Pseudomonas aeruginosa is an important pathogen in conditions such as severe burns and cystic fibrosis, causing significant morbidity and mortality. Despite many efforts, no clinically effective vaccine against \textit{P}. \textit{aeruginosa} is available to date especially in CF patients. In order to optimize an antipseudomonal vaccine and enhance mucosal immunity, we focused our study on the enhancement of the B cell response. Stimulating B cells through B cell activating molecules during immunization against \textit{P}. \textit{aeruginosa} may increase the efficiency of a vaccine. B cell activating factor (BAFF), a 34kD single chain TNF-family member, is produced by activated antigen presenting cells and stimulates B cells. Similar to other members of the TNF family, BAFF is secreted as a trimmer by cleavage of the protein from the membrane. Following binding to its receptors on B cells BAFF prolongs the life-span of activated B cells by preventing apoptosis and induces T cell independent immunoglobulin class switch \textit{in vitro} and is crucial for B cell development and for the generation of humoral immune responses \textit{in vivo}. Based on these findings, we hypothesized that the strong B cell stimulatory properties of BAFF can be exploited for the induction of immunity against \textit{P}. \textit{aeruginosa} and that the transient overexpression of BAFF during immunization will favor the development of a rapid, strong humoral immune response. To evaluate this concept, AdmBAFF, an E1-E3- adenovirus expressing full-length murine BAFF under control of a CMV promotor, was constructed. After infection of A549 cells with AdmBAFF, expression of full-length BAFF could be seen in the cell lysate by Western analysis, and a cleaved form of BAFF was detected in the supernatant, demonstrating that the overexpressed BAFF was properly shed from the membrane. To assess the potency of AdmBAFF to induce humoral immunity against \textit{P}. \textit{aeruginosa} in \textit{vivo}, C57Bl/6 mice were injected subcutaneously with 7.5x10^{10} particle units of AdmBAFF together with 10^{5} cfu of heat-inactivated \textit{P}. \textit{aeruginosa} strain PA01. Mice injected with AdNull or PBS plus PA01 served as controls. Serum binding antibodies against PA01 were evaluated by ELISA 1, 2, 3, and 4 wk following immunization. Mice injected with PA01 + AdmBAFF showed higher levels of PA01-specific IgM titers 1 and 2 wk after immunization (1175 ± 506 and 304 ± 118, respectively) compared to mice immunized with PA01 + AdNull (280 ± 105 and 73 ± 48) or PA01 + PBS (305 ± 91 and 61 ± 17, p<0.02 for both comparisons at both timepoints). Similarly, higher PA01-specific total IgG levels were observed 2, 3 and 4 wk following immunization with PA01 + AdmBAFF (373±206, 158±35 and 164±99, respectively) compared to mice immunized with PA01 + AdNull (79±70, 47±45 and 38±32) or PA01 + PBS (63±41, 30±9 and 40±15, p<0.05 for both comparisons at all 3 time points). These data indicate that coadministration of AdmBAFF and heat-inactivated \textit{P}. \textit{aeruginosa} leads to an increased humoral immune response against \textit{P}. \textit{aeruginosa}, and thus overexpression of BAFF may be useful for the development of a genetic vaccine against \textit{P}. \textit{aeruginosa}.

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