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FILARIASIS IN SAMOAN IMMIGRANTS TO THE UNITED STATES*

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ABSTRACT: A survey for filariasis was done among 178 Samoan immigrants living in California and Hawaii; 14% were found to have microfilaremia. All positive blood films were from persons who had been away from endemic areas for 8 years or less. Microfilaria rates differed considerably from those in Samoa. Only a small fraction of the persons tested showed symptoms of filariasis. Although competent vectors are present, it is unlikely that the infection will be established in the United States. The prevalence of filariasis in Samoan immigrants can be expected to decline as a secondary effect of a control program in American Samoa.

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Many tropical diseases are imported into temperate areas by new population movements. Bancroft's filariasis has been noted previously in immigrants in the eastern United States,[1] in the Netherlands,[2] and in Hawaii.[3] Carriers of filariasis are also present on the West Coast of the United States. These are mostly Samoan immigrants, and they occasionally cause concern to physicians and health officers unfamiliar with the infection.

We estimate that there are more than 6,000 Samoans now resident in California, Washington, and Hawaii. Most of these persons have emigrated from American Samoa in the last 10 years. Subperiodic filariasis is endemic in American Samoa, and before the beginning of a filariasis-control program, crude microfilaria rates averaged about 20%.[4] It seemed desirable to assess the prevalence of filariasis in Samoan immigrants, to determine if there were any risk of establishment of subperiodic filariasis in the United States.

METHODS

Standard sampling methods are not well-adapted to sampling of small immigrant groups. The pastors of several Samoan churches, however, readily agreed to set up special clinics after their services, and encouraged their parishioners to attend. The emergency-room files of the Los Angeles County General Hospital and the Harbor General Hospital were searched for Samoan names, and patients not referred for filariasis were asked to volunteer.

Because of difficulty in obtaining consent from children, only native Samoans over the age of 16 were admitted to the study. Each person completed a short questionnaire listing identifying data, date of last visit to an endemic area, and specific symptoms of filariasis occurring since immigration. The 20-cmm blood films were drawn by finger-prick, stained with Giemsa's stain, and examined for microfilariae (mf) of *Wuchereria bancrofti*. Persons who did not report the date of immigration or whose blood film showed less than 20 cmm of blood were excluded from further computations.

One hundred seventy-eight persons met these criteria for inclusion in the study: 112 from a clinic in Laie, Hawaii, 62 from two clinics in Los Angeles, and four from hospital records. They ranged in age from 16 to 90 years. Forty-three had been continuously resident in the U. S. less than 3 years at the time of the survey, 61 from 3 to 5 years, 22 from 6 to 8 years, and 52, 9 years or more.

RESULTS

Twenty-five persons showed microfilaremia on examination, yielding a crude prevalence of 14%. Microfilaria counts ranged from one to 407 mf

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TABLE 1
Symptoms of filariasis in 164 Samoan immigrants

Symptom or condition	Persons with microfilaremia (*No.**)	(%)	Persons without microfilaremia (*No.**)	(%)
Swollen glands	2/24	8	10/140	7
Acute lymphangitis†	3/24	13	13/140	9
Swelling of extremities	1/24	4	2/140	1
Swelling of scrotum	1/17	6	4/74	5
Elephantiasis	0/24	0	0/140	0
Any symptoms of filariasis	5/24	21	23/140	16

* Numerator, number reporting one or more episodes of this complaint since immigration; denominator, subsample size.

† Acute lymphangitis, history of *mumu* or of redness and swelling of extremity, breast, or scrotum.

per 20 cmm, with a mean of 34 and a median of five. Age-specific microfilaria rates were in general lower in the sample than in Samoa, with correspondence only among those 16 to 19 and 50 to 59 years old. This difference was statistically significant ($\chi^2 = 15.16$, 5df, $p < 0.01$—Ciferri's data[4] used for comparison). This difference is due to clustering of age at immigration. Prevalence in males was 19% and in females 11%, but the difference is in the range of sampling error ($p = 0.12$). Immigrants are not representative of the population of Samoa, and their microfilaria rates are different.

Subjects were then grouped into 3-year intervals from the time of immigration. Eight of 43 persons less than 2 years removed from Samoa (19%) showed microfilaremia. Thirteen of 61 (21%) of the 3- to 5-year group had positive blood films. Four of 22 in the 6- to 8-year group (18%) still showed microfilaremia. Fifty-two persons 9 or more years removed from reinfection had negative blood films. The longest duration of microfilaremia observed occurred in one person who showed microfilaremia 8 years after emigration from Samoa. This is comparable to the observations of Jachowski[3] and Leeuwin.[2]

Most persons denied having any symptoms of filariasis since immigration. One hundred and sixty-four questionnaires containing complete symptom histories are summarized in Table 1. Only 21% of those whose blood was positive reported symptoms referable to filariasis. Only a fraction of these are likely to seek care; others with microfilaremia will be discovered only by accident, and their infections will persist for several years before dying out naturally.

DISCUSSION

Immigrant Samoans may show persisting microfilaremia for at least 8 years after migration to nonendemic areas. Most of these persons are asymptomatic, and are likely to be discovered only by chance. If they concentrate in areas where there are competent mosquito vectors, they could conceivably introduce subperiodic filariasis to the United States. It is known that some American mosquitoes may be able to transmit the infection.[5, 6]

We know of no proved cases of infection with *W. bancrofti* acquired in any part of the United States since before World War II. Very few physicians have looked for such infections. Worth found no microfilaremia in 186 non-Samoan children living in close association with Samoans in Hawaii.[7] Worth's survey does not completely exclude the possibility of transmission in Hawaii, but it does indicate that if it does occur, it is uncommon.

Successful transmission of filariasis requires the production of microfilaremia in previously uninfected persons. The simple coincidence of carriers and vectors is not enough. Hairston and de Meillon estimate that about 15,000 infective bites are required, on the average, to produce microfilaremia.[8] With the inefficient vectors in the United States, it is not likely that any significant number of persons could receive a sufficient infectious dose. Microfilaria rates have declined significantly in Samoa[4] since the time of immigration of most of the persons in this study; one would expect microfilaria rates in newer immigrants to be considerably less, and the risk of transmission lower yet. It seems extremely unlikely that immigration of infected persons will result in the establishment of filariasis in the United States.

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