SIgN Immunology Seminar



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Moving Toward Licensure and Deployment of a Whole Plasmodium falciparum (Pf) Sporozoite (SPZ) Malaria Vaccine

Host
Prof Laurent Renia
Singapore Immunology Network, A*Star

Date
Friday
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Time
11am – 12pm

Venue
Breakthrough
Matrix Building
Level 4
Biopolis

Although an ideal malaria vaccine would attack all stages of the parasite life cycle, the ideal single stage vaccine would be a pre-erythrocytic stage vaccine that induces protective antibodies that prevent all SPZ from entering hepatocytes and/or cellular immune responses that eliminate all parasite-infected hepatocytes before the parasite can full develop. Such a pre-erythrocytic stage vaccine would prevent development of asexual and sexual erythrocytic stages of the parasite life cycle, and thereby prevent all malaria disease and transmission of parasites to mosquitoes. It has been know for many years that it is possible to develop a highly effective pre-erythrocytic stage malaria vaccine based on studies in humans immunized by exposure to the bites of Plasmodium falciparum (Pf) sporozoite (SPZ)-infected mosquitoes either attenuated by irradiation or antimalarial drugs; high level, long-lasting protection against heterologous strains of Pf was achieved. Sanaria's was founded to translate mosquito-based immunization approaches into injectable whole PfSPZ malaria vaccines, and to use the vaccine (s) to eliminate malaria from geographically defined areas through mass immunization and as a prophylactic vaccine to prevent malaria in non-immune visitors to malarious areas. To be considered for these indications such a vaccine must be highly effective (>85% protective efficacy sustained for at least 6 months), and amenable to mass administration. Until 2012 the only immunogen reported to induce this degree of high-level protective immunity in humans had been PfSPZ administered by mosquito bite. In 2012 it was reported that immunization of humans with radiation attenuated, aseptic, purified, cryopreserved PfSPZ, Sanaria® PfSPZ Vaccine, protected 6/6 (100%) of subjects (R. Seder et al., Science 2013). To achieve this milestone and to eventually license and use its PfSPZ vaccines to achieve its goals, Sanaria and its collaborators have had to and will continue to have to overcome a series of challenges in manufacture and delivery, administration, and clinical development of PfSPZ. The parasites that cause malaria are complex. The subunit vaccine approach seeks to unravel that complexity and identify a few important targets among the greater than 5,000 proteins in the parasite's proteome, and induce protective immune responses against these selected targets. The whole PfSPZ approach does not try to distinguish among the potential targets, and allows the parasite to do the targeting. It required development of a new technology to move the whole PfSPZ approach forward. This has been accomplished. Both radiation-(Sanaria® PfSPZ Vaccine) and drug- (Sanaria® PfSPZ-CVac) attenuated PfSPZ have now been show to induce high-level protective efficacy in humans, and Sanaria® PfSPZ-GA1, a genetically altered parasite vaccine, will soon move into clinical trials. In the next few years we anticipate licensure and deployment of a PfSPZ vaccine that can be used to prevent Pf malaria in individuals and halt transmission and eliminate Pf malaria in communities.