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PERSPECTIVES

Brucellosis: A neglected but existing threat to travelers and laboratory personnel in Taiwan

Tsung-Pei Tsou, Jung-Jung Mu*

Bacterial Enteric and Emerging Diseases Laboratory, Research and Diagnostic Center, Centers for Disease Control, Taiwan

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Between May and September 2011, the first four cases of human brucellosis in 30 years were confirmed in Taiwan.[1] All cases occurred in returned travelers from regions where brucellosis is endemic. It reminds us of the possible threat of this neglected zoonosis.

Brucellosis is the most common zoonotic disease worldwide with more than 500,000 new cases diagnosed annually. This disease is caused by the *Brucella* species and major animal hosts are goats, sheep, camels, cows, and pigs. Transmission to humans occurs through ingestion of infected, unpasteurized animal-milk products, through direct contact with infected animals, or through the inhalation of infected aerosolized particles. Like all zoonotic diseases, the incidence of brucellosis differs between countries and is the highest in the Middle East and Africa, where people still adhere to traditional farming and lifestyles. In developed countries, brucellosis has become a common imported disease because of increased international travel or imported food from endemic countries.[2] Brucellosis is also notorious of being the most frequently recognized cause of laboratory-transmitted infection. Therefore, this organization endangers not only people with animal contact, but also laboratory personnel performing diagnostic tests.[3]

Surveillance and control of animal brucellosis in Taiwan was started in 1962. Antibody positive cows were sent to the abattoir immediately and the remaining cows in the contaminated farms were then tested monthly. The first case of bovine brucellosis caused by *B abortus* was diagnosed in 1963. After surveillance for more than one decade, the infection rate of bovine brucellosis has decreased from 4.99% in 1962 to 0.06% in 1979.[4] Bovine brucellosis was eventually eradicated in Taiwan in 1989. Serologic survey on sheep has been regularly performed since 1986 and all showed negative results. First domestic case of human brucellosis was reported in 1978 in a graduate student who acquired the infection during laboratory work.[4] The first and the only outbreak occurred in 1979, in which 16 people including nine laboratory personnel, six dairy farm workers, and one veterinarian were infected.[4] Since then, no human case, either domestic or imported, has ever been reported in Taiwan.

Animal brucellosis is a World Organisation for Animal Health (OIE) listed disease, and it is also listed as a notifiable infectious animal disease in Taiwan by the Bureau of Animal and Plant Health and Quarantine. Human brucellosis was listed as a Category IV notifiable disease by the Taiwan Centers for Disease Control (TCDC) in 2012. Brucellosis can be confirmed by either positive culture or serologic test. Two serological tests, rose-Bengal test and micro-agglutination test (MAT), are in use now in TCDC. Rose-Bengal test, a kind of agglutination slide test for the detection of *Brucella* specific agglutinins, was used as a first screening test. In endemic areas, use of this test may be limited due to high background seropositivity.[5] In non-endemic areas like Taiwan, a single positive test with compatible clinical symptoms and relevant exposure history is highly suggestive of true infection. Therefore, we use the

* Corresponding author. Bacterial Enteric and Emerging Diseases Laboratory, Research and Diagnostic Center, Centers for Disease Control, 161 Kun-Yang Street, Taipei, Taiwan.
E-mail address: jjmu@cdc.gov.tw (J.-J. Mu).

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combination of positive rose-Bengal test and a single MAT titer of $\geq$160 as the definition of a confirmed brucellosis infection. Identification of suspected isolate of the *Brucella* species should be performed in a P3 lab and follow the safety guidelines for biosafety level 3 laboratory formulated by TCDC.[6] Differentiation between species will be made by polymerase chain reaction using specific primers.

During the early stages of the disease, patients are frequently bacteremic so circulating brucella are easily detected by blood culture.[3] Therefore, all clinical labs may encounter a positive isolate of the *Brucella* species and need to be aware of its high transmissibility through laboratory procedures. Three of the four cases this year had their blood culture performed in hospital and reported to be positive for the *Brucella* species resulting in dozens of exposed laboratory personnel. The attack rate of laboratory acquired brucellosis ranged from 30%—100% in different reports, and the risk of transmission is not limited to staff who process the isolate.[3] The Health Protection Agency in the United Kingdom and Centers for Disease Control and Prevention in the United States have proposed guidelines for managing staff with possible exposure to *Brucella* species.[7, 8] With different categorizations of exposure, the two guidelines both emphasize the importance of serological follow up and postexposure prophylaxis. Following diagnosing four cases this year, TCDC has proposed their own recommendations recently.[9] Postexposure prophylaxis and serological follow-up will be offered to exposed laboratory staff by TCDC.

All the four cases had travel history to countries with brucellosis and relevant animal or food history, including contact with camels and ingestion of possibly unpasteurized milk products. Since eating is an important experience in any trip, travelers are more willing to try new food, drinks, and exotic food preparations. The tendency to get "natural," "organic" food directly from the farm also increases the risk of many foodborne pathogens, including brucellosis.[10] According to the World Tourism Organization, the Middle East has showed the strongest growth of international tourist arrivals in 2000—2010 (a 9.6% increase), followed by the Africa (a 6.4% increase), both of which are regions of leading brucellosis incidence. Besides reaching a double-digit growth in 2010 (a 14.1% increase from 2009—2010), international tourist arrivals in the Middle East are forecast to grow at more than 5% per year in 2011—2020. For the aforementioned reasons, the risk of imported brucellosis is expected to exist, if not increasing, in the following years. Travelers, travel medicine doctors, travel agencies, and tour guides should all be familiar with food safety principles and proper protective measures when animal contact is unavoidable.

Infectious diseases know no boundaries. As the epidemiology of zoonosis changes with changing lifestyle and evolving human-animal interaction, we should be alert and flexible.

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