

saliva of the ectoparasites, as detected by measuring the thickness of a skinfold after the intradermal injection of a tick salivary gland extract.

Treatment of the rabbits with cyclosporin A inhibit the development of the immediate hypersensitivity and depresses the delayed cutaneous reaction to the salivary gland antigens.

Furthermore, the resistance against *I. ricinus* is decreased under cyclosporin A treatment. Surprisingly, parameters of the life cycle of the Ixodids (for example egg laying and hatching) are disturbed in ticks fed on treated hosts, suggesting a direct influence of the metabolite on the biology of the ectoparasites.

The efficacy of appropriate clothing and of DEET-Simulium-repellent as an individual protection against the transmission of onchocerciasis

A. Renz*, P. Enyong**, D. Weyler***

* Institute of Tropical Medicine, University of Tübingen, FRG,

** Medical Research Station, Kumba, Cameroon, *** Institute of Medical Parasitology, University of Bonn, FRG

The degree of protection against the bites of *Simulium damnosum* s.l. afforded by different ways of clothing was studied in the Cameroonian rain-forest and savanna. Normal western-style clothing, including long trousers, shoes and socks resulted in a reduction by 90 to 95 % of the numbers of fly-bites received, if compared to an unprotected control, wearing but short trousers. Long trousers alone, without shoes and socks, resulted in 40 to 60 % of reduction. Further protection was achieved when the clothes had been impregnated with Diethyltoluamide (DEET) insect repellent, which was found to be effective for up to 5 consecutive days after impregnation of a specially designed garment (1). Applied topically to the skin, the repellent acts for short periods only.

The high degree of protection afforded by the covering of the lower parts of the body only is due to the fact, that flies in search of a blood-meal do hardly move upwards to the unprotected face and arms, if these body parts are farther than 50 cm distant from the ground. In addition to the reduced chance of receiving infective fly-bites, the intake of *Onchocerca volvulus* microfilariae would also be reduced if the flies fed on the upper parts of the body, where the microfilariae were found in low numbers only (2).

At present, the estimated protection factor of the normal clothing of the villagers in the Cameroon savanna and rain-forest varied between 40 to 70 %, depending on age, sex and occupation. In both areas, a marked tendency towards a more complete covering of the body is evident from an analysis of photos from books over the past 50 years. If this evolution continued, a protection of as much as 80 % or more might be extrapolated for the near future as a result of the socio-economic development. A person aware of the risk of onchocerciasis transmission by the bites of the flies could even easily achieve a protection of 95 % by appropriate behaviour, clothing and the occasional use of repellents.

The increased degree of protection of the human population will presumably prompt the flies to take their blood-meals from other sources, like cattle, game animals or birds, since there is evidence, particularly in the savanna, that the *Simulium* vector-populations are widely zoophilic. Probably the majority of the blood-meals are taken on animals in these sparsely populated areas.

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References

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