Bone marrow *Penicillium marneffei* infection in acquired immunodeficiency syndrome patients: Report of 35 cases

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**Abstract.** Penicilliosis is a tropical disease occurring mostly in Southeast Asia. The incidence of *Penicillium marneffei* infection in acquired immunodeficiency syndrome (AIDS) patients is increasing due to the infection of the HIV in the population in recent years. In this report, the bone marrow smears of 331 AIDS patients have been examined for the evidence of *P.* marneffei infection, and 35 (10.6%) of whom were found positive, showing the existing of pathogen in the bone marrow smears. This result indicates that bone marrow *P.* marneffei infection is a serious complication in HIV infected patients and the inspection of bone marrow should be considered as a routine procedure during treatment.

**INTRODUCTION**

The incidence of acquired immunodeficiency syndrome (AIDS) infected by human immunodeficiency virus (HIV) is increasing and becoming a common health problem in China in recent years (HIV & AIDS in China: http://www.avert.org/aidschina.htm). Opportunistic infection in AIDS patients is accounted for one of the cause in death (Li et al., 2011; Stewart et al., 2012). In Southeast Asia, opportunistic infection caused by a fungal pathogen, the *Penicillium marneffei* in AIDS patients also become more and more common and is considered as a tropical disease (Cui et al., 2011; Le et al., 2011; Dahiya et al., 2012; Han et al., 2012; Lee et al., 2012; Nor-Hayati et al., 2012; Yang et al., 2012). The *P.* marneffei usually infected only the wild rodents such as the bamboo rats (Ajello et al., 1995). However, reports showed that human were also infected by this fungal pathogen in as early as 1959 and 1973 (Jayanetra et al., 1984). Beginning in 1980s, more and more cases were reported due to the spread of the HIV caused AIDS and represents 10% of opportunistic infection in AIDS patients (Piehl et al., 1988). The most *P.* marneffei infected organs are liver and lung, but infection of lymph node, bone marrow, skin, and intestine are also reported (Wong & Wong, 2011). This report shows that 35 of 331 AIDS patients had been confirmed to have evidence of *P.* marneffei infection in bone marrow.

**MATERIALS AND METHODS**

**Patients**

A total of 331 hospitalized acquired immunodeficiency syndrome (AIDS) patients in a period between January 2010 and May 2012 from the No. 4 Hospital of the City of Nanning were enrolled in this study. The age of the patients ranging from 22 to 71 years old with male dominating.
Wright-Giemsa staining of bone marrow smear and photographing
The bone marrow was aspirated from patients by following standard protocol. All the patients gave consent to the procedure in this examination. The bone marrow smear was air dried for 10 min at room temperature followed by fixing with 1 ml of methanol for 1 min at room temperature. The methanol solution was then rinsed gently by tap water then was stained with Wright-Giemsa staining solutions for 1 min. The smear was then gently washed with phosphate buffered saline (PBS) for 3 times to remove excess and unbound dye. The slide was then observed and photographed under an Olympus microscope equipped with a digital camera system (Olympus, Tokyo, Japan).

RESULTS AND DISCUSSION
Penicilliosis is an opportunistic infection in AIDS occurring mostly in Southeast Asia with humid tropical climate including the South and Southwest of China due to an increase in the incidence of HIV infection in the population in recent years. As mentioned above, P. marneffei mostly infected the liver and lung, but infection of lymph node, bone marrow, skin, and intestine were also reported (Wong & Wong, 2011). In this study, we studied a total of 331 AIDS cases. Among them, 35 cases (10.6%) with 28 males and 7 females were found having P. marneffei infection in bone marrow. Piehl et al. (1988) were probably the first to report P. marneffei infection in AIDS patients. The authors reported a case of disseminated penicilliosis in a patient with the acquired immunodeficiency syndrome. The P. marneffei pathogen was cultured from the blood, bone marrow, sputum, stool, and skin; the yeast forms were demonstrated in skin and bone marrow biopsy specimens (Piehl et al., 1988). Recently, Han and colleagues reported that 11.49% of AIDS patients were found to have P. marneffei infection with mucocutaneous disorders (Han et al., 2012). The percentage of patients with P. marneffei infection in AIDS cases in our report is similar to that of Han, however, they did not indicate the evidence of P. marneffei infection in bone marrow.

In bone marrow smears, the phagocytes engulfed pathogens were round or oval in shape; a few were sausage-like and unstained septates were seen. The size of the pathogen was about 1-2 µm, and 1-2 small, dark-purple stained nuclei with low to medium density chromatin can be observed. The cytoplasm was light blue non uniformly stained (Fig. 1A and 1B). Figure 1. Illustration of P. marneffei positive bone marrow smear
The Wright-Giemsa staining results of bone marrow smear shows two phagocytes engulfed P. marneffei pathogens (A and B). The pathogen exhibits round or oval shape; a few of sausage-like P. marneffei and unstained septates can be seen. The size of the pathogen is about 1-2 µm, and 1-2 small, dark-purple stained nuclei with low to medium density chromatin can be observed. The cytoplasm was light blue non uniformly stained. The pathogens outside of the cells are from crushed phagocytes.
REFERENCES


