



Evolution and Diagnosis of Lymphatic Filariasis

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DESCRIPTION

Lymphatic Filariasis (LF) is a disease caused by a group of filarial nematodes transmitted by mosquito vectors. They are caused by three species of tissue-dwelling filaroid nematodes, such as *Brugia malayi*, *Brugia timori* and *Wuchereria bancrofti*. Approximately 120 million people, 2% of the world's population, in over 90 countries are infected.

W. bancrofti is the most common causative agent and accounts for about 90% of cases while *B. malayi* accounts for 10% of cases and is confined to East and Southeast Asia. *B. timori* is found only in Timor and nearby islands. Lymphatic filariasis has been identified by the World Health Organisation (WHO) as the second leading cause of permanent and long-term disability worldwide. LF is a major cause of morbidity, with the loss of 4.6 million DALYs (Disability-Adjusted Life Years), severely affecting socio-economic development in endemic areas. WHO estimates that 44 million people have overt clinical disease – lymphedema, elephantiasis, hydrocoele, recurrent infections associated with damaged lymphatics, lung disease, chyluria and renal disease. Another 76 million have pre-clinical damage to their renal systems. India alone accounts for 40% of the global burden of LF and at least one-third of the people affected with the disease live in India. There are ~21 million people with symptomatic filariasis and 27 million with asymptomatic microfilaraemia, while a total of 553 million people are at risk of infection. WHO initiated the 'Global Program to Eliminate Lymphatic Filariasis' (GPELF) by the year 2020 and it has been successfully implemented in China, Malaysia, Korea and in certain islands of the Pacific. GPELF mainly focuses on Mass Drug Administration (MDA) using either Diethylcarbamazine (DEC) in single or two-dose regime combined with albendazole once a year to interrupt transmission of LF and morbidity alleviation. Management of acute and chronic filariasis cases requires treatment of Adenolymphangitis (ADL) with antibiotics since majority of acute episodes appear to be of bacterial aetiology. Rigorous local hygiene measures like washing of legs with or without local antibiotic and antifungal agents to reduce the severity of ADL. However, the anti-filarial drugs are micro-filaricidal drugs

which cannot clear the adult worms and there is a need for more macro-filaricidal drugs. The effective control of filariasis lies in the early diagnosis, treatment of the infected individuals, particularly the microfilaremics, and effective follow-up of drug administration. The unequivocal method of diagnosis of lymphatic filariasis is the microscopic examination of microfilariae (mf) by Giemsa-stained night blood smears, membrane filtration techniques. The nocturnal periodicity of mf areas requires night-time blood collection and survey, which is often unpopular with the local population. Furthermore, low numbers of mf are sequestered in inaccessible sites or completely absent as in prepatent cases, making these methods ineffective in diagnosis. Immunodiagnostic methods have expanded with time and now they remain as one of the most powerful and sensitive tool for the demonstration of parasitic infections either for individual cases or for epidemiological studies. The circulating filaria-specific antibodies are largely explored to develop antibody-based diagnostic methods 5 that conversely detect mf. Recombinant antigen-based rapid IgG4 antibody ELISA and dipstick test have been developed for the detection of antibodies in sera of patients with brugian infection. Currently, the MAb-based Og4C3 assay and the Immuno-Chromatographic Test (ICT) card test have been used widely for the early diagnosis of bancroftian filariasis. Although Og4C3 assay is the most sensitive in detecting CFA levels in bancroftian filariasis, it cannot be used for the detection of active filarial infection in brugian filariasis. On the other hand, the ICT card test is only a qualitative test and is found to be specific for bancroftian filariasis.

CONCLUSION

Better understanding of the transmission of LF is crucial for predicting the impact of control programmes and assessing the prospects of elimination. The combined impact of density dependence in both uptake and development of mf determines the relationship between mf density in the human blood and the number of third infective larval stage (L3) eventually developing in mosquitoes after feeding. The rapid flow-through immunodiagnostic kit developed in our centre is used in diagnosing the mixed infection of brugian and bancroftian filariasis in India. This is also recommended to WHO by Lammie as a good antigen candidate to diagnose filariasis. The

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advantage in this device is that it not only picks strong but also the weak infection which is assessed by the intensity of the colour development during assays. It can also be used to estimate the rate of infection based upon the intensity of

the colour developed and thus can help in interrupting the transmission. Long-lived helminth parasites have evolved highly effective strategies to evade host immunity, which requires both adaptation of existing genes and evolution of new gene families.