**Penicillium marneffei**

Alternative Name: Penicilliosis

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**Taxonomy**

- Kingdom: Fungi
- Phylum: Ascomycota
- Class: Euroascomycetes
- Order: Eurotiales
- Family: Trichocomaceae
- Genus: Penicillium
- Species: *P. marneffei*

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**Geographic Distribution**

- Widespread
- Specifically in Southeast Asia
  - Burma (Myanmar), Cambodia, Southern China, Indonesia, Laos, Malaysia, Thailand and Vietnam
- Cases were reported in HIV-positive patients in Australia, Europe, Japan, the UK and the U.S.
  - All, except one traveled to Southeast Asia.

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**Epidemiology**

- Affects HIV-infected & immunosuppressed patients
- Discovered in bamboo rats (Rhizomys & Cannomys)
- Epidemiological markers and reservoirs for human infections
- High mortality and morbidity rates
- 10% of HIV patients in Hong Kong affected
- Soil exposure, especially during the rainy season, is a critical risk factor.
- Third most common opportunistic infection (after extrapulmonary tuberculosis and cryptococcosis) in HIV-positive individuals

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**Life Cycle**

- Thermally dimorphic
- Divided into three distinct phases:
  1. A multicellular, filamentous (mold) vegetative form
  2. Asexual reproductive stage (conidiogenesis)
  3. A unicellular yeast-like/arthroconidial phenotype
- Temperature and nutrition are key factors to determine which specific phase is displayed

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**Morphologies of *P. marneffei* under a microscope**

- Young colonies are grown on Sabouraud glucose agar
  - Rapid growing, flat, filamentous, and velvety, woolly, or cottony in texture
  - Usually appear bluish gray-green
  - Mature colony is reddish yellow, producing a pink or red-rose pigment that diffuses into the surrounding medium
Pathogenesis

- Pathogen found in bamboo rat feces, liver, lungs and spleen
- Higher incidence during rainy season
- Favorable for production of fungal spores (conidia)
- Airborne spores inhaled by susceptible individuals
- Unclear whether people get the disease by eating infected rats, or by inhaling fungi from their feces

Diagnosis and Histopathology

- Biopsy of skin lesions, lymph nodes or bone marrow
- The organism can also be identified on peripheral blood smear or bone marrow aspirate
- Fungi shown:
  - Spherical or oval in shape
  - Basophilic intracellular or extracellular yeastlike appearance on Wright stain, often with clear central septation
- Histopathologic features include granulomatous, suppurrative, or necrotizing inflammation
- Polymerase chain reaction (PCR) assay is under evaluation for rapid diagnosis of *P. marneffei* infection

Clinical Manifestations

- Duration of symptoms before presentation is 4 weeks.
- Other common manifestations:
  - Skin lesions, anemia, lymphadenopathy, and hepatomegaly with or without splenomegaly.
  - Skin lesions are present in two thirds of cases
  - Include papular eruptions, central umbilicated papules, acnelike lesions and folliculitis.
  - Found on the face, trunk, and extremities.
  - Pharyngeal and palatal lesions
  - Subcutaneous nodules
  - Pulmonary symptoms (cough and dyspnea) occur in about 50% of cases.

Treatment & Prevention

- Mortality is at a 20% rate with treatment
- Amphotericin B with or without flucytosine, or itraconazole
- Ketoconazole & miconazole
- Newer azoles (posaconazole, ravuconazole, and voriconazole)
- Clinical failure rates:
  - Fluconazole (63.6%)
  - Amphotericin B (22.8%)
  - Itraconazole (25%)
- Primary prophylaxis with itraconazole 200 mg daily can prevent the occurrence of penicilliosis among patients with AIDS

Case 1.

- Patient:
  - Located in India
  - 27-year-old male
- Recently developed multiple nodules on his face
- Other Symptoms:
  - Fever, weight loss, anorexia, and general weakness.
  - General examination revealed multiple molluscum contagiosum-like papules of various sizes with central umbilications mainly on his face, trunk, and upper and lower limbs.
Case 1.

- He was diagnosed seropositive for HIV infection.
- Mild anemia, leukopenia, and a raised erythrocyte sedimentation rate (ESR).
- A chest X ray revealed bilateral patchy pneumonitis, and an ultrasonogram (USG) of the abdomen revealed mild hepatomegaly.
- A portion of the fine needle aspirate (FNA) when cultured yielded a Penicillium species.
  - Red diffusible pigment was produced.
  - Giemsa-stained smears of the aspirate.
    - Numerous intracellular and extracellular oval, elongated or sausage-shaped yeast-like cells.
    - Cells divided by fission rather than by a budding process.
- Three days before initiation of treatment, the patient died.

Case Study

- A 23 year old student from Namibia checked into the dermatology department of a hospital in Kuala Lumpur in Malaysia. The patient had multiple papules on the face and upper body that appeared 2 months before. He also complained of dysuria and urethral discharge that began a month earlier, as well as loss of appetite, weight loss, cough and fever that lasted 3 months.
- Upon further examination, it was discovered that the man was HIV positive, had oral candidiasis, and anemia. Giemsa stain of cultured facial papules revealed yeast cells. The patient was given 400mg of oral itraconazole, doxycycline 100mg, and nystatin oral suspension 500,000 units.

References