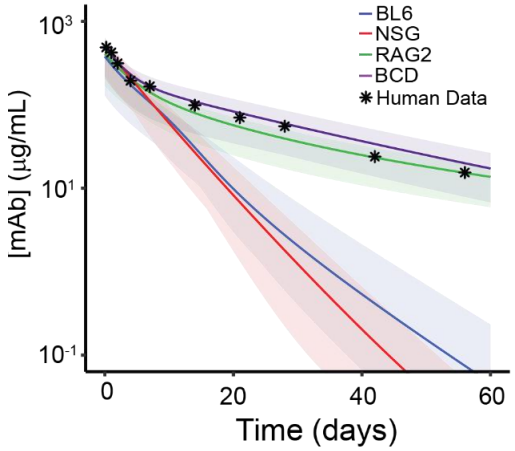


Functional Immune Cell Population	BL6 mice C57BL/6NCrl	BCD mice B6.129S2-Ighmtm1Cgn/J	RAG2 mice B6.Cg-Rag2tm1.1Cgn/J	NSG mice NOD.CgPrkdcscid Il2rgtm1Wjl/SzJ
Monocyte	+	+	+	+
Macrophage	+	+	+	-
Basophil	+	+	+	+
T-Cell	+	+	-	-
B-Cell	+	-	-	-
Neutrophil	+	+	+	+
Dendritic Cell	+	+	+	-
Eosinophil	+	+	+	+
Natural Killer Cell	+	+	+	-

Anti-Drug Antibody Generation



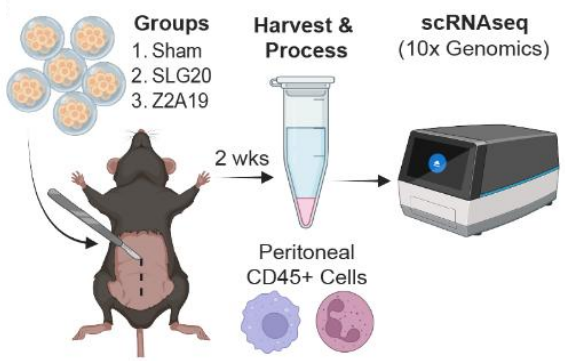
RAG2 and BCD mice scaling fit human data



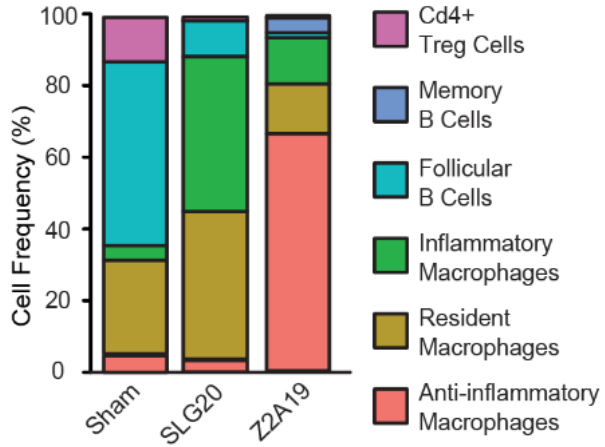
Source: Jon Debonis, Anthony Davis et al. JCR (2025)

Mechanistic analysis identifies gene signatures associated with inflammatory macrophages driving exacerbated FBR in unmodified alginate groups

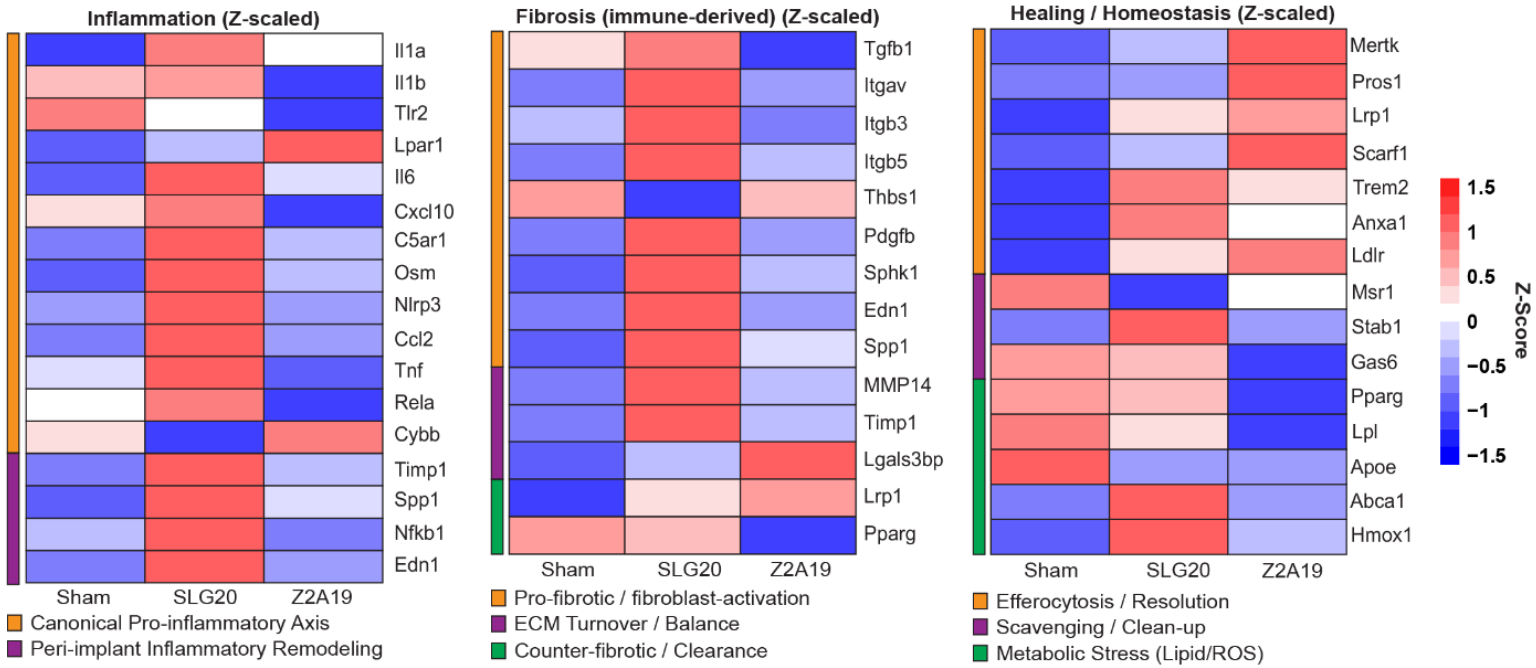
Experimental Design



Immune cell populations across groups



Heat maps of gene signatures



Source: Fell*, Davis*, Pandey* et al. BioRxiv (2026), Schematic created in BioRender