considered is the duration of protective antibodies. Recent findings relevant to the present work indicated that when *P. vivax* transmission-blocking vaccine candidate Pvs25 was injected s.c. with incomplete Freund's adjuvant into BALB/c mice, it induced a strong antigen-specific serum IgG response that was maintained for more than 6 months (our unpublished data). i.n. vaccination with Pvs25 plus CT induced a level of serum IgG comparable to that induced by s.c. vaccination formulated with incomplete Freund's adjuvant, but the level gradually decreased over 6 months. However, we found that i.n. vaccination with Pvs25 plus CT was generally more potent based on the magnitude and duration of the specific serum IgG response than s.c. vaccination with Pvs25 formulated with aluminum hydroxide (unpublished data).

In this study we used CT as a mucosal adjuvant; however, the use of CT for humans is hampered by the toxicity of this compound. Also, as mentioned above, issues related to the potential allergic response and the duration of antibodies need special consideration. Fortunately, however, nontoxic and thus safer adjuvants, but adjuvants that are as effective as CT, are being developed, making a mucosal malaria vaccine a feasible goal (1, 15). For example, we recently found that when a nontoxic subunit of CT, CTB, was fused to malaria OSP, it was efficacious by both the mucosal and s.c. routes for blocking parasite transmission (unpublished data). Thus, if the mucosal transmission-blocking vaccine efficacy data obtained with this rodent infection model can be reproduced in human clinical trials with guaranteed safety, OSP antigens formulated as noninvasive vaccines may become a powerful tool for use against human malaria.

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