STRUCTURE-FUNCTION RELATIONSHIP IN THE REPEAT REGIONS OF MALARIA PARASITE PROTEINS

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A feature of the many antigens of the human malaria parasites that have been sequenced to date, is the presence of tandemly repeated sequences of amino acids. The functions of the repeat regions is not known. It has been proposed that the repeats function as an immunological smokescreen, in preventing the affinity maturation of an antibody response that is needed for the development of protective immunity. An alternative suggestion is that the repeats favour a thymus-independent antibody response that is by nature of low affinity.

The relative proportions of amino acids in the repeat and non-repeat regions of parasite antigens, and possible difference in other structural parameters between the two regions were examined. A significant difference in the distribution of many amino acids between shorter repeat regions containing less than fourteen amino acids and non-repeat regions was observed. Hydrophobic amino acids show a decreased frequency in the shorter repeat regions, while there is an increase in amino acids with negatively charged side chains in the repeats.

The results suggest that the repeats are generally present on the surface of the antigens in structures such as loops, turns or random coils. Protein segments in such conformations show greater atomic mobility than helicies and are known to give rise to low affinity cross-reactive antibodies. The structural characteristics of repeats therefore support a role in immune evasion by the malaria parasites.