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Educational Workshop
VAR2CSA vaccine for malaria in pregnant women
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A vaccine that efficiently prevents infection with the malaria parasite Plasmodium falciparum is unlikely to become available in the near future. A vaccine to prevent disease is a feasible alternative approach, the development of which is a goal that appears achievable in the particular context of pregnancy-associated malaria. The evidence base for this assertion rests on several interconnected epidemiological, parasitological and immunological observations. At the epidemiological level it is known that, in areas with stable transmission of malaria, primigravid women are more susceptible than multigravidae, both to infection with P. falciparum and to its pathological consequences. The latter are directly related to the fact that parasite-infected erythrocytes (PfiE) accumulate in the placenta resulting, especially in primigravidae, in frequently intense monocytic inflammatory activity. Multigravidae are rendered less susceptible by the specific immunity they have acquired over the course of earlier pregnancies. That immunity is characterized by the antibody-based, gender-specific nature of the response to a particular parasite-derived protein antigen expressed on the surface of PfiE. The protein in question acts as a ligand that mediates adhesive interactions between PfiE and a placental receptor, chondroitin sulphate A (CSA), expressed on syncytiotrophoblasts. The antigen is referred to as VAR2CSA, a designation derived from the fact that it is encoded by a gene of the var family, members of which are responsible for the production of PfEMP1 proteins. Although indeed polymorphic, a characteristic of all PfEMP1 proteins, VAR2CSA displays a comparatively reduced degree of variability. The latter is emphasized by the fact that the antibodies acquired by multigravidae living in a given distinct geographical region can inhibit the adherence to CSA of infected erythrocytes from placentas of women living elsewhere. The detailed molecular understanding of the processes involved now available thus provides the foundation for the on-going efforts aimed at developing a VAR2CSA-based vaccine. Such a vaccine would represent an extremely valuable additional tool with which to reduce the burden of disease both in mothers and their offspring.