New treatment for river blindness

Despite available therapies, filarial nematode diseases, including river blindness (onchocerciasis), remain a threat to public health in west and central Africa. EU-funded scientists have developed new vaccines poised to enter clinical trials.

The standard treatment for river blindness is ivermectin, which has been successful in reducing morbidity where it has been used in mass treatment programmes. However, resistance to this drug is now emerging and its use in regions where the eye worm (Loa loa) is co-endemic is restricted because of the risk of severe adverse reactions. In these circumstances, doxycycline can be used safely to treat river blindness, but neither drug can be used in children who remain exposed to infection, development of disease and contribution to continued transmission.

Researchers with the EU-funded E PIAF (Enhanced protective immunity against filariasis) project have developed three vaccines that are now going to enter phase I first-in-human safety trials. Three main species are targeted: Onchocerca volvulus.
First-in-human safety trials. Three main species are targeted: Onchocerca volvulus that causes river blindness; the nematode that gives rise to lymphatic filariasis, Wuchereria bancrofti; and Loa loa, the eye worm.

The vaccines exert their effect by neutralisation of parasite derived molecules that suppress the host immune system. This neutralisation leads to expression of a T helper 2 (Th2)-driven protective immune response.

A database containing clinical and parasitological profiles together with human gene expression data has generated information on immune responses and also identification of biomarkers for diagnosis and severity of infection.

The three most promising vaccines are capable of reducing the number of microfilariae by more than 90%, a doubling of efficacy when compared with previous vaccine candidates. Its overwhelming success is in part due to the action of an adjuvant or helper chemical that drives the Th2 response as well as a third protein that makes the filarial antigen a target of dendritic cells that induce the Th2 response.

The next step will require Good Manufacturing Production of the vaccines for phase 1 safety trials (although funding of this work is problematic). If successful, it is anticipated that phase 2 trials could start in 2020 and the European & Developing Countries Clinical Trials Partnership (EDCTP) offers the prospect of support for phase 2 studies.

A proposed vaccination strategy could protect preschool children who currently act as a reservoir for transmission. The researchers also anticipate that a vaccine could be used on older individuals. Other applications of the research include diseases with the same immune basis as well as multiple sclerosis and irritable bowel disease.

**Keywords**

River blindness, parasitic worm, vaccines, filariasis, immune

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