IMPORTED MALARIA AMONG TRAVELERS

From 1980 to 1984, 217 cases of malaria were reported to the Taiwan Provincial Institute of Infectious Diseases (TPIID). Ninety-nine (46%) cases occurred among Republic of China (R.O.C.) citizens who were infected while traveling abroad. 113 (52%) cases occurred among foreign nationals visiting Taiwan, and five (2%) cases were relapses or transfusion-associated. Of the 99 cases among R.O.C. residents traveling abroad, 54 (55%) were due to *Plasmodium vivax*, 39 (39%) to *P falciparum*, 5 (5%) to *P malaria*, and 1 (1%) to *P ovale*. None of the R.O.C. citizens who acquired malaria while traveling abroad were taking chemoprophylaxis.

During the 1980-1984 period, the number of *P falciparum* cases among R.O.C. travelers rose seven-fold from two cases in 1980 to 14 in 1984. During this period, the proportion of chloroquine-resistant *P falciparum* malaria also increased from one out of 14 (7%) cases in 1980-1981 to seven out of 31 (23%) in 1983-1984. The increase in the number of *P falciparum* cases has been most marked among R.O.C. travelers to west Africa: in 1980-1981 only five cases occurred among such travelers, compared with 17 cases in 1983-1984. Although no deaths were reported during this period, infections with *P falciparum* malaria in non-immune individuals can be serious and potentially fatal; the case-fatality rate due to *P falciparum* among U.S. travelers was four percent for the period 1973-1983[1].

In 1983-1984, 17 of 21 (81%) cases of *P falciparum* malaria among R.O.C. travelers were acquired in four west African countries: Nigeria (14 cases), Ivory Coast (1 case), Ghana (1 case), and Cameroon (1 case). Malaria attack rates for R.O.C. citizens visiting these countries can be calculated with information from the Ministry of Communications, Bureau of Tourism. In 1983-1984, the estimated number of *P falciparum* malaria infections per 1,000 R.O.C. visitors to these countries was 125.0 for Cameroon, 58.8 for Ghana, 51.9 for Nigeria, and 6.5 for Ivory Coast. These rates are extremely high and may be related to the duration of stay and types of areas visited. Unfortunately, this information for R.O.C. travelers is unavailable.

Reported by Taiwan Provincial Institute of Infectious Diseases, Bureau of Disease Control, Department of Health, Executive Yuan.

Editorial note: Although there has been no autochthonous transmission of malaria in Taiwan since 1974, *Anopheles* mosquitos are abundant in some areas and imported cases continue to occur both among R.O.C. citizens and foreign nationals. Taiwan's malaria control program is based on aggressive surveillance, treatment and follow-up of confirmed cases. In addition to passive surveillance by hospitals, clinics, and health stations, the TPIID utilizes four active surveillance methods to identify cases: blood smears from febrile primary school children in areas with heavy concentrations of vector mosquitoes or areas where malaria was formerly endemic, blood smears from febrile patients seen at government health stations, blood smears from febrile travelers entering Taiwan from malarious areas, and blood smears from household and neighborhood contacts of confirmed cases. All confirmed cases are followed for one year after treatment to identify treatment failures due to either drug resistance or lack of compliance. Cases of *P vivax*, *P ovale* and *P malaria* are treated with both chloroquine and primaquine to achieve radical cure.

To protect the health of R.O.C. residents traveling abroad and minimize the risk of

endemic malaria transmission in Taiwan, travelers to malarious areas should take chemoprophylaxis. Chloroquine phosphate 300 mg base (500 mg salt) taken orally once a week beginning 1-2 weeks before entering a malarious area and continuing for six weeks after leaving the area is the drug of choice for suppression of malaria strains which are chloroquine-sensitive[2]. For areas with known chloroquine-resistance (Table 2), chloroquine is still the prophylactic drug of choice, although travelers should be advised to carry a therapeutic dose of an alternative drug like Fansidar®(pyrimethamine-sulfadoxine) to be taken in the event of a febrile illness if professional medical care is not readily available. Fansidar® has been recently shown to cause severe dermatologic reactions with a high fatality rate when used in combination with chloroquine for malaria prophylaxis[2]. The risk of fatal reactions has been estimated among U.S. users to be between 1/18,000 and 1/26,000 users[2]. Because of the risk of these reactions, Fansidar® is no longer recommended for malaria chemoprophylaxis, although it remains the first drug of choice for the treatment of chloroquine-resistant *P falciparum* malaria. Other drugs such as doxy-

TABLE 2. Areas with reported chloroquine-resistant *Plasmodium falciparum*(CRPF)[1]

AFRICA[2]
- Angola
- Burundi
- Central African Republic
- Comoros
- Gabon
- Kenya
- Madagascar
- Malawi
- Mozambique
- Namibia
- Rwanda
- Sudan (northern provinces)
- Tanzania
- Uganda
- Zaire (northeastern)
- Zambia (northeastern)

SOUTH AMERICA
- Bolivia
- Brazil[3]
- Colombia
- Ecuador[4]
- French Guiana
- Guyana
- Panama (east of the Canal Zone, including the San Blas Islands)
- Peru (northern provinces)
- Surinam
- Venezuela

ASIA
- Burma
- China (Hainan Island and southern provinces)
- Indonesia[5]
- Kampuchea[5]
- Laos[5]
- Malaysia
- Philippines (Luzon, Basilan, Mindoro, Palawan, and Mindanao Islands; Sulu Archipelago)
- Thailand
- Vietnam

OCEANIA[5]
- Papua New Guinea
- Solomon Islands
- Vanuatu

INDIAN SUBCONTINENT[5]
- Bangladesh (north and east)
- India
- Pakistan (Rawalaindi)

[1] There is no malaria risk in urban areas unless otherwise indicated. This table should be used in conjunction with the text in determing appropriate prophylaxis.
[2] Malaria risk exists in most urban areas.
[3] Malaria risk exists in urban areas of Timor and Kalimantan provinces. Irian Jaya should be considered as Oceania.
[4] Malaria risk exists in all urban areas except Vientiane.
[5] Malaria risk exists in urban areas of interior Amazon River region.
[6] Malaria risk exists in urban areas of Esmeraldas, Manabi, El Oro, and Guayas provinces (including city of Guayaquil).

Source: MMWR 1985; 34:186

cycline and amodiaquine may be more effective than chloroquine in the treatment of chloroquine-resistant *P. falciparum* and may also have some benefit as chemoprophylactic agents in areas with chloroquine resistance; however, these drugs have not been well studied and information about their efficacy is limited.

Presently, the demand for chloroquine in Taiwan is low and the drug is not routinely available in pharmacies. The TPIID has a limited supply of chloroquine available, and travelers to malarious areas, especially those going to rural areas for extended periods of time, should contact TPIID for a supply of drug. The Department of Health is working with TPIID to increase the supply of chloroquine in Taiwan and make the drug available at all county and city health bureaus. Travelers to areas with known chloroquine resistance will have to purchase Fansidar® abroad since this drug is not presently licensed in Taiwan.

In addition to chemoprophylaxis, all travelers to malarious areas should be advised to take general protective measures which include remaining in well-screened areas from dusk to dawn and sleeping under mosquito netting. Exposure to mosquitoes outdoors can be reduced by wearing protective clothing and applying mosquito repellent to thin clothing and exposed areas of the skin.

Travelers should be aware that prophylactic measures are not always successful and that suppressive prophylaxis for *P vivax, P ovale* and *P malaria* infections will not prevent relapse. Travelers should therefore be warned that if they experience any malaria symptoms during, or even several years after possible exposure to malaria, they should inform a physician of their travel history so the diagnosis of malaria will be considered.

References

1. CDC. Imported malaria among travelers - United States. MMWR 1984; 33:388-90
2. CDC. Revised recommendations for preventing malaria in travelers to areas with chloroquine-resistant *Plasmodium falciparum* MMWR 1985;34:185-90, 195

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R.O.C. EXECUTIVE YUAN/G I O PUBLICATION NO 4435
PRINTED BY FEAN YANG PRINTING ENTERPRISE CO . LTD
12, LANE 62, SIN SHAN S ROAD, SEC 2, TAIPEI
中華郵政台北字第1568號執照登記為雜誌交寄