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Nasal immunization studies by cationic, fusogenic and cationic-fusogenic liposomes encapsulated with tetanus toxoid

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Abstract

Particulate antigens are more effective than soluble antigens in induction of systemic and mucosal immunity; possibly because they are more efficiently endocytosed by mucosal-associated lymphoid tissue (MALT) M cells. In this study, we determined the systemic and mucosal immune responses in rabbits following intranasal immunization with tetanus toxoid (TT) entrapped in cationic, fusogenic and cationic-fusogenic liposomes. Liposomes containing TT were prepared by dehydration-rehydration method. The volume mean diameter of cationic, fusogenic and cationic-fusogenic liposomes were ٣,٤ ± ٠,٦, ٤,٣ ± ٢,٣ and ٣,٤ ± ١,٥ μm, respectively. Encapsulation efficiency of TT in cationic, fusogenic and cationic-fusogenic liposomes was respectively determined as ٤٩,١ ± ٨,٤٪, ٤٨,٥ ± ٢,١٪ and ٥٠,٨ ± ٤,٩٪. After ٣ months, the leaking of encapsulated TT from liposomes ranged between ٢,٠٢ - ٥,٤٦٪. Immunoreactivities of encapsulated TT in all kinds of liposomes were completely preserved, as studied by Sodium Dodecyl Sulfate - Polyacrylamide Gel Electrophoresis (SDS-PAGE) and Enzyme-Linked Immunosorbent Assay (ELISA). The highest serum immunoglobulin G (IgG) and antitoxin titers were observed in groups immunized with solution formulation (P< ٠,٠٠١). However, the highest mucosal secretory IgA (sIgA) titers were achieved by fusogenic liposomes (five times more titers compared with TT solution, and ١٥ times more titers compared with i.m. vaccine), followed by cationic-fusogenic liposomes. No hemolysis was occurred on incubation of liposomes and human erythrocytes. Also after nasal administration of plain liposomes to human volunteers, no local irritation was seen. This study suggests that intranasal administration of fusogenic and cationic-fusogenic liposomes encapsulated with vaccines could be an effective way for inducing mucosal immune responses. © ٢٠٠٨ Bentham Science Publishers Ltd.

Author keywords

Cationic liposomes; Cationic-fusogenic liposome; Fusogenic liposome; Nasal immunization; Tetanus toxoid

Indexed Keywords

EMTREE drug terms: cationic fusogenic liposome; cationic liposome; fusogenic liposome; immunoglobulin A; immunoglobulin G; liposome; tetanus toxoid; unclassified drug

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Medline is the source for the MeSH terms of this document.