

ONCHOCERCIASIS CONTROL PROGRAMME IN THE VOLTA RIVER BASIN AREA  
PROGRAMME DE LUTTE CONTRE L'ONCHOCERCOSE DANS LA REGION DU BASSIN DE LA VOLTA

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EXPERT ADVISORY COMMITTEE  
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ORIGINAL : FRENCHTHE SITUATION AS REGARDS  
EPIDEMIOLOGICAL EVALUATION

The thoughts set out below are in the nature of commentaries on the follow-up of the recommendations and remarks regarding the Epidemiological Evaluation Unit made at the second meetings of the Expert Advisory Committee and the Joint Programme Committee.

1. On the correlation between epidemiological and entomological indices for an understanding of the tolerable limits of infection

A correlation between these two parameters has already been established in previous studies and has been used in defining onchocerciasis endemicity levels.

Today, however, given the remarkable successes achieved in vector control, which have been confirmed by epidemiological evaluation data, the idea of an "onchocerciasis-free" zone deserves to be clearly defined.

To do so, we have first to define continuous transmission, residual transmission, and the interruption of transmission.

In 1977, the Scientific Advisory Panel defined the tolerability threshold as an annual transmission potential (ATP) not exceeding 100 infective larvae of O. volvulus/man/year and an annual biting rate (ABR) not exceeding 1000 flies/man/year.<sup>1</sup>

From the epidemiological point of view, the fundamental qualitative sign from among the other criteria was the absence of any new case of infection among children below the age of five years. In this connexion, there are five factors which need to be considered.

(a) The correlation between catching points at which ATP  $\leq$  100 and ABR  $\leq$  1000 and the epidemiological indices is not easy to establish. In the attempt, we examined the inhabitants of seven villages for which ATP is  $\leq$  100 and ABR  $\leq$  1000. Partial processing of the data reveals a progressive reduction of the epidemiological data which are largely age-related and above all related to the length of time for which transmission is interrupted, which is of prime importance in that: (i) it does not necessarily correspond to the duration of effective treatment of a watercourse; (ii) it may be marred by the effects of reinvasion and resistance; (iii) the variability bracket of the epidemiological indices is better appreciated through its precise determination.

It may be considered that the epidemiological effects of the same ATP and ABR rates are dissimilar as between the forest and the savanna. Leaving aside the nuisance caused by the blackflies and the bites, the "public health" impact of very high ATP and ABR does not have the same effects in forest zones and in the savanna.

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<sup>1</sup> Document OCP/SAP/77.1.

(b) The real epidemiological value of the detection of a new case of onchocerciasis in five-year-old children, in relation to fluctuations in sampling, when all that is needed in order to fall within an age-group in which such detection is significant is a variation of one or two years.

(c) The anti-incidence parameter, which we have been led to consider through being faced with the increasing number of individuals who were previously positive and who have become negative without any chemotherapy or migration. Even when the greatest caution is exercised in the analysis of such data, the proportion attributable to error is minimal relative to the large number of individuals for whom the test has become negative. Can we then speak of parasitological cure?

(d) The absence of microfilariae in the anterior segment of the eye of previously infected individuals, which is frequently recorded in the course of ophthalmological examinations. Furthermore, the decline in the prevalence of ocular lesions is rapid in the region in which transmission is interrupted. It declined from 58.2% before the launching of vector control operations to 34.2% in 1982, which is a 41.3% reduction. Irreversible ocular lesions have declined from 19.3% to 15.1%, which is a 21.8% reduction. The blindness rate has declined from 5.8% to 4.7%, which is a 19% reduction (Table 1).

(e) The remarkable mortality of O. volvulus females. It has emerged from an analysis of 711 female worms that the mortality rate, which was 12.8% in a zone in which transmission had not been interrupted, was 19.1% after two years' interruption in transmission, climbed to 21.9% after three years and reached 69.4% after six to seven years' interruption in transmission (Table 2 and Fig. 1).

In the light of these new data, we have to acknowledge that the old criteria used in defining an "onchocerciasis-free zone" are in need of re-examination. It would therefore be desirable for a commission to pronounce on the concepts of continuous transmission, residual transmission, and interruption in transmission before reviewing the basic criteria for the definition of an "onchocerciasis-free zone".

## 2. On the immunological diagnosis of onchocerciasis

In the search for an immunological diagnostic method, several biological samples have been sent to the Laboratory of Parasitology and Exotic Pathology in Grenoble for the development of a metabolic antigen; to the University of Lille for the production of monoclonal antibodies; to the Swiss Tropical Institute in Basle for the development of an immunological technique; and to the London School of Hygiene and Tropical Medicine, from which we have received an unpurified antigen which has been tested in three villages in an uncontrolled zone in the Republic of Mali; the data from these villages are being analysed; to the Laboratory of Immunoparasitology, at the Walter and Eliza Hall Institute of Medical Research, Melbourne, Australia; the preliminary results should be enlarged upon by results from a second batch sera recently dispatched.

For the moment these steps taken by us have not yielded the desired results and the Programme is considering the commissioning of research on an immunological diagnostic method through contractual agreements that would speed up the work by giving the researchers more incentive.

## 3. On study of the longevity of adult worms

Progress has been made in keeping of O. volvulus females in vitro (Dr Schultz-Key).

What now has to be done is to improve the keeping of the worms in vitro without the addition of serum for immunological reasons, and to study spermateleosis.

4. On the differentiation of savanna/forest strains

Success was initially achieved in the isolation of five O. volvulus strains from biological material from the Programme area (Dr H. Flockhart). Of the various enzymes tested, only lactate dehydrogenase (LDH) revealed a difference between the forest strains and the savanna strain.

Also currently under investigation is the differentiation of strains by histochemical staining of infective larvae in blackflies (Dr Omar).

5. On the Unit's participation in the health activities of Member States

Participation by the Programme in health activities, and even in the setting up of primary health care in Member States is a very delicate matter and extremely limited having regard to the organizational problems raised by such participation.

Nevertheless, the Programme already has to its credit:

- the production of a report on the results of a questionnaire that is readily usable by village health workers in zones freed of onchocerciasis. This report has been widely brought to the attention of Member States;
- the detection and treatment of conditions currently encountered in the villages;
- health education in the villages, which is beginning to have an effect;
- the drafting of an experimental schistosomiasis treatment protocol in collaboration with the Unit on Schistosomiasis and other Helminthic Infections of the WHO Parasitic Diseases Programme, with the object of finding an effective, cheap treatment.

6. On the raised level of mortality in the blind

The Programme has undertaken a study of the raised level of mortality in the blind in three villages in Benin and two in Upper Volta. Medical, ophthalmological and biological investigations were carried out on blind people and their immediate circle in these villages. Their environment was very closely scrutinized and a post-mortem was conducted on those blind persons who died in the interval between the last two visits of the epidemiological team. The processing of the data is now in a quite advanced stage. The results are being analysed. Should they prove significant, a wider-scale study could be undertaken.

TABLE 1. OCULAR ONCHOCERCIASIS  
EVOLUTION SINCE THE COMMENCEMENT OF VECTOR CONTROL OPERATIONS

	Phase I			Phase II			Phase III-W			Phase III-E			Total		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
Number of villages investigated	6			4			4			9			23		
AT START OF OPERATIONS															
- Prevalence of ocular onchocerciasis		55.2			68.3			57.5			52.1			58.3	
- Prevalence of severe ocular lesions	23.7	15.8	19.8	27.7	19.9	23.8	20.4	15.9	18.0	21.3	9.0	15.2	23.3	15.2	19.3
- Prevalence of blindness	8.3	5.0	6.7	7.1	4.9	6.0	6.6	7.7	7.2	4.2	2.2	3.2	6.6	5.0	5.8
ON LAST VISIT															
- Prevalence of ocular onchocerciasis		33.3			35.0			37.0			31.3			34.2	
- Prevalence of severe ocular lesions	17.0	10.5	13.8	24.6	15.1	19.9	21.7	9.8	15.8	13.3	8.1	10.7	19.2	10.9	15.1
- Prevalence of blindness	6.2	2.9	4.6	6.7	3.5	5.1	6.4	5.6	6.0	4.0	2.4	3.2	5.8	3.6	4.7

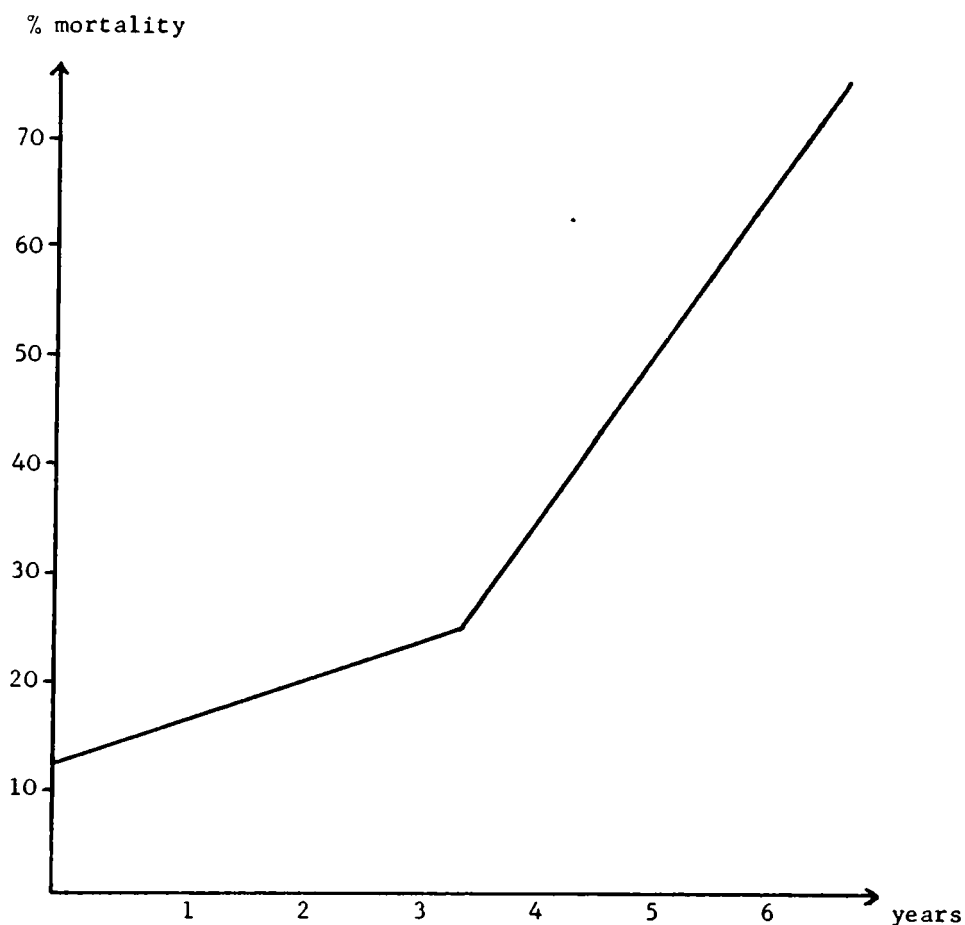
M = Male  
F = Female  
T = Total

Note: The figures are percentage means.

TABLE 2. EVOLUTION OF THE MORTALITY OF  
FEMALE O. VOLVULUS WORMS

Phases	Duration of effective vector control	Number of villages	Number of nodules	Total number worms	Male worms	Female worms	Sex ratio	Percentage of dead female worms
I	6-7 years	3	29	53	17	36	2.2	69.4
III-W	3 years	1	62	182	68	114	1.7	21.9
IV	2 years	1	38	152	68	84	1.2	19.1
West Extension	0	3	170	751	274	477	1.7	12.8
		8	299	1 138	427	711		

FIG. 1. EVOLUTION OF PERCENTAGE MORTALITY OF  
O. VOLVULUS FEMALES AS A FUNCTION OF TIME  
FOR WHICH TRANSMISSION INTERRUPTED IN  
EIGHT VILLAGES IN THE PROGRAMME REGION



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