HIV virion capturing liposomes for therapeutic vaccination

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HIV currently has no effective cures and requires lifelong antiretroviral treatments. Cures have failed due to HIV's immune evasion and rapid mutation rate. Here we present a first-in-class HIV therapeutic vaccine, termed nanotrap therapeutic vaccines (NTVs) that are designed to capture circulating HIV virions and facilitate internalization by local antigen presenting cells. NTVs are modified liposomes that display the CD4 mimetic molecule, CJF288, on their surfaces and have the TLR 7/8 agonist R848 loaded into their bilayer. This strategy is a “bait and switch”: NTVs display CD4 mimetics to appear as an infection target but instead capture virions on particles loaded with adjuvants, allowing for local antigen presenting cells to uptake the entire complex. This prevents immune evasion and facilitates a strain specific immunity. In a preliminary study[1], we have shown that NTVs can 1) bind gp120 and capture pseudoviral particles, 2) facilitate uptake by antigen presenting cells and 3) generate robust anti-HIV CD8 T cell immunity in transient infection mouse models. NTVs have translational potential to generate patient-specific HIV immunity.