Pinpoint accuracy: DNA vaccines that home in on DCs are more potent

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One strategy being pursued to develop new vaccines against infectious diseases is DNA vaccination. The idea is that following administration of a DNA vaccine, the body converts the information in the DNA vaccine into a protein that activates an immune response.

However, current DNA vaccines induce relatively weak immune responses even if administered multiple times. New data, generated in mice, by Ralph Steinman and colleagues, at the Rockefeller University, New York, has now identified a way to make DNA vaccines more potent.

In the study, mice were administered a DNA vaccine that included the information to make a single protein comprised of the HIV protein gp41 fused to a single-chain Fv antibody specific for DEC205. DEC205 is expressed by immune cells known as DCs, which show proteins from infectious organisms to immune cells known as T cells that then attack the infectious organism. The authors found that the single-chain Fv antibody specific for DEC205 targeted the protein made from the information in the DNA vaccine to DCs, such that it was expressed exclusively in DCs.

Furthermore, this DNA vaccine induced a much stronger T cell response than DNA vaccines including information to make the HIV protein gp41 fused to an irrelevant single-chain Fv antibody, and it protected mice more efficiently from a virus engineered to express the HIV protein gp41. These data led to the suggestion that DNA vaccines might be more potent if the information they contain generates a protein that is targeted to DCs, for example by fusion to a single-chain Fv antibody specific for a DC surface molecule.

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