Microbiological Laboratory Hazard of Bearded Men

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An investigation was conducted to evaluate the hypothesis that a bearded man subjects his family and friends to risk of infection if his beard is contaminated by infectious microorganisms while he is working in a microbiological laboratory. Bearded and unbearded men were tested with Serratia marcescens and Bacillus subtilis var. niger. Contact aerosol transmission from a contaminated beard on a mannequin to a suitable host was evaluated with both Newcastle disease virus and Clostridium botulinum toxin, type A. The experiments showed that beards retained microorganisms and toxin despite washing with soap and water. Although washing reduced the amount of virus or toxin, a sufficient amount remained to produce disease upon contact with a suitable host.

Indirect contact transmission of disease from the microbiological laboratory to persons outside by means of contaminated clothing has been reported in the instances of Q fever in laundry workers (11) and in a veterinarian's wife who may have acquired Q fever by handling the clothing of her husband (6).

There may be other cases of similar indirect transmission. However, there are few reports of direct personal contact in which a healthy microbiological laboratory worker has infected his family or friends outside the laboratory. One paper reported the Q fever infection of a housewife by a tenant in her home; it was concluded that the most reasonable theory was passive carriage of the organism from the laboratory either on the clothing, hands, shoes, or hair (2).

After many years of absence from the laboratory scene, beards are now being worn by some persons working with pathogenic microorganisms. Beard contamination might result from an evident spill of culture or from an unrecognized microbial aerosol. Previous investigations have shown that common microbiological techniques and accidents generate sufficient microbial aerosol to infect man (22). It is assumed that differences in susceptibility may permit infection of a contact even if the bearded carrier remains uninfected. Because the source of laboratory-acquired infection is unknown in 39 to 86% of the cases (12), it has been our policy that beards are undesirable because they may constitute a risk to close associates.

This hypothesis was tested by four volunteers with 73-day-old beards. Noninfective Serratia marcescens and Bacillus subtilis var. niger were used in the test.

To study transmission of disease by a beard, a full-length, natural-hair beard on a mannequin was contaminated with Newcastle disease virus (NDV) and Clostridium botulinum type A toxin. Chickens and guinea pigs were used as test animals.

MATERIALS AND METHODS

Bacterial experiments with bearded men. Two bacterial cultures were used in this investigation. S. marcescens was grown for 16 hr at 30°C in a modified Tryptose Broth medium (Difco) and was diluted with physiological saline immediately before use to a concentration of 10^4 organisms/ml. B. subtilis var. niger was grown for 48 hr at 34°C in a modified N-Z Amine Type A medium and was diluted with physiological saline immediately before use to a concentration of 10^8 spores/ml.

A 1-ml amount of culture was sprayed from a small Chicago atomizer (17) on the entire beard of each man. In the final experiment in which one half the beard was sprayed before shaving off the beard, only 0.5 ml was used. The particles had a mass median diameter of approximately 3 to 5 μ.

Two intervals, 30 min and 6 hr, were used between spraying and sampling the beard. The 30-min interval was selected to represent two work situations: (i) the time necessary for a man to complete a laboratory operation in a zealous attempt to avoid loss of an experimental series despite a known accidental contamination of his beard before he rejoined his associates with an unwashed beard, and (ii) the time required for an immediate shower and change of clothing, after an accident that contaminated the beard and the beard in the before association with fellow employees or family. The 6-hr interval was selected to represent the time between an unrecognized contamination of the beard and family contact with the unwashed beard.

The test site was an isolated laboratory room with both the temperature and humidity controlled. During