

Periodic Mass Treatment with Diethylcarbamazine for the Control of Filariasis in American Samoa

JOHN F. KESSEL,¹ NOFO SILIGA,² HARRY TOMPKINS, JR.³
& KENNETH JONES³

Filariasis surveys made during 1962-63 in 5 villages in American Samoa among persons over 5 years of age gave an elephantiasis rate of 3.4 %, a microfilarial rate of 26 % and a median microfilarial rate (MfD₅₀) of 29. These rates were somewhat higher than those found in surveys made in the same villages among villagers of the same ages some 20 years previously. A mass treatment programme with diethylcarbamazine was then decided on.

Preliminary treatment with a single total regimen of 72 mg of the drug per kg of body weight, given in 12 doses of 6 mg/kg, was administered in several villages over a period of 6 months. Among villagers of all ages at the end of 3 years, the microfilarial rate was 7.3 % and the MfD₅₀ value was 2. These results appeared to be inadequate for a successful control programme and a periodic mass treatment project of 2 or more regimens of 72 mg/kg to be administered every 2 years was instituted on the Island of Tutuila, to be continued until considered no longer necessary.

Surveys made 2 years after the second mass treatment in the villages of Amouli, Amanave, Onenoa, Tula, Alao, Utumea and Alofa, in which 1407 persons were examined, showed that 3 villages were negative for microfilariae, that the average microfilarial rate in all 7 villages was 0.4 % and that the MfD₅₀ was 1. These villages were also negative in intensive mosquito surveys for infective-stage larvae of Wuchereria bancrofti. It is suggested that interruption of transmission has been observed in the 3 villages negative for both microfilariae and infective-stage larvae and that, if favourable surveys continue, eradication programmes should be established.

Surveys made in American Samoa by several US Navy groups during, and soon after, the Second World War indicated that the frequency of filariasis, as based on microfilaraemia rates among villagers in Tutuila over the age of 5 years, was about 20 % and the elephantiasis rate was about 2.6 % (Dickson, 1943; Murray, 1948; Jachowski & Otto, 1955).

In June 1962, at the request of Governor H. Rex Lee of American Samoa, a co-operative filariasis study, referred to in this report as the Filariasis Pilot Control Programme, was undertaken by the Medical Services of American Samoa and the School of Medicine, University of California, Los Angeles, on the Island of Tutuila. During the first

3 years, surveys of the villages of Amouli, Amanave, Malaeloa and Aoa, which had first been made in 1945 by Murray (personal communication), were repeated (Ciferri et al., 1969). Another village, Aoloau, first surveyed in 1948 by Jachowski (personal communication), was also re-surveyed in this pilot programme beginning in June 1963. New data from all 5 villages have now been added to the current extended report (Table 1).

A second stage of the study, designated as the Mass Treatment Project of Tutuila, was inaugurated in August 1963 by Dr Harry Tompkins, Jr, and Dr Nofo Siliga.

Fig. 1 shows the location of the 5 villages of the pilot programme on the Island of Tutuila, the first 5 villages of the Mass Treatment Project and another 6 villages of the Mass Treatment Project in which 1053 persons who had 24 doses of diethylcarbamazine were reported on in follow-up surveys.

¹ Professor Emeritus, Schools of Medicine and Public Health, University of California, Los Angeles, Calif., USA.

² Public Health Officer, Medical Services, American Samoa.

³ Formerly Public Health Officers, Medical Services, American Samoa.

TABLE 1
FREQUENCY OF MICROFILARIAEMIAS IN PERSONS ABOVE THE AGE OF 5 YEARS, AND
MEDIAN PER 20 MM³ OF BLOOD BEFORE TREATMENT WITH
DIETHYLCARBAMAZINE IN 5 VILLAGES OF THE PILOT PROGRAMME IN
AMERICAN SAMOA

Village	According to Murray (personal communication)				According to Ciferri et al. (1969)			
	No. ^a	Rate (%)	Median	Range	No. ^a	Rate (%)	Median	Range
Amouli	17/121	14	30	1-352	39/206	19	12	1-385
Amanave	24/113	21	24	2-387	58/223	26	33	1-384
Malaeloa	23/166	14	7	1-140	74/250	29	24	1-618
Aoa	35/149	24	18	1-739	31/140	22	33	1-670
Aoloau	30/104 ^b	29	32	1-600 ^c	45/147	30	35	1-581
Totals	129/653	20	22		247/966	26	29	

^a Number positive/number examined.

^b From Jachowski (personal communication).

^c From the current survey for 1963.

PROCEDURES

Surveys

All pre-treatment blood surveys were based on averages of 2 thick blood films of 20 mm² each and final blood surveys were based on averages of 3 thick films of 20 mm² each.

Mosquito surveys and dissections of mosquitos followed the methods of collection proposed by Bonnet et al. (1956). This programme was organized by Herald Adams, Entomologist, Institute of

Medical Research, Tahiti, but the only item recorded in this study is the percentage of dissected mosquitos of the species *Aedes polynesiensis* found to be positive for infective-stage larvae of *Wuchereria bancrofti*.

Reporting of results

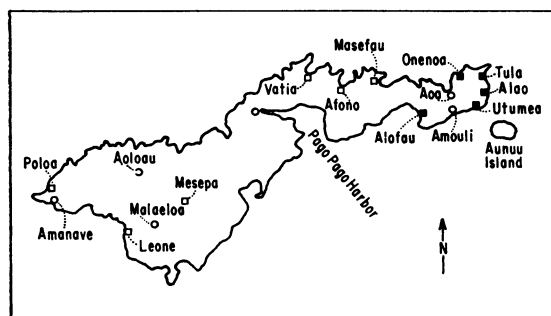
Microfilarial rates, frequency distribution and the median value of the microfilarial density (MfD₅₀) are expressed as recommended by the WHO Expert Committee on Filariasis (1967).

Regimen of diethylcarbamazine and follow-up surveys

The basic minimum regimen of 72 mg of diethylcarbamazine per kg of body weight was first administered in the Filariasis Pilot Control Programme in American Samoa as follows: 6 mg/kg once a day for 6 days, followed by one of three procedures, (1) treatment was withheld for 6 months and then 6 additional daily doses were administered in Amouli and Amanave villages; (2) the second 6 doses were administered in a schedule of 6 mg/kg once a month for the next 6 months in Malaeloa and Aoloau villages; (3) Aoa villagers received the second 6 daily doses of diethylcarbamazine after 12 months.

Annual follow-up surveys were made in the 5 villages for 3 years. A review of the first follow-up survey in August 1963 showed that 3.5% of positives

FIG. 1
TUTUILA ISLAND, AMERICAN SAMOA



- Villages (5) of Pilot Programme.
- First 5 villages of Mass Treatment Project.
- Other villages of Mass Treatment Project only partially surveyed.

who had been completely treated were still carriers. Thus it was confirmed by the Filariasis Team that a single regimen of 72 mg/kg was insufficient treatment for a successful control programme. For baseline information however, it was decided: (1) to continue withholding additional doses of diethylcarbamazine from the five pilot villages but to perform annual follow-up blood surveys beginning in June of each year until the end of the third year; and (2) to establish a Mass Treatment Project on the Island of Tutuila by administering, within 6 months, schedule 2, as described above (i.e., the minimum standard dosage of 72 mg of diethylcarbamazine per kg). After an interval of 18 months, the first follow-up blood survey was performed. The mass treatment was to be repeated every 2 years until, as judged by subsequent biennial blood and mosquito surveys, no further treatment was needed.

In this project, all the other 47 villages of Tutuila, with the exception of the 5 villages listed in the Pilot Programme, were given 2 periodic mass treatments of 72 mg/kg of diethylcarbamazine, the first beginning in September 1963 and continuing into early 1964, and the second beginning in September 1965 and continuing into 1966. Amouli and Amanave villages were transferred to the Mass Treatment Project in August 1965 and then given their second regimen of 72 mg of diethylcarbamazine per kg while Malaeloa was maintained as a control village without a second mass treatment.

The administration of diethylcarbamazine began at the eastern end of Tutuila, the villages of Onenoa, Tula, Aloa, Utumea and Alofa'u being treated first. These five villages have been used in progressive checks of the Project by means of regular periodic surveys.

The coverage of 11–12 doses in the first mass treatment was 93% of the 1130 persons followed-up in the first blood survey, leaving only 7% who received fewer than 11 daily doses.

Because of a change in administrative personnel that reduced the number of treatment supervisors, the second mass treatment did not progress as rapidly as the first; even so, the second follow-up blood survey was held on schedule in 1967. The follow-up report in 1967 thus reflects higher microfilarial rates than would have been expected had all prescribed doses been completed before blood surveys were made.

No organized mosquito control was used in American Samoa during this study, but regular

village clean-up programmes were carried out by the Division of Sanitation. They consisted of the collection of garbage and refuse by truck from the villages each week.

RESULTS AND DISCUSSION

Most results from the first 4 villages of Amouli, Amanave, Malaeloa and Aloa in the Filariasis Pilot Control Programme that were studied between June 1962 and August 1965 are included in the report by Ciferri et al. (1969). In these 4 villages, where persons of all ages were examined, somewhat higher rates for elephantiasis (3.4%) and microfilariae (20.2%) occurred than had been reported in surveys performed by US Navy personnel between 1943 and 1951.

Surveys made before the use of diethylcarbamazine

Recently, the original records of the filariasis survey performed in American Samoa by Murray in 1945 (personal communication) and the results of the survey in Aloa by Jachowski in 1948 (personal communication) were kindly made available to the senior author. The further comparison of the earlier microfilarial density data with those of the current Pilot Programme and Mass Treatment Project, some 14–20 years later, has thus become possible.

Table 1, compiled from data for the 5 villages of the Pilot Programme for persons over 5 years of age, shows an increase in microfilarial rates from 20% to 26% between the 2 periods and also an increase in the MfD_{50} from 22 to 29. The increases were not considered to be highly significant but, as no decrease in microfilaraemia was apparent during the previous 20 years, the institution of a diethylcarbamazine control study seemed to be warranted.

Pilot control programme with a dosage rate of 72 mg/kg

This programme was initiated with a regimen of 72 mg of diethylcarbamazine per kg of body weight administered during the first 6 months. One year after this mass treatment in villagers of all ages who received the complete treatment, the microfilarial rate coincidentally had dropped to 4.1% and the MfD_{50} to 2.

Table 2, however, indicates that in this same group at the end of 3 years, without any additional doses of diethylcarbamazine having been given, the microfilarial rate had increased to 7.3%. This rise stands

TABLE 2
PILOT PROGRAMME, 1 MASS TREATMENT
WITH 72 mg OF DIETHYLCARBAMAZINE
PER KG; ALL AGES

Villages surveyed	Years of survey	No. of persons examined	Microfilarial rate (%)	MfD ₅₀
Surveys before mass treatment				
Amouli Amanave	1962-63	251/1 191	21.0	20
Surveys 1 year after mass treatment				
Malaeloa Aoa	1963-64	37/894	4.1	2
Surveys 3 years after mass treatment				
Aoloua	1965-66	71/975	7.3	2

as a warning that without further mass treatment, high infection rates may recur.

Repeated mass treatments

A comparison of the individual records of the Pilot Control Programme for the villages of Amouli, Amanave and Malaeloa during 1962-68 (Table 3), each with about the same population but showing variations in the microfilarial load and in the doses of diethylcarbamazine administered, illustrates that

without additional mass treatment, high infection rates may continue. Amouli and Amanave received a second mass treatment beginning in September 1966 and Malaeloa served as a control, a second mass treatment not being given.

Amouli. The following results were obtained in Amouli village:

(1) a lowest pre-treatment microfilarial rate of 15.0% and a lowest MfD₅₀ of 12;

(2) 3 years following the first regimen of 72 mg of diethylcarbamazine per kg, a lowest post treatment microfilarial rate of 3.2% and an MfD₅₀ of 1;

(3) no microfilariæ 2 years following the second mass treatment regimen with diethylcarbamazine.

As already pointed out by Ciferri & Kessel (1967), individuals with the highest microfilarial rates and lowest MfD₅₀ values respond most successfully to diethylcarbamazine. This is probably the first village to show interruption of transmission especially as no infective-stage larvae of *W. bancrofti* were found in the mosquitos dissected. Fig. 2 illustrates a close positive correlation between the drop in the microfilarial rate from 15% in 1962 to 3.3% in 1965 and 0 in 1968, and the drop in infective-stage larva rate of *W. bancrofti* from 2.1% in 1962 to 0.58% in 1965 and 0 in 1968 (see also Kessel, 1967, Fig. 2).

TABLE 3
MICROFILARIA RATES AND MEDIANS BEFORE AND AFTER FIRST AND SECOND
REGIMENS OF DIETHYLCARBAMAZINE

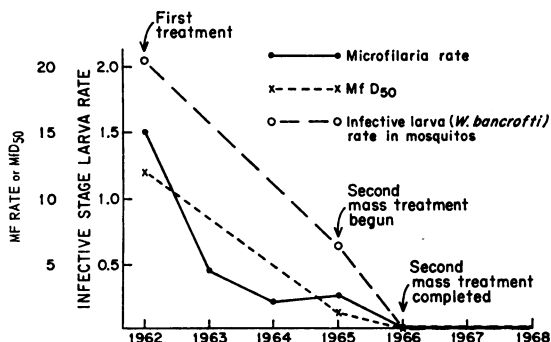
Village	Before treatment with diethylcarbamazine June 1962			After treatment with diethylcarbamazine					
				August 1965			1967-1968		
	No. ^a	%	Median and range	No. ^a	%	Median and range	No. ^a	%	Median and range
Amouli ^b	40/268	15.0	12 1-385	7/214	3.3	1 1-22	9/313	0.0	0
Amanave ^b	59/269	21.9	33 1-384	25/233	10.7	2 1-107	2/241	0.8	1 1-9
Malaeloa ^c	74/296	25.0	24 1-618	25/233	10.7	2 1-55	20/217	9.2	4 1-60

^a Number positive/number examined.

^b First mass treatment, August 1962-January 1963; dosage 72 mg of diethylcarbamazine per kg. Second mass treatment, August 1965-January 1966; dosage 72 mg of diethylcarbamazine per kg.

^c First mass treatment August 1962-January 1963; dosage 72 mg of diethylcarbamazine per kg. No second mass treatment, village treated as control.

FIG. 2
MASS TREATMENT WITH DIETHYLCARBAMAZINE
IN VILLAGE OF AMOULI, AMERICAN SAMOA



Amanave The following results were noted in Amanave village:

(1) an intermediate pre-treatment microfilarial rate of 21.6% and a highest MfD₅₀ of 33;

(2) 3 years after the first regimen of diethylcarbamazine, a high post-treatment microfilarial rate of 10.7% and an MfD₅₀ of 2;

(3) 2 years after the second regimen of diethylcarbamazine, a low microfilarial rate of 0.8% and an MfD₅₀ of 1.

Malaeloa. The results obtained at Malaeloa were:

(1) a highest pre-treatment microfilaria rate of 25.0% and an intermediate MfD₅₀ of 24;

(2) 3 years after the first regimen of diethylcarbamazine, the same post-treatment microfilarial rate and MfD₅₀ as at Amanave;

(3) the high microfilarial rate of 9.2% and the high MfD₅₀ of 4 were maintained in 1965-66 with no second regimen of diethylcarbamazine.

In summarizing annual follow-up surveys in a control programme, the positives originate from several sources such as light infections having been overlooked, people refusing to take the drug or being excused from treatment for personal or medical reasons, unexamined positive cases among immigrants, new infections, recurrences and reinfections. As it is impossible by morphological characteristics alone to differentiate microfilariae of various origins until experimental procedures are developed, it is necessary to try to designate their origin on the basis of case histories and statistical procedures. Considerable speculation thus occurs in treatment campaigns about which of the categories listed in Table 4 contributes the greatest number of positives. Actually, the number of positives may vary in different programmes and at different times in the same programme.

TABLE 4
PERSONS POSITIVE FOR MICROFILARIA IN SECOND YEAR AFTER
SECOND MASS TREATMENT, AMOULI AND AMANAVE, 1968

Category ^b	Years of examination ^a				No. of persons present in original category			
	1962 ^c	1963 ^c	1964 ^c	1965 ^c	Amouli		Amanave	
					Original village ^d	Immigrants	Original village ^d	Immigrants
NN	0	0	0	0	0/126	Previous	0/110	Previous
NI	0	0	0/+	0/+	0/4	records	0/7	records
N	+	0	0	0	0/13	incomplete	0/16	incomplete
P	+	+	0/+	0/+	0/5		0/4	
R ₁ or Re I	+	0	0/+	0/+	0/4		2/13	
Totals					0/152	0/161	2/150	1 ^e /92
Total for each village					313		242	

^a First mass treatment, 1962-63; second mass treatment, 1965-66.

^b NN = always negative; NI = new infection; N = negative after treatment; P = persistently positive after treatment; R₁ = recurrence of positivity after being negative; Re I = reinfection after being negative.

^c 0 = microfilaria negative; + = microfilaria positive;

^d Number positive/number negative.

^e The immigrant from Hawaii who was not included in mass treatments (see Table 3).

In Tahiti (see Kessel, 1970) and American Samoa the positives were differentiated into several categories: (1) always negative for microfilariæ, (2) new infections, (3) positive before treatment but always negative after treatment, (4) persistently positive after treatment, and (5) negative in first year after treatment, then becoming positive again because of insufficient treatment, or negative after first treatment but acquiring a reinfection. A further discussion of these categories has been prepared and should be published shortly (L. E. Mahoney & J. F. Kessel, unpublished data).

For the villages of Amouli and Amanave, where identical blood surveys were made and identical mass treatment was given from 1962 to 1968, the results have been tabulated in Table 4 according to these categories. The clearly observable difference between the villages is shown in Table 3, Amouli having a microfilarial rate of 15% and an MfD_{50} of 12 before treatment and Amanave a microfilarial rate of 21.6% and an MfD_{50} of 33.

The 1968 results from Amouli for both the original village and the immigrants after 2 mass treatments with a total dose per person of 144 mg of diethylcarbamazine per kg show that, among a total population of 313 persons, everyone examined was negative for microfilariæ, thus illustrating, as already indicated, the interruption of transmission.

In Amanave, which had the higher pre-treatment microfilarial rate and the higher MfD_{50} , 2 positives remained among 150 persons examined from the original village in the final 1968 survey (Table 4). The histories of these positives are of interest.

Positive patient No. 169 (female) had a pre-treatment microfilarial count of 69, became negative for microfilariæ after 12 doses of diethylcarbamazine and remained so for 2 years. In 1965, a microfilarial count of 13 recurred. In 1966, the patient took an incomplete second regimen of 8 doses of diethylcarbamazine and still had a microfilarial count of 8 at the last survey performed in 1968. The second positive, No. 222 (male), had a pre-treatment microfilarial count of 39, became negative for microfilariæ after 12 doses of diethylcarbamazine and remained so for 4 annual surveys. His second mass treatment of 12 doses was given in 1966. In 1968 he had a microfilarial count of 1; this should undoubtedly be considered as a new infection.

A third man, immigrant No. A 182, not included in Table 3, had received no diethylcarbamazine and had just returned to American Samoa, having

previously left Amanave for Hawaii in 1960, before the Pilot Programme had begun. He was included in the August 1968 survey and showed a microfilarial count of 8. It seems probable that he was a carrier when he left Samoa and had remained positive during his 8-year stay in Hawaii (see Jachowski et al., 1951, for other similar histories). Such an immigrant should be recorded in the 1968 survey but was not included in Table 3 among villagers who had received diethylcarbamazine treatment.

Possibility of resistance towards diethylcarbamazine

In reviewing the subject of treatment failures, it has been suggested by some that drug-resistance, in contrast to inadequate dosage, may have been responsible. Table 3 shows that 32 persons, in Amouli and Amanave were still positive for microfilariæ after 1 mass treatment with a total dosage of 72 mg of diethylcarbamazine per kg. However, 18 months after the second mass treatment with an identical regimen only 1 woman was still positive, and she had not completed the full regimen of treatment. In our experience, recurring microfilariæ respond to second or third regimens of 72 mg of diethylcarbamazine per kg and therefore should not be regarded as the result of microbiological drug-resistance.

Mass Treatment Project in Tutuila

The left half of Table 5 shows microfilarial rates and medians observed by Murray in 1945 in the first 5 villages that later were given the first mass treatment with diethylcarbamazine by Tompkins and Siliga in September 1963. The second mass treatment was repeated 2 years later, beginning in September 1965. These first 5 villages were regarded at each survey as the follow-up check group for the Project. The second half of Table 5 shows the results of follow-up surveys in 1965, i.e., 2 years after the first mass treatment, and in 1967, 2 years after the start of the second mass treatment. It will be seen that in 1965, of 1135 examined, 35 (3.1%) remained positive. This was about the same microfilarial rate as that found in the Pilot Programme in 1963.

The second mass treatment was supervised by Dr Manly Donaldson, Dr Kenneth Jones and Dr Nofu Siliga. The second blood survey in 1967 showed that only 4 of 1105 subjects (0.36%) were positive, indicating a further drop in the microfilarial rate. Of 276 immigrants examined in all

TABLE 5
BLOOD SURVEYS IN MASS TREATMENT PROJECT, BEFORE AND 2 YEARS AFTER
EACH REGIMEN OF DIETHYLCARBAMAZINE

Village	Before mass treatment				After mass treatment			
	No. ^a	Rate (%)	Median	Range	1965	Rate (%)	1967	Rate (%)
Onenoe	16/82	20	8	2-562	5/172	2.9	0/162	0.0
Tula	37/107	35	31	1-283	14/283	4.9	1/268	0.4
Aloa	43/211	20	9	1-150	2/262	0.8	0/278	0.0
Utumoe	7/46	15	18	2-343	5/110	4.5	1/99	1.0
Alofau	19/111	17	20	2-144	9/306	2.9	2/298	0.7
Totals	122/557	21	24	1-562	35/1 133	Rate: 3.1% Median: 4 Range: 1-50	4/1 105	Rate: 0.36% Median: 2 Range: 1-9

^a Number positive/number examined.

5 villages during the 1967 survey, 9 positives were found, giving a microfilarial rate of 3.3%, a median of 1 and a range of 1-32. Immigrants examined in the Project were generally slower to receive mass treatments than were the original villagers.

In 1968, an additional partial count was made from 12 villages involving 1053 persons who had completed a course of treatment with 144 mg of diethylcarbamazine per kg 2 or more years previously. These persons were from the villages of Onenoe, Tula, Aloa, Utumoe, Amouli, Amanave, Afono, Leone, Poloa, Masefau, Vatia and Mesepa. Only 2 persons (0.2%) were positive and this rate is slightly lower than that (0.36%) in the 1967 survey. Mosquito surveys were also performed in all the 12 villages during 1967-68 and all were negative for infective-stage larvae of *W. bancrofti*.

Treatment of positives found only at routine follow-up surveys periodic mass treatments

Two main types of filariasis control programme have been followed in the Pacific area.

Single mass regimen of diethylcarbamazine. The dosages range from 12 to 24 doses of 6 mg of diethylcarbamazine per kg body weight. Various intervals between doses were tried, the maximum being a monthly dose of 6 mg/kg for 24 months in Tahiti, i.e., a total dosage of 144 mg/kg. The first follow-up survey was held 1 year after the treatment ended. Only positives were re-treated, and they received 1 regimen of 72 mg/kg. It was intended to carry out blood surveys annually and at each survey to re-treat those positive for microfilariae.

Employing this system, it was found that 1 year after the first mass treatment ended, the microfilarial rate had dropped from 31% to 2.5%. After 3 years, the microfilarial rate had increased to 5%, indicating that a reservoir of treatment failures still existed and was responsible for continual transmission at a low rate, as shown by Laigret et al. (1966) and later confirmed in Tautira by Kessel in an unpublished review of filariasis control programmes in Tahiti and American Samoa presented at a joint seminar held by WHO and the South Pacific Commission in 1968.

The markedly lower microfilarial rates were, however, associated with reduced clinical filariasis rates, as reported by March et al. (1960) and by D. Outin & B. Bambridge (personal communication), who showed that there were essentially no new cases of elephantiasis and that the public health problems related to filarial infection were much reduced.

The question then arose, whether to continue the control programme already in progress or whether to institute a periodic mass treatment programme in the hope of further reducing the reservoir of lightly infected treatment failures.

Periodic mass treatment plan. This plan, instituted in American Samoa in 1963 as the Mass Treatment Project in Tutuila, was an attempt to test the usefulness of periodic mass treatment, treating a population at 2-yearly intervals and making follow-up checks at the end of each 2-year period. The results of the survey 2 years after the second mass series of treatments in the 7 original villages

(Amouli, Amanave, Onenoe, Tula, Alao, Utumoe and Alofa) show that the microfilarial rate had been reduced to 0.4% and the MfD_{50} to 1.

If subsequent follow-up surveys to be conducted in 1970 by the continuing filariasis Project confirm these low levels, several questions will arise: should a third identical mass treatment be administered, or should annual, or other periodic, blood surveys be performed and only current positives or past positives, or both, be re-treated?

Control versus eradication

Many filariasis control programmes based on the use of diethylcarbamazine have been undertaken in different parts of the world, of which some have been appropriately designed and continued for an ade-

quate length of time, one such programme was begun in French Polynesia by Beye et al. (1953), and was last reported on by Saugrain et al. (1968), another was undertaken in parts of Japan by Sasa (1963) and Fukushima (1967), and a third is the programme in American Samoa described in this report; all show that marked reductions in filariasis were achieved. For further progress, when simultaneously the microfilarial rates fall to 1% or less, the MfD_{50} falls to 1 or less and intensive mosquito surveys show an infective-stage larva rate of 0.5% or less, often 0, and if these falls are associated with a decline in clinical disease that indicates that filariasis is no longer an important public health problem, criteria for surveillance should be standardized and procedures for changing from control to eradication programmes should be established.

ACKNOWLEDGEMENTS

Dr C. L. Weldon, Chief of Medical Services, American Samoa, was most helpful in initiating the programme in 1962. The programme was aided from 1962 to 1968 by US Public Health Service Grant No. T1-AI-132 from the Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda, Md., USA. Medical and public health trainees who participated during this period were Dr Patric Aiu, Dr Gayle Brewer, Dr Flavio Ciferri,

Dr Tom Grollman, Dr Robert Hayward, Dr Joan Hillsley, Dr Gary Long, Dr Louis Mahoney, Dr Corey Marco, Dr F. Kevin Murphy, Dr Trudy Murthy, Dr William Shaw, Dr Joshua Tofield, Dr Clay Whitehead, and Dr Victor Williams. From 1962 to the present time the programme was assisted by contributions to the Pacific Tropic Diseases Project at the University of California, Los Angeles, from Mr John C. Elliot.

RÉSUMÉ

TRAITEMENT DE MASSE PÉRIODIQUE PAR LA DIÉTHYLCARBAMAZINE DANS LA LUTTE CONTRE LA FILARIOSE DANS LES SAMOA AMÉRICAINES

De 1943 à 1953, plusieurs enquêtes ont permis de recueillir nombre de données sur les aspects de la filariose de Bancroft dans les Samoa américaines. A l'époque, la prévalence de l'éléphantiasis, parmi les habitants âgés de 5 ans et plus, atteignait 2,6%, l'indice microfilarien 20% et la densité microfilarienne médiane (DMf_{50}) 22. Aucune mesure de lutte contre l'infection n'a été appliquée à ce moment. En 1962-63, des investigations menées dans les mêmes villages montraient une fréquence de 3,4% de l'éléphantiasis, cependant que l'indice microfilarien et la DMf_{50} se situaient respectivement à 26% et à 29.

La décision a alors été prise d'appliquer un traitement de masse comportant l'administration, en 6 mois, d'une dose totale de 72 mg de diéthylcarbamazine par kilo de poids corporel, répartie en 12 prises. En ont bénéficié les habitants de cinq villages chez lesquels on a procédé à des examens hématologiques avant et 6, 12, 24 et 36 mois après le début du traitement.

On a constaté, après 3 ans, une réduction notable des indices microfilariens et des DMf_{50} qui sont passés à Amouli de 15% et 12 à 3,3% et 1, à Amanave de 21,9% et 33 à 10,7% et 2, et à Malaeloa de 25,0% et 24 à 10,7% et 2. Un second traitement par la diéthylcarbamazine (72 mg/kg) a entraîné après 2 ans une chute de l'indice microfilarien à 0,0% (indiquant l'interruption de la transmission) à Amouli et à 0,8% à Amanave. Dans le village témoin de Malaeloa, soumis à un seul traitement, l'indice microfilarien s'est maintenu à 9,2%. Ces premiers essais confirment que si un traitement unique par la diéthylcarbamazine est relativement efficace, il ne permet en aucune façon de maîtriser la filariose de Bancroft et *a fortiori* de l'éradiquer.

Un nouveau programme de traitement de masse périodique, basé sur l'administration bisannuelle de diéthylcarbamazine (72 mg/kg), a été appliqué à tous les habitants de l'île de Tutuila pour tenter d'amener à zéro les

indices microfilariens. Les enquêtes hématologiques effectuées dans cinq villages montraient, avant tout traitement, un indice microfilarien de 21% et une DMf₆₀ de 24. Deux ans après le 1^{er} traitement, les taux étaient de 3,1% et 4, et deux ans après le 2^e traitement de 0,36% et 2.

Selon les auteurs, lorsque l'indice microfilarien s'abaisse au-dessous de 1% et la DMf₆₀ au-dessous de 1 avec, concomitamment, une raréfaction des manifestations cliniques de la filariose, cette dernière ne représente plus un problème important de santé publique et il est possible d'envisager son éradication.

REFERENCES

- Beye, H. K., Kessel, J. F., Huels, J., Thooris, G. & Bambridge (1953) *Bull. Soc. Path. exot.*, **46**, 114
- Bonnet, D. D., Kessel, J. F., Kerrest, J. & Chapman, H. (1956) *Amer. J. trop. Med. Hyg.*, **5**, 1093
- Ciferri, F. E. & Kessel, J. F. (1967) *Amer. J. trop. Med. Hyg.*, **16**, 321
- Ciferri, F. E., Siliga, N., Long, G. & Kessel, J. F. (1969) *Amer. J. trop. Med. Hyg.*, **18**, 369
- Dickson, J. G. (1943) Annual sanitary report of the Public Health Department of American Samoa
- Fukushima, H. (1967) *Acta med. Univ. Kagoshima*, **9**, 25
- Jachowski, Jr., L. A. & Otto, G. F. (1955) *Amer. J. Hyg.*, **61**, 334
- Jachowski, Jr., L. A., Otto, G. F. & Wharton, J. D. (1951) *Proc. helminth. Soc. Wash.*, **18**, 25
- Kessel, J. F. (1967) *Diethylcarbamazine in filariasis control*. In: *Proceedings and Papers of the Thirty-fifth Annual Conference of the California Mosquito Control Association, Inc. and the Twenty-third Annual Meeting of the American Mosquito Control Association*, Visalia, Calif., p. 17
- Laigret, J., Kessel, J. F., Bambridge, B. & Adams, H. (1966) *Bull. Wld Hlth Org.*, **34**, 925
- March, H. N., Laigret, J., Kessel, J. F. & Bambridge, B. (1960) *Amer. trop. Med. Hyg.*, **9**, 180
- Murray, W. D. (1948) *U.S. nav. med. Bull.*, **48**, 327
- Sasa, M. (1963) *Bull. Wld Hlth Org.*, **20**, 437
- Saugrain, J., Leproux, P., Outin, D., Bagnis, R. & Delebecque, P. (1968) In: *Annual Report of the Institut de Recherches Médicales de la Polynésie Française*
- WHO Expert Committee on Filariasis (1967) *Wld Hlth Org. techn. Rep. Ser.* No. 359