Editorial

Liposome Adjuvants: Simultaneous Induction of Innate and Adaptive Immunity is Key to Success

The current generation vaccines are mainly composed of highly purified antigens and tend to be poorly immunogenic, requiring potent adjuvants for their success. The adjuvants currently available suffer from various drawbacks such as low potency (inability to activate strong humoral and cell-mediated immune response) and extreme toxicity for routine clinical use in humans. In addition, not all adjuvants are effective for all antigens. The compromise between the requirement for strong adjuvant activity and an acceptable low level of toxicity has left us with limited choice of adjuvants. Although alum adjuvant has been used for decades, it is associated with severe level of toxicity has left us with limited choice of adjuvants. Although much success has been shown by liposomes, the mechanism of their stimulating effect on innate immunity has been studied inadequately. In particular their global effects on gene transcription and the complex regulatory machinery in the cell that leads to enhanced immune responses are poorly understood. Liposomes are considered to be a sensitive adjuvant. Small changes in their properties (lipid composition, size, charge) lead to great differences in immune responses. Thus, availability of immunological profile of a liposome with a particular charge, size and lipid composition would enable rational retro-design of liposomal vaccine adjuvants. While the mechanism of most of the currently used adjuvants like alum, MF59, CpG are being explored by exploiting transcriptional gene profiling, only a few studies have reported the adjuvant mechanism of liposomes [20,21]. We have explored the adjuvant mechanism of immunostimulatory and fusogenic liposomes in mice by applying microarray-based transcriptional profiling. Our results have shown that injection of conventional (CL) or immunostimulatory/fusogenic liposomes (IFL) at mouse. Muscle or peritoneum induced distinct
The innate response generated also correlated to the adaptive immune response (unpublished data).

In conclusion, immunostimulatory and fusogenic liposomes are effective and promising vaccine adjuvants which can be engineered to produce desired immune response against the particular pathogen. Exploiting new technologies to understand molecular mechanism of liposome action will pave way for the development of novel liposome-based therapeutics and prophylactics.

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