were 100 and with patients to serum reus respectively. The antibody (IgG) diagnosis were susceptible CCUG two cases cisus we could exclude the basis of phenotypic characteristics, we. Apparently, Lastovica et al. did not apply these two distinctive criteria to their H2-requiring isolates. Thus, it is not surprising that none of the strains they selected as C. mucosalis hybridized with C. mucosalis NCTC 11000. It would be interesting to see whether those nine strains were susceptible to cephalothin and produced a yellowish pigment.

Microbiologists have been relying on biochemical, tolerance, susceptibility, and colony characteristics of bacteria for almost a century. I believe that the production of a yellowish pigment and susceptibility to cephalothin can adequately differentiate C. mucosalis from C. concisus. DNA hybridization and other diagnostic tools certainly enable the performance of very accurate assays, but for many researchers, “the phenotypic tests remain the most important diagnostic methods for the identification of bacteria” (3).

In any case, our C. mucosalis strains can be requested from the National Collection of Type Cultures, London, United Kingdom, where they have been deposited. They are C. mucosalis NCTC 12407 and C. mucosalis NCTC 12408.

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Serologic Diagnosis of Tuberculosis through Assays of Lipoarabinomannan Antigen or Antibody or Lysozyme Level

The coagglutination studies of Sada et al. (5) for simplified diagnosis of tuberculosis, which used Staphylococcus au-

reus Cowan I sensitized with purified immunoglobulin G (IgG) antibody to lipoarabinomannan (LAM), had a sensitivity of 88 and 67% with samples from patients with smear-

positive and smear-negative active pulmonary tuberculosis, respectively. For AIDS patients with tuberculosis, sensitiv-

ity was 57%. The specificity with samples from 63 control patients with lung diseases other than tuberculosis and with 63 serum samples from a blood bank from persons presumed to be healthy was 100%. The positive and negative predictive values for the LAM antigen assay with samples from pa-

tients with sputum-positive active pulmonary tuberculosis were 100 and 97%, respectively (5).

Before the universal acceptance of LAM antigen assays for specific diagnosis of tuberculosis, its specificity would have to be investigated with samples from Mycobacterium bovis BCG vaccinees and patients with other mycobacterial diseases. Apart from global use of BCG as a prophylactic agent incorporated in the WHO Expanded Programme on Immunization, BCG has also been effective in patients with leukemia. In Quebec, leukemia mortality in children below 15 years of age was half as high in those who were vacci-

nated with BCG as in those who were not, while a British trial found leukemia mortality to be 2.4 per 100,000 in vaccinated subjects versus 4.1 in those who were not (2). The interference in LAM specificity following a recent or an earlier BCG vaccination needs close scrutiny.

Use of IgG antibodies against LAM as a reliable diagnostic marker for tuberculosis on 66 patients with pulmonary, miliary, and pleural tuberculosis in an enzyme-linked immu-

nosorbent assay was 96% specific and 72% sensitive. New-
ertheless, only 75 patients with lung diseases other than tuberculosis and just 10 purified protein derivative (PPD)-positive and 10 PPD-negative healthy subjects served as controls (6). In another attempt, serum lysozyme levels were quantified in an immunoassay rather than by an enzymatic format. Lysozyme assays with samples from 19 Ethiopian tuberculosis patients not only were 100% sensitive but also enabled detection of more patients than were detectable by LAM IgG antibody assays. Apparently, no information was available on the PPD reactivity among the controls, comprising 27 healthy volunteer medical students from Wayne State University, Detroit, Mich., and 14 hospital and laboratory personnel from the Black Lion Hospital or the Armauer Hansen Research Institute in Addis Ababa (4). The exclusion of PPD-negative and -positive subjects from the control for evaluation of noncultural and nonmolecular biological assays for diagnosis of tuberculosis is rather unfortunate. During the past three decades about three billion doses of BCG have been offered globally, and the vaccination has had a remarkable impact against leprosy and has been one of the contributing factors to decline of leprosy in many countries (1).

The serologic diagnosis of tuberculosis could be vitiated through frequent infections by environmental mycobacteria, including the pathogenic species. Such mycobacteria could be isolated from clinical specimens, hand and forearm washings of healthy individuals, or leprosy patients. Furthermore, in the tropics, Mycobacterium ulcerans is responsible for progressive, indolent skin ulcerations in closely defined areas related to a river or lake system (3). The increased pathogenicity of otherwise innocuous opportunistic mycobacteria in AIDS patients would alter both sensitivity and specificity of every LAM antigen-antibody or lysozyme serological assay directed towards a specific diagnosis of tuberculosis. A specific 1- or 2-step rapid test for field use in areas with extensive tuberculosis and human immunodeficiency virus infection and AIDS should be aimed to distinguish BCG vaccinated PPD reactors, PPD nonreactors, atypical mycobacterial infections, and both pulmonary and extrapulmonary tuberculosis. That should be feasible following isolation of specific antigenic components of Mycobacterium tuberculosis, without any cross-reactivity with BCG or environmental mycobacteria.

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Author’s Reply

We would like to answer the concerns expressed by Arya regarding two studies that we published recently in the Journal of Clinical Microbiology. One is related to the use of lipoarabinomannan (LAM) for the serological diagnosis of tuberculosis (5), and the other concerns antigen detection of LAM in sera from patients with tuberculosis (4). The main concern of Arya is to know whether these assays could be useful for people who have been vaccinated with BCG. In our studies we did not know if the control subjects were vaccinated with BCG; however, in Mexico the BCG application is compulsory and is included in all the immunization programs. Different surveys in Mexico have shown that nearly 90% of the population has been immunized with BCG (1, 2); therefore, we assume that at least 90% of the control subjects were vaccinated with BCG and that the specificity results obtained in both studies are representative for countries with a high index of BCG vaccination. Furthermore, a recent study by Hussey et al. evaluating an enzyme-linked immunosorbent assay (ELISA) for diagnosis of tuberculosis in children showed that previous BCG vaccination did not affect the ELISA results (3). In regard to PPD and the possibility of interference with the assays, the following considerations should be taken into account. In the first study, we included subjects with positive and negative PPD, which is representative of the population which attends our institution. In the second study, we did not know the PPD status of the control population. However, 40 to 50% of healthy adults in Mexico have positive PPD results (1, 2); therefore, the specificity obtained in both studies showed that positive PPD probably did not interfere with the results, since only one healthy control in the serological study (5) and none in the antigen detection study (4) gave a positive test.

Regarding the issue of specificity of LAM, we clearly wrote in both papers that LAM is not an M. tuberculosis-specific antigen; therefore, it is possible for patients with mycobacterial infections other than tuberculosis to give positive results in both assays. In our studies we did not explore this because in our population atypical mycobacterial infections are rare; however, we do think that other studies should be done to clear this question. We agree with Arya when he says that mycobacterial infections in patients with AIDS are an important problem and that LAM serology and antigen detection have to be evaluated carefully to know the sensitivity and the specificity of these assays. In our antigen detection study (4) we tested 21 patients with AIDS and tuberculosis. The sensitivity of the assay was 57%; these results demonstrate that this test could be useful for this population. Recently, we obtained a serum collection from 10 patients with AIDS and Mycobacterium avium bacteremia. When we tested these sera by the coagglutination assay, none of the sera gave positive results (unpublished data). Since LAM is present in M. avium, we suggested that the negative results obtained are related to immunosuppression and to the inability of AIDS patients to degrade mycobacteria and thus release antigen to circulation.

Finally, we agree with Arya that specific M. tuberculosis antigens useful for serology and antigen detection will be an important advance in the diagnosis of tuberculosis.

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Bottone and Perez (1) recently reported a case of folliculitis due to *Pseudomonas aeruginosa* which was bacteriologically linked to a loofah sponge by serotyping. They also reported that new sterilized loofah sponges plus distilled water supported the growth of the patient’s *Pseudomonas* isolate. The authors suggest that a yet-to-be-identified *Pseudomonas* growth-promoting component of the loofah sponge may have a role in turning these reputed beauty aids into infectious fomites. My experience with a case of *Pseudomonas* folliculitis associated with a synthetic sponge made of nonwoven polyester implies that factors not specific to loofahs, such as incomplete drying and accumulation of epidermal debris, may be sufficient to support pseudomonal colonization of other types of sponges and may induce *Pseudomonas* folliculitis.

**Case.** A 32-year-old healthy Caucasian female developed crops of moderately painful, papular lesions which progressed to pustules of 2 to 3 mm in diameter. She had no constitutional symptoms associated with the rash and no known exposures to persons with illness or to animals.

The exanthem began on the buttocks with approximately 8 lesions. On the second, third, and fourth day of the rash, an additional 40 to 50 papules erupted on her buttocks, thighs, back, chest, arms, and neck and one erupted on the face. The papules evolved into pustules within 6 to 24 h. The lesions scabbed, and surrounding erythema and pain resolved within 4 days of onset. A pustular lesion was unreroofed on the fourth day, and a Gram stain of the purulent material showed many polymorphonuclear leukocytes and no bacteria. Bacterial cultures were initiated. No new lesions occurred until day 9, when 8 to 10 papular/pustular lesions were noted on her buttocks, thighs, and lower back. The bacterial culture grew *P. aeruginosa*.

Additional history elicited after the culture results were known indicated that the patient had not been in jacuzzis, hot tubs, swimming pools, or mud baths, nor had she participated in activities associated with *Pseudomonas* folliculitis, such as use of wax depilatories (2, 3, 6–8), in the weeks prior to the rash. During the past 3 years the patient used coarse sponges of synthetic material marketed to produce smoother skin by their exfoliative properties. The patient kept her sponge in the shower soap dish beside the soap. A culture of the sponge grew many colonies of *P. aeruginosa* and a moderate number of colonies of *Serratia liquefaciens* and *Aeromonas hydrophila*. The antibiotic susceptibility profiles of the skin and sponge *Pseudomonas* isolates were identical.

In concert with the popularity of exfoliative sponges as antitache and beauty aids, isolated cases of *Pseudomonas* folliculitis are likely to occur more frequently than is commonly recognized in persons using not only loofah sponges (1, 4) but also other types of sponges (5). The abrasive action of the sponges may traumatize the epidermis and may allow entry of bacteria and the development of folliculitis. Residual moisture, soap, and keratin may promote the growth of bacteria in the sponge. Instructions to minimize these conditions, such as thorough rinsing and drying of the sponge, may lessen the occurrence of folliculitis in persons who choose to use exfoliative sponges.

**REFERENCES**


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**Author’s Reply**

We applaud Dr. Frenkel’s observation that even a synthetic sponge used as an exfoliative device can serve as a vehicle for the transmission of bacterial contaminants, especially *P. aeruginosa*, to the human skin. Her report, coupled with that of Sheth et al. (4), who documented *P. aeruginosa* otitis externa linked to a contaminated synthetic infant bath sponge in an infant, augments our report of a case of natural-fiber (loofah) sponge-associated *P. aeruginosa* follicu-