Electronic Supplementary Material (ESI) for Biomaterials Science.

Affinity of Plant Viral Nanoparticle Potato Virus X (PVX) Towards Malignant B cells Enables Cancer Drug Delivery

Sourabh Shukla[1#], Anne Jessica Roe[2#], Ruifu Liu[2], Frank A. Veliz[3], Ulrich Commandeur[4], David N. Wald[2*] and Nicole F. Steinmetz[1,5,6,7,8*].

Departments of [1]NanoEngineering, [5]Bioengineering, [6]Radiology, [7]Moores Cancer Center, [8]Center for Nano-ImmunoEngineering, University of California, San Diego, La Jolla, California, 92093, United States; Departments of [2]Pathology, [3]Biomedical Engineering, Case Western Reserve University, Cleveland, Ohio 44106, United States; [4] Department of Molecular Biotechnology, RWTH-Aachen University, Aachen 52064, Germany.

*Correspondence: nsteinmetz@ucsd.edu, dnw@case.edu
[#] These authors contributed equally

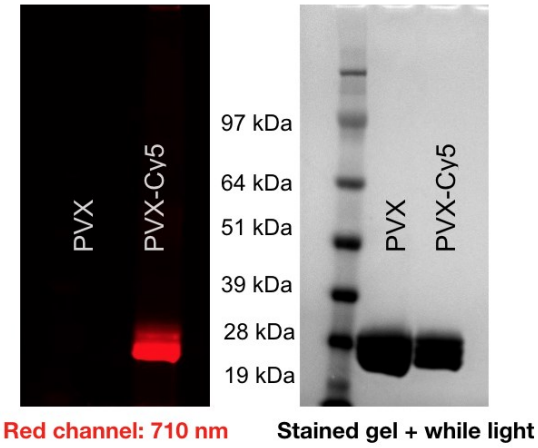

Figure S1. SDS gel electrophoresis shows conjugation of Cy5 fluorescent dye to the PVX coat protein.

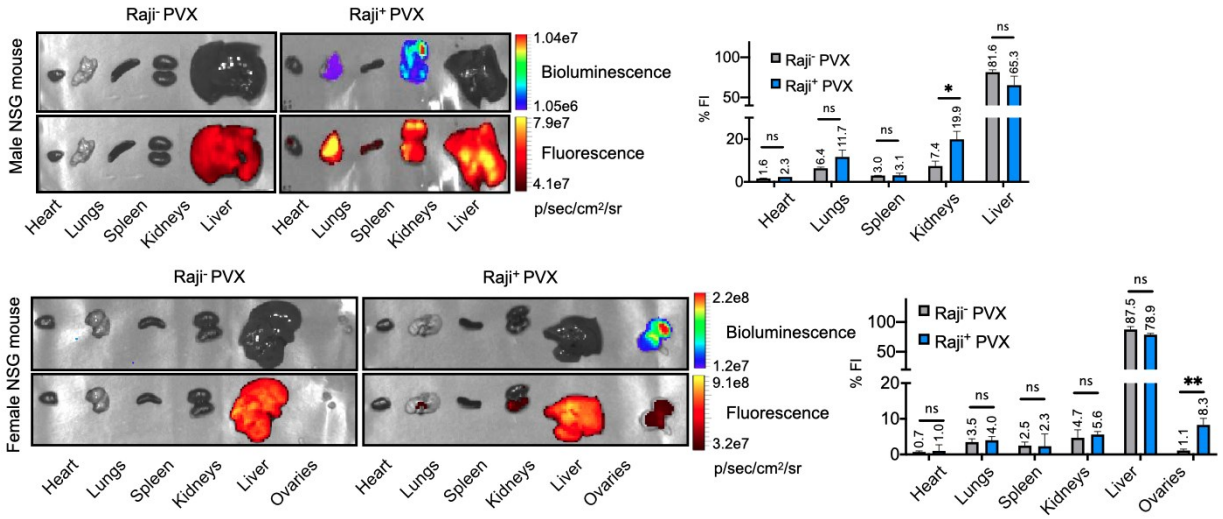

Figure S2. Biodistribution of PVX-Cy5 in Raji$^-$ and Raji$^+$ male and female NSG mice. Statistical analysis was performed between tissues from Raji$^-$ and Raji$^+$ mice were performed using student t test (* $p<0.05$; ** $p<0.01$).

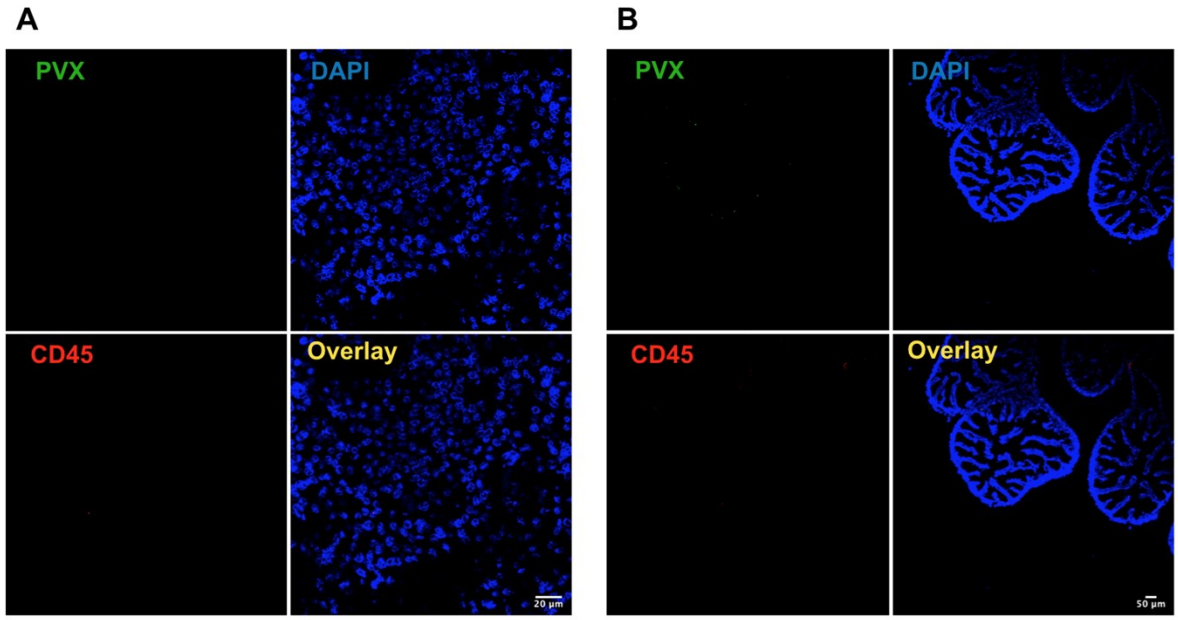

Figure S3: Confocal microscopy of kidney (**A**) and ovary sections (**B**) from healthy NSG mice (Raji$^-$ mice) injected with PVX-Lys-Cy5 shows no PVX accumulation in these tissues. Tissue sections were stained for CD45$^+$ Raji cells and with DAPI nuclei staining (blue).

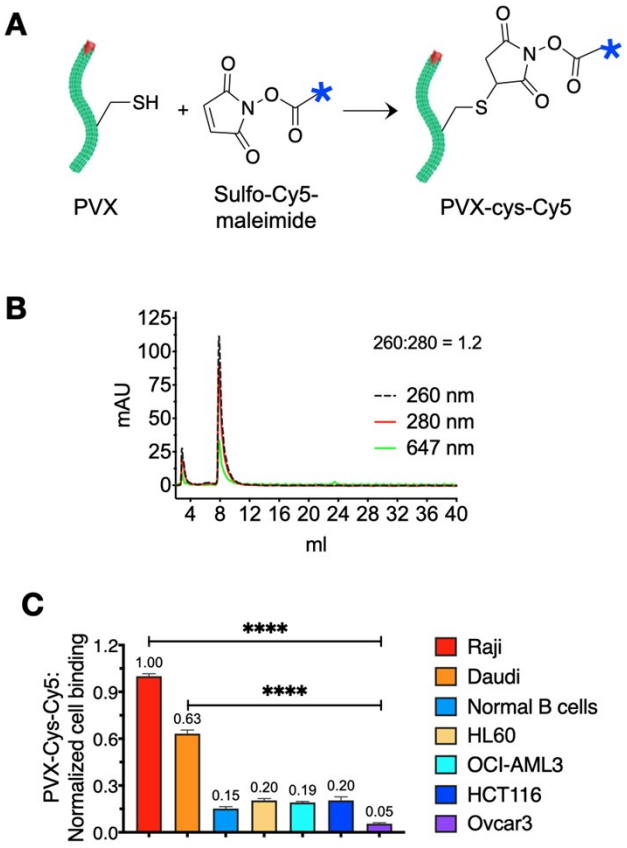

Figure S4: **A**) Fluorescent PVX particles were also prepared using maleimide chemistry targeting the cysteine residues on PVX coat protein. **B**) PVX-Cys-Cy5 particles were characterized using FPLC. **C**) Cell binding of PVX-Cys-Cy5 was evaluated with flow cytometry; statistical analysis was performed using Ordinary one-way ANOVA (Tukey's multiple comparison tests; **** $p<0.0001$).

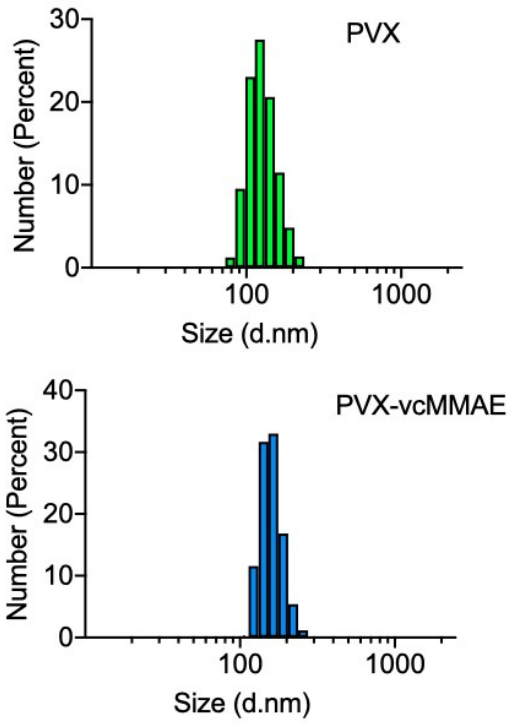

Figure S5: Dynamic light scattering analyses showed comparable sized PVX and PVX-vcMMAE particles.

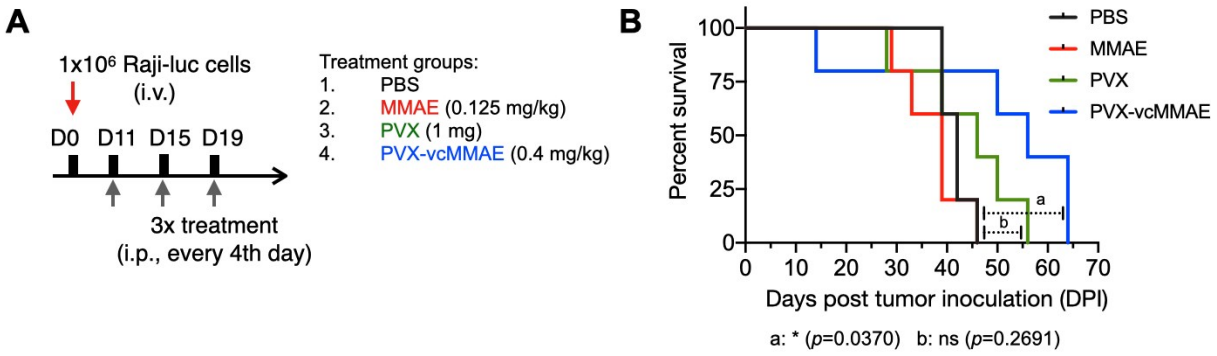

Figure S6: Efficacy of PVX-vcMMAE treatment compared with soluble MMAE in Raji B cell lymphoma bearing mice (n=5). Mice were engrafted with $1x10^6$ Raji-Luc B lymphoma cells and treated three times at four-day intervals with PBS, PVX, MMAE and PVX-vcMMAE, starting at day 11 post-tumor challenges. Survival curves were analyzed using the Log-Rank Mantel-Cox test using GraphPad Prism8 software.