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Buruli Ulcer Distribution in Benin

To the Editor: *Mycobacterium ulcerans* disease, commonly called Buruli ulcer, is an emerging infectious disease in West Africa (1,2). Several forms of Buruli ulcer exist; large, chronic ulcerations or indurated plaques of the skin are the most frequent manifestations of the disease (1), and bone is sometimes involved (3). Little is known about the focal epidemiology of Buruli ulcer; incidence, prevalence, and other data are usually reported at the national or district level (4). These data convey the importance of the disease but do not show the wide variations that occur at the village level within a given district. In 2002, we investigated the disease in an arrondissement (Gnizounmè) in an area in which Buruli ulcer is endemic, the commune of Lalo in Benin. Prevalence rates of Buruli ulcer varied from 0.58 to 32.62 per 1,000 inhabitants of villages in the same arrondissement. For Gnizounmè Arrondissement, the overall prevalence was 10.70 per 1,000 inhabitants. These results confirmed that distribution of Buruli ulcer must be determined at geopolitical divisions lower than district or national levels, as is frequently assumed to be the case.

An inverse relationship exists between the prevalence of Buruli ulcer and distance from the Couffo River, which drains the arrondissement of Gnizounmè. A comparison of the relevant data for Assogbahoué and Tandji villages shows that the number of patients per 1,000 inhabitants increases gradually from 0.58 to 32.62 as the distance from the river decreases from 10 to 1 km.

Recently, aquatic insects have been considered potential vectors of *M. ulcerans* (5,6). These aquatic insects can fly many kilometers from their source (7). This finding may partially explain how patients who live farther distances from their source of water become infected, but not as often as those who live closer. Some water bugs obtained from water collection points along the Couffo River in the village of Tandji were found to be positive for *M. ulcerans* by using PCR with specific insertion sequence *2404* as a target (8).

If we consider domestic water sources in the arrondissement of Gnizounmè, only Tandji (32.62 Buruli ulcer patients per 1,000 inhabitants) used water directly from the Couffo River. Other villages employed protected water sources for domestic purposes (boreholes, cisterns, or piped water from artesian wells). These results are similar to Barker's findings in Uganda, which showed that families who used unprotected sources of water for domestic purposes had higher prevalence rates of Buruli ulcer than those who used boreholes (9). Consequently, besides the possible influence of distance from the river on disease prevalence through potential vectors, such as insects or other factors, we hypothesize that the use of river water for domestic purposes may also play a role in the elevated prevalence of the disease in Tandji village. If this hypothesis is confirmed, preventive public health programs based on strategies that provide protected water supply systems to villages must be developed to reduce the frequency of the disease.

Determining the complex relationship between distance from the Couffo River and the numbers of cases and level of protection of water supply is difficult. Our findings argue for the need to perform additional epidemiologic studies to understand more completely the key factors that determine the distribution of the disease in the entire commune of Lalo.

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Mycobacterium tuberculosis Drug Resistance, Abkhazia

To the Editor: Drug-resistant tuberculosis (TB) has been identified as a major problem in the former Soviet Union, and was recently surveyed in the Aral Sea regions of Dashoguz (Turkmenistan) and Karakalpakstan (Uzbekistan) (1). However, few data are available for the Caucasian region and published reports have focused mainly on prisons (2,3).

We report a drug resistance survey for first- and second-line anti-TB drugs conducted in Abkhazia, a Caucasian region of 8,600 km^2 with approximately 250,000 inhabitants, at the western end of Georgia on the Black Sea. The collapse of the Soviet Union lead to disruption of TB control activities in all Eastern bloc regions (4). In Abkhazia, the shortage and poor quality of drugs, self-medication, and poor adherence to the therapy became even more evident during the war with Georgia in 1993 and the international embargo that followed. A TB program based on the World Health Organization/International Union against Tuberculosis and Lung Disease (WHO/IUATLD) recommendations was initiated in Abkhazia with the support of Médecins Sans Frontières (MSF) in 1999. In 2000, monitoring of drug resistance was started for new cases and previously treated case-patients. The study was performed in collaboration with the Guliripchi TB Hospital, MSF, and the Istituto Superiore di Sanità (ISS), a WHO/IUATLD Supranational Reference Laboratory for anti-TB drug resistance.

Sputa were collected from all case-patients attending Gulirip-chi TB Hospital in Sukhumi, the capital of Abkhazia, from September 2000 to April 2004. Patients were either referred by their practitioners or came spontaneously because TB was suspected. Diagnosis, treatment, and hospitalization were provided free. Samples were treated as previously described (5). Of 489 sputa collected from individual patients, 447 were culture positive (246 from new case-patients and 201 from previously treated case-patients) and 42 were culture negative; of these, >90% showed a negative, doubtful, or 1+ smear result. Susceptibility to first-line (streptomycin, isoniazid, rifampin, and ethambutol) and second-line (kana-mycin, ethionamide, capreomycin, cycloserine, *p*-aminosalicylic acid, and ofloxacin) drugs was determined by the proportion method on Middlebrook 7H10 agar. The critical concentrations used were streptomycin, 2 μg/mL; isoniazid, 0.2 μg/mL; rifampin, 1 μg/mL; ethambutol, 5 μg/mL; kanamycin, 5 μg/mL; ethionamide, 5 μg/mL; capreomycin, 10 μg/mL; *p*-aminosalicylic acid, 2 μg/mL; and ofloxacin, 2 μg/mL (6–8). Cycloserine was used at a concentration of 30 μg/mL (9). If a strain was resistant to ≥1 first-line drugs, the susceptibility to all second-line drugs was determined.

Data on resistance to the first- and second-line drugs are given in the Table. The strains isolated from 35.8% of the new case-patients and 57.2% of the previously treated case-patients were resistant to ≥1 first-line drugs. The highest monoresistance was seen for isoniazid and streptomycin in both new and previously treated case-patients while monoresistance to rifampin and ethambutol was low (<1%). Multidrug-resistant (MDR) strains (i.e., strains resistant to at least isoniazid and rifampin) were observed in 4.9% of the new cases and 25.4% of the previously treated case-patients. Strains resistant to isoniazid and streptomycin were isolated from 6.9% of the new cases and 8% of the previously treated case-patients. Resistance to second-line drugs was high (15.9% in new cases and 35.7% in previously treated case-patients), with the highest values being observed for kanamycin (4.5% in new cases and 21.7% in previously treated case-patients) and ethionamide (8% in new cases and 16.5% in previously treated case-patients). Twenty-five percent and 52.9% of the MDR strains isolated from new and previously treated case-patients, respectively, showed resistance to ≥1 second-line drugs.

Few data have been reported on drug resistance to first- and second-line drugs in the former Soviet Union and in the Caucasian region (1–4). Overall, in Abkhazia, monoresistance to isoniazid was higher than in Karakalpakstan and Dashoguz (1), while monoresistance to streptomycin was lower. MDR-TB in new and previously treated case-patients showed levels intermediate between these 2 regions. Resistance to kanamycin