Cationic liposomes formulated with synthetic mycobacterial cordfactor (CAF01): a versatile adjuvant for vaccines with different immunological requirements.

BACKGROUND: It is now emerging that for vaccines against a range of diseases including influenza, malaria and HIV, the induction of a humoral response is insufficient and a substantial complementary cell-mediated immune response is necessary for adequate protection. Furthermore, for some diseases such as tuberculosis, a cellular response seems to be the sole effector mechanism required for protection. The development of new adjuvants capable of inducing highly complex immune responses with strong antigen-specific T-cell responses in addition to antibodies is therefore urgently needed. METHODS AND FINDINGS: Herein, we describe a cationic adjuvant formulation (CAF01) consisting of DDA as a delivery vehicle and synthetic mycobacterial cordfactor as immunomodulator. CAF01 primes strong and complex immune responses and using ovalbumin as a model vaccine antigen in mice, antigen specific cell-mediated- and humoral responses were obtained at a level clearly above a range of currently used adjuvants (Aluminium, monophosphoryl lipid A, CFA/IFA, Montanide). This response occurs through Toll-like receptor 2, 3, 4 and 7-independent pathways whereas the response is partly reduced in MyD88-deficient mice. In
three animal models of diseases with markedly different immunological requirement; Mycobacterium tuberculosis (cell-mediated), Chlamydia trachomatis (cell-mediated/humoral) and malaria (humoral) immunization with CAF01-based vaccines elicited significant protective immunity against challenge. CONCLUSION: CAF01 is potentially a suitable adjuvant for a wide range of diseases including targets requiring both CMI and humoral immune responses for protection.