From Saccharides to Synthetics: Exploring Biomaterial Scaffolds as Cell Transduction Enhancers

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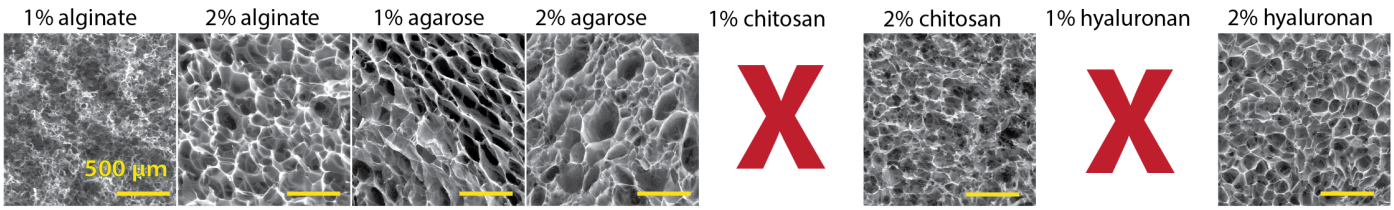
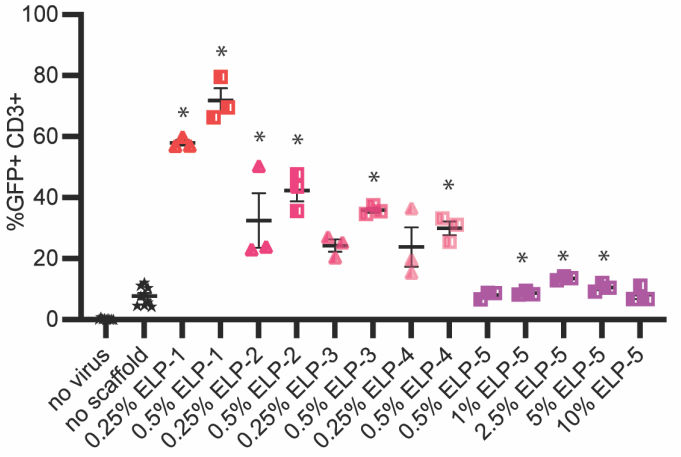
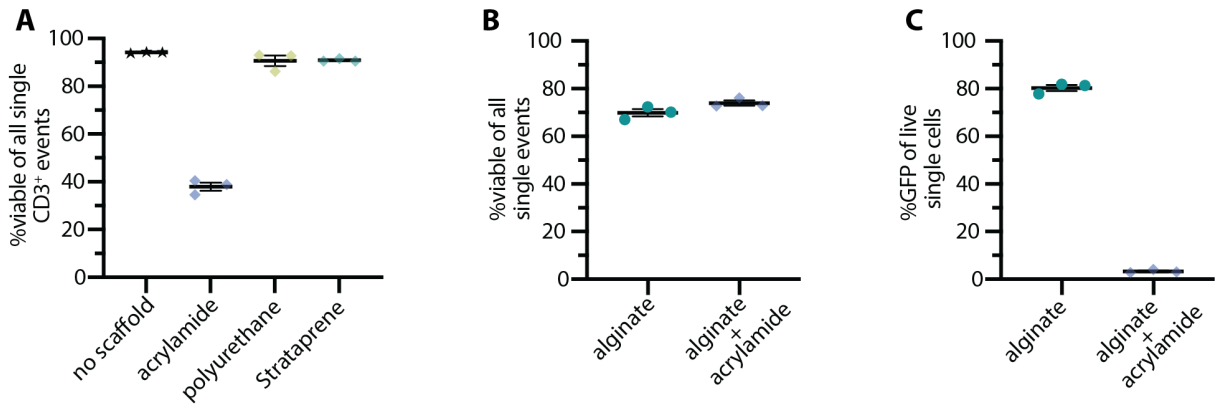


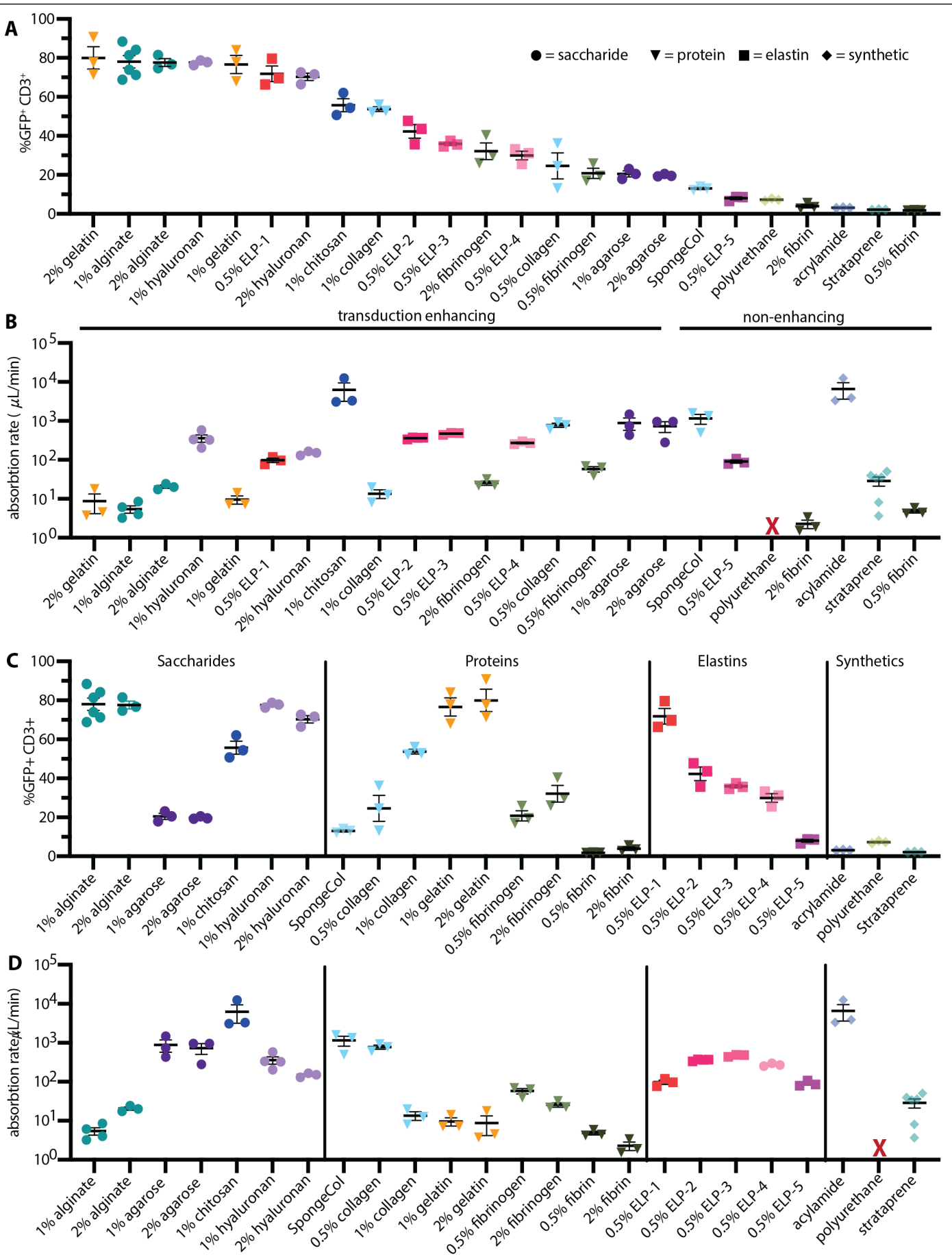
Supplemental figure 1: **Cross-sectional SEM** reveal channel-like pore network despite non-porous surface of agarose scaffolds. Alginate, 2% hyaluronan, and 2% chitosan cross-sections resemble their respective surface porosities. 1% hyaluronan and 1% chitosan were unable to be sectioned without severely disforming the scaffold and representative SEM was not able to be taken (X).



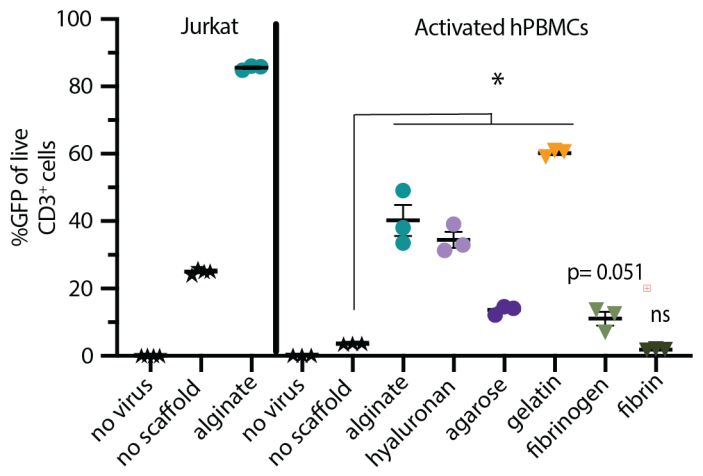
Supplemental figure 2: **Increased ELP concentration results in increased transduction enhancement**. In successfully transducing ELP constructs, increasing concentration results in increase transduction efficiency. * indicates $p < 0.05$ by one-way ANOVA with Dunnett's multiple comparisons with respect to the no scaffold group.



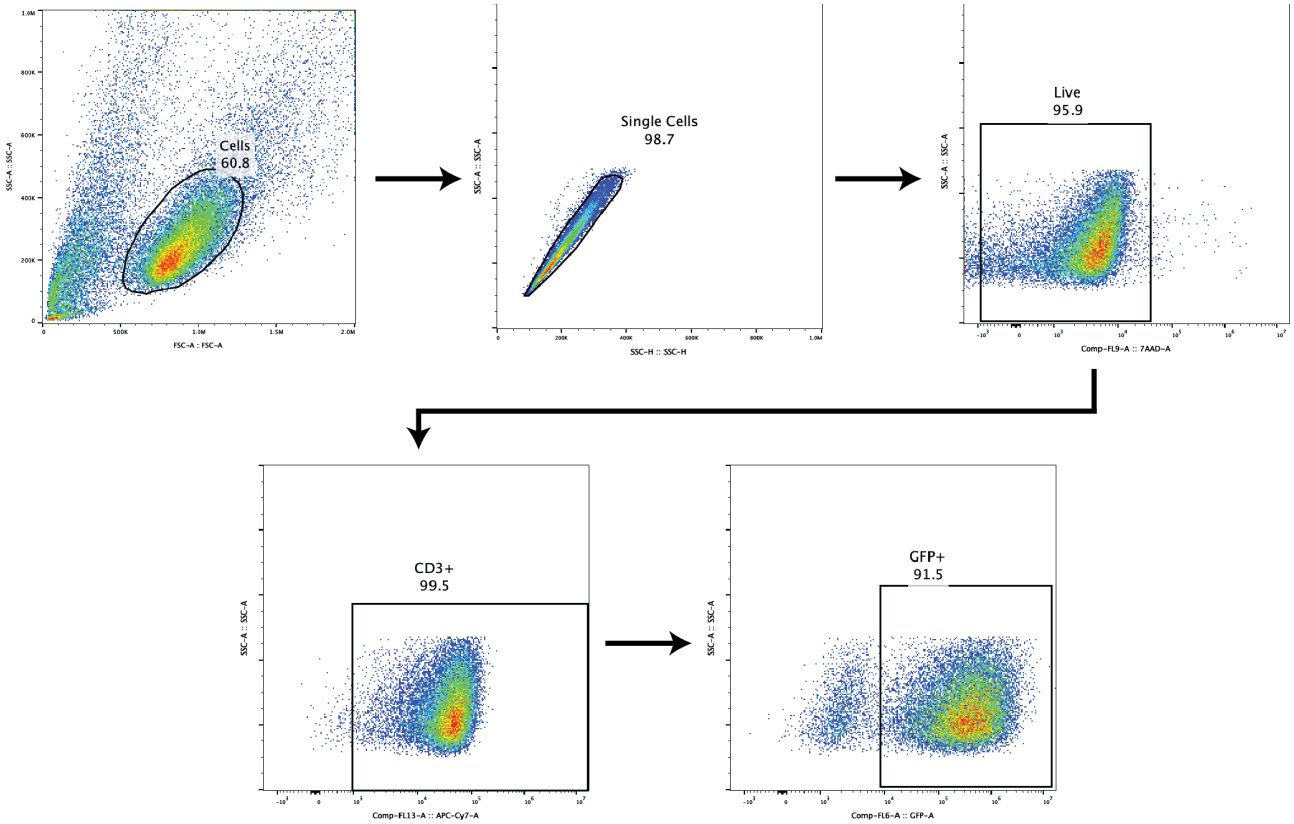
Supplemental figure 3: Alginate-synthetic blend rescues viability but not transduction enhancement. (A) Acrylamide scaffold cells only had ~40% viability, likely contributing to the acrylamide scaffold lack of transduction enhancement. The other synthetics had no adverse impact on viability. Creating a scaffold from an interpenetrating network of alginate and acrylamide restored the recovered cell viability (B) but did not result in transduction enhancement (C) highlighting that scaffold transduction enhancements are not simply additive.



Supplemental figure 4: Absorption rate range across four orders of magnitude with no clear connection to transduction enhancing success. Ranking materials by transduction efficiency enables rapid relative comparison (A) and highlights a wide range of absorption rates in both successful and unsuccessful transduction scaffolds without clear correlation. Grouping materials by polymer type enable intergroup comparison for transduction efficiency (C) and absorption rates (D).



Supplemental figure 5: Biomaterial scaffold transduction enhancement in primary human cells. Human peripheral blood mononuclear cells (hPBMCs) show similar transduction enhancement patterns as Jurkat cells, despite lower overall transduction efficiency under identical circumstances. High-performing materials with Jurkat cells (alginate, hyaluronan, and gelatin) also showed superior performance with hPBMCs, while mid/low-performing materials (agarose, fibrinogen, and fibrin) maintained similar relative positions. With hPMBCs, gelatin resulted in the highest transduction efficiency, highlighting that some cell types may experience different results with different material combination. * indicates statistical significance ($p < 0.05$) compared to no scaffold control using one-way ANOVA with Dunnett's multiple comparisons. All scaffolds were prepared from 1% w/v solution concentration.



Supplemental figure 6: **Representative flow plots of 1% alginate showing the gating strategy for flow cytometry analysis**. Jurkat cells were gated then doublet exclusion was performed before excluding any dead cells. Finally, $CD3^{+}$ cells were analyzed for GFP expression. MFI data was extracted from the final gated population.