Parabasalids in Respiratory Secretions and Lung Diseases

To the Editor:

I read with great interest in a recent issue of CHEST (April 2014) the article by Khemasuwan et al, who provided a comprehensive review of helminthic and protozoal infestations of the respiratory system. Regarding the protozoal infestations, however, I think the authors have omitted a group of flagellated protists, the para-basalids, some of which are well-known protozoa and others of which are considered as uncommon emerging pathogens.

Parabasalids, which belong to the Excavata supergroup and the Metamonada phylum, are a group of anaerobic multiflagellated protozoa. Parabasalids exhibit a number of unique morphologic features such as the parabasal apparatus (similar to the Golgi apparatus) and the hydrogenosomes, a membrane-enclosed organelle adapted to the anaerobic environment. Phylogenetically, the parabasalids can be classified into six genetic groups. Only a number of families and/or species have been associated with respiratory diseases, such as Trichomonadidae (Trichomonas vaginalis and Trichomonas tenax), Tritrichomonadidae (Tritrichomonas foetus), Lophomonadidae (Lophomonas blattarum), and Holomastigotooididae (Spirotrichonympha).

Some protozoa such as L blattarum and Spirotrichonympha live in anaerobic environments. While they are mainly endosymbionts living in the hindgut of certain insects such as termites and cockroaches, L blattarum and Spirotrichonympha have also been observed in human respiratory secretions under light microscopy. An interesting question is whether these parabasalids inhabiting in the intestines of termites and cockroaches are associated with lung diseases. Through their feces, termites and cockroaches can eject the parabasalids into unfavorable environmental conditions, in which the parabasalids can form protective cysts. The protozoal cysts may be easily spread through the air or by soil, and inhalation of protozoal cysts by humans is possible. Under favorable conditions in the respiratory system, especially anaerobic status caused by hypoxic inspissated mucopurulent secretions, flagellate protozoa may be released from the cysts through excystation (Fig 1). Based on the interaction between certain protozoal proteases and the respiratory epithelial cells, a number of mechanisms for how protozoa cause lung diseases have been proposed. Proteolytic enzymes secreted by protozoa can destroy bonds such as the tight junctions between bronchial epithelial cells, causing structural damage of the respiratory epithelium. In addition, synthesis of protozoal proteases may activate the protease-activated receptors, causing airway inflammation through a number of inflammatory mediators such as IL-6 and IL-8. More interestingly, these uncommon multiflagellated protozoa were identified in respiratory secretions and were associated with unusual inflammatory responses characterized by a marked increase of monocytes rather than other types of leukocytes. In summary, the role of pathogenic parabasalids in respiratory infections should be recognized and highlighted.

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Figure 1 – Microphotographs obtained from a sputum smear of a patient with asthma. A, Two cystic forms can be observed where a tuft of thin and irregular flagella are protruding outward (black arrow). At the bottom (right corner) it is possible to observe a ciliated bronchial cell. B, The black arrow points to a multiflagellated protozoon. Note the irregular flagella and the absence of a terminal bar (Wheatley trichrome; scale bar = 20 µm).
Response

To the Editor:

We thank Dr Martínez-Girón for his interest in our article in CHEST¹ and appreciate the astute observation. His input certainly supplements our article, and we agree that parabasalids, the flagellated protozoa, can occasionally cause lung diseases.

Pulmonary infestation from Lophomonas blattarum is extremely rare.² The majority of the case reports are from Southern China, probably because its hosts (termites and cockroaches) are abundantly found in this region.³ Pulmonary symptoms are nonspecific and include productive cough, hemoptysis, and dyspnea. Only 7% of patients have a history of asthma and 36% have eosinophilia.² The diagnosis is made by microscopic examination of the sputum smear and/or BAL. Metronidazole is the treatment of choice for L. blattarum infection.

Trichomonas vaginalis is a common sexually transmitted pathogen. Occasionally, it has been reported involving the respiratory tract of neonates and adults.⁴ In the majority of neonates, premature rupture of fetal membrane has been documented. There are only two adult cases with respiratory tract involvement by T. vaginalis. These patients had a history of orogenital contact.⁴ Most of these cases were successfully treated with metronidazole.

Thus, the respiratory involvement of parabasalids is extremely rare in adults. These patients have unique exposure risks to the organisms. The clinical presentation is relatively nonspecific. The diagnosis is solely made by identification of the organisms in the specimens from respiratory tract. The pulmonologists should have a high clinical suspicion of parabasalids infection in a proper clinical context.

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References