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Immunogenicity, gut associated histopathological changes and immunohistochemical evidence of cholinergic neuroimmune interactions in lymphoid tissues in mice immunized with *Lactococcus lactis* expressing a malaria parasite protein

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Introduction: Gram positive food grade bacteria *Lactococci* have significant advantages over attenuated pathogens as vaccine delivery vehicles due to inherent safety.

Methods: *Plasmodium falciparum* merozoite surface antigen2(PfMSA2) was expressed in recombinant *Lactococcus lactis*. Recombinant *L.lactis* strain, delivered oro-nasally for mucosal immunisation to *Balb/c* mice. Non-recombinant *L.lactis* used as control. Serum antibody response investigated by ELISA and immunofluorescence assay. Histopathological changes in gut associated lymphoid tissue investigated. The cholinergic nerve ending and the distribution of alpha subunits of nAChRs in the spleen, Peyer's patches and mesenteric lymph nodes were studied by indirect immunohistochemistry

Results: Serum IgG anti-MSA2 responses was significantly higher in Balb/c mice, after oronasal delivery. Antibodies elicited reacted with native MSA2 in the surface of *P. falciparum* merozoites in an immunofluorescence assay. Enlargement of mesenteric lymph nodes and increased lymphatic infiltration of the lamina propria were noted. Spleen showed periarteriolar lymphoid aggregation in immunized mice. The α1nAChRs were distributed in the capsule and red pulp of spleen. Germinal centres of Peyer's patches showed diffuse(+1) distribution of α1nAChR and expressed a low immunoreactivity(IR) of anti-nAChRs.

Conclusions: Recombinant *L. lactis* is a suitably safe vector for subunit vaccines. Neuronal control of immune response by parasympathetic cholinergic innervation through nAChRs is suggestive.

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