

Molecular epidemiology of malaria in Viet Nam

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Molecular epidemiology is here defined as the study of pathogen genotypes and gene expression as it relates to the occurrence of infection and disease in human populations. PCR techniques have been developed that are capable of detecting parasites at a density of 1 parasite/ μ l or less. Some of the ways in which the application of PCR techniques to the study of malaria parasites have led to an improved understanding of the epidemiology of the infection:

- Detection of sub-patent infections: The results of using nested multiplex PCR of 500 blood samples negative by microscopy showed that 41.5% of this sample were positive for malaria parasites.
- Detection of mixed infections: PCR techniques have consistently shown mixed infections with two or three species of parasite at a much higher frequency (30 – 41%) than had been suggested by microscopy (4.5 – 10%).
- Study of the multiplicity of infection: Analysis of samples obtained from parasitaemic subjects resident in areas highly endemic for *P. falciparum* using the PCR technique has shown that most subjects are infected with parasites belonging to more than one genotype.
- Differentiation of recrudescences and re-infections after treatment: The standard in vivo method of testing for drug resistance involves the examination of a blood film for parasites 14 or 28 days after treatment. In these situations, the parasites found on day 14 or day 28 may be because of a new infection and not to failure of treatment. Recently it was possible to differentiate re-infections from recrudescences using molecular typing techniques. This showed that only about half of the infections were due to new infections (data from 4 provinces).
- Detection of drug resistance markers. Using PCR techniques, it is possible to analyse large numbers of samples in a short time using stored material, such as filter paper samples. We have detected associations of mutation points with Pyrimethamine and Sulfadoxine resistance (DHFR) and with Chloroquine resistance on position 76 of Pfcrt.