Polyethyleneimine as a mucosal adjuvant for HIV-1 immunisation
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Introduction
Effective HIV-1 vaccination probably requires immune activation at the site of HIV-1 entry: the mucosa. This can almost certainly only be achieved through mucosal immunisation with an effective mucosal adjuvant, while currently available adjuvants lack strong mucosal activity. We observed strong adjuvant activity with the transfection agent polyethyleneimine (PEI, Fig.1 & 2). PEI protected against disease in Influenza and HSV-2 challenge models. Here we investigated PEI as a mucosal adjuvant in the context of HIV-1 immunisation with HIV-1 gp140 immunogen (Fig.3) in mice.

Results 1: Mucosal adjuvant activity
We investigated PEI as adjuvant in an intranasal HIV-1 gp140 immunisation model in mice.

ANTIBODY RESPONSES: Mucosal PEI adjuvantation enhances systemic and local antibody responses to gp140

A Serum α-gp140 IgG titre

B Vaginal

T CELL RESPONSES: Mucosal PEI adjuvantation enhances T cell responses and release of T₈₁, T₁₂₂, and T₈₁₇ cytokines

A T cell proliferation

B T cell cytokines (spleen)

Results 2: PEI – gp140 interaction:
PEI binds to gp140 and forms complexes
As transfection agent PEI interacts with negatively charged DNA and forms complexes. We hypothesized that PEI similarly interacts with negatively charged patches on gp140 surface to form PEI-gp140 complexes.

Results 3: PEI targets OVA/ gp140 to antigen presenting cells
We hypothesized that PEI-gp140 complexes, like PEI-DNA complexes, are internalised and we investigated which leukocyte populations are targeted by PEI.

Summary:
- PEI is a potent mucosal adjuvant in mice
- PEI binds to gp140 antigen and forms complexes
- PEI recruits leukocytes, particularly monocytes to peritoneal site and induces T₈₁, T₁₂₂, T₈₁₇ cytokines (data not shown)
- PEI targets gp140 and OVA antigen to antigen presenting cells

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