

## Pulmonary Blastomycosis in a Monkey

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### Introduction

Blastomycosis is a disseminated or localized mycotic infection caused by *Blastomyces dermatitidis*. It is chiefly a disease of man and dogs, and its infection is almost always caused by inhalation of infective spores into the lungs or by a cutaneous mycosis, with subsequent hematogenous spread.<sup>1, 6, 11</sup> Most cases in dogs and human are primary pulmonary localization.<sup>2, 3, 7</sup>

Although the frequency and distribution of the disease in animals are not accurately reported, it appears to be most frequent in southern areas of North America.<sup>9, 12</sup> Blastomycosis has been reported infrequently in nonhuman primates, but acute primary pulmonary localized cases have not been reported yet. The purpose of this report is to describe a case of acute pulmonary blastomycosis leading to sudden death in a monkey.

### Materials and Methods

**Case History;** An interesting case of ante-mortem dyspnea with restless spasm occurred in an adult male rhesus monkey (*Macaca mulata*) of unknown age.

The monkey had been kept in the wild monkey corral in Delta Regional Primate Research Center, Louisiana since its birth. During that time it has flourished under the routine diet and management of the primate center. Then the healthy animal developed anorexia, ataxia, dullness, coughing, and some elevated body temperature for more than a week. Every symptomatic treatment was given

with antibiotics, but the monkey revealed bad condition every day, and then died. The body was brought to us for necropsy.

### Results

**Gross Findings;** The monkey was well nourished and weighed 18.3kg. All vital organs were normal, with the exception of thick exudate accumulation in respiratory canal. At necropsy, the monkey's general physical appearance was found to be almost good. Small amount of yellowish tinct exudate was found in the pleural cavity.

The lungs contained multiple variable-sized firm yellowish white nodules that protruded above the pleural surface. The largest mass was about 6 cm in diameter and located around hilum of the right lobes.

These nodules or masses were principally on the right side, with left lobes of lungs containing only miliary small nodules. The cut surface of the nodules were granulomatous firm consistency and contained purulent or caseous materials in the center of them.

**Microscopic Findings;** Pulmonary lesions were characterized by severe diffuse disseminated pyogranulomatous pneumonia, with macrophages and neutrophils as well as lymphocytes, epithelioid cells and giant cells comprising the cellular response. The alveoli and intralobular bronchioles were almost occupied by these cellular components and humoral exudate (Figs. 1,2).

Secondary pulmonary atelectasis, edema, congestion, and hemorrhage immediately surrounded the

confluent lesions. Also many bronchi and bronchioles were occluded with cellular exudates.

Some nodules underwent central liquefaction or caseation, while some others were composed of new granulation tissue.

Numerous single and budding spherical cells 8 to 18 $\mu$ m in diameter, and with a thick refractile wall and single nucleus, were free in the massive exudate. The cells revealed variety in staining property of the preparations stained with hematoxylin-eosin, Giemsa, or methenamine-silver nitrate (Figs. 3,4).

### Discussion

Blastomycosis is diagnosed on the basis of microscopic findings. Most fungi are stained typically with methenamine-silver nitrate. *Blastomyces dermatitidis* are larger than *Histoplasma capsulatum* (3~12 $\mu$ m in diameter) and smaller than *Coccidioides immitis* which contains endospores and does not reproduce by budding, and do not have the wide mucicarmine-staining capsule of *Cryptococcus neoformans*<sup>4,5,8,10</sup>. Of the organisms causing the granulomatous diseases listed, only the cryptococcal organism is similar in size and might be confused on an impression smear. But the organisms can be demonstrated readily in

typical lesions and stained differentially with glycogen stain (PAS) on account of thick glycogen bound wall.

Although the pulmonary form of the disease in most animals is insidious in onset, and the course, which is seldom less than several weeks, may occupy many months<sup>13</sup>, but this animal exceptionally revealed acute diffuse confluent pneumonia with severe exudate containing many organisms. Also it is very peculiar case that the pulmonary lesions are of similar structure to acute severe exudative pneumonia with massive multiplication of organisms, and have not made any metastases in the body.

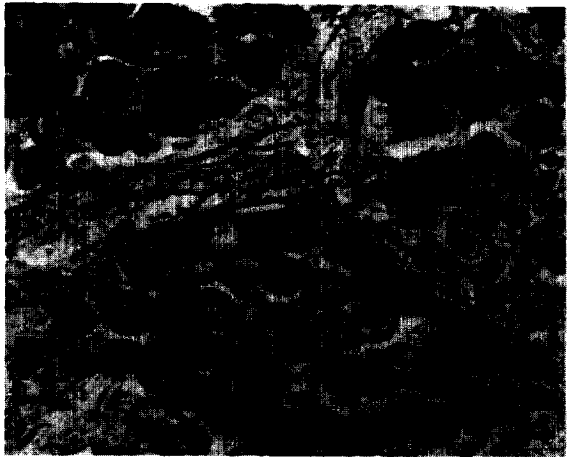
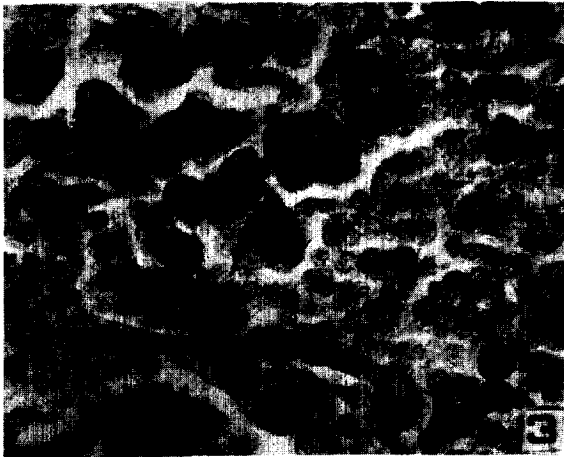
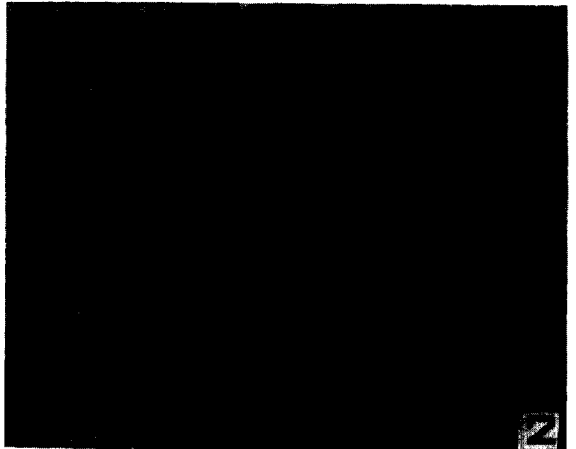
### Summary

An adult male rhesus monkey (*Macaca mulata*) developed anorexia, ataxia, dullness, coughing, and some elevated body temperature and died a week after the initiation of such symptoms. At necropsy the monkey's physical condition was found to be normal. Body weight was 18.3kg and the only notable gross lesion was the appearance of acute pneumonia with multiple nodules.

Histopathologic observation of the tissues obtained from this animal revealed the features of acute primary pulmonary blastomycosis.

### Legends for Figures

- Fig.1.** Acute blastomycosis observed in an adult rhesus monkey. Note the great amount of exudate throughout the lobes of lung with inflammatory cells. H & E stain.  $\times 400$ .
- Fig.2.** Massive exudative elements and *Blastomyces dermatitidis* occupied all the spaces and demolished the normal architecture of the lung tissue. Giemsa stain.  $\times 400$ .
- Fig.3.** Note budding (arrow) and thick walls of *Blastomyces dermatitidis* of the section stained with methenamine-silver nitrate (MSN).  $\times 400$ .
- Fig.4.** Numerous *Blastomyces dermatitidis* which had varied tinct with MSN staining were surrounded by increased fibroblasts in the interalveolar septa. MSN stan.  $\times 400$ .



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## 원숭이의 폐장 Blastomycosis 1 예

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### 초 록

비교적 건강하게 사육되어 오던 성숙한 숫컷 원숭이(*Macaca mulata*)가 약 1주일간 식욕감퇴, 무력, 침울, 기침, 체온상승 등의 임상증세를 보이다가 돌연히 호흡곤란과 경련증세를 보이면서 폐사하였다.

이 원숭이는 체중 18.3kg으로 검안시에 신체조건이 양호하였으며 유일한 육안적병변은 다수의 소결절을 형성하고 있는 급성폐렴 소견이었다.

병리조직학적인 관찰에서도 급성, 원발성 폐장 blastomycosis의 병소 소견을 보였기에 문헌과 비교 검토하여 증례보고 하는 바이다.