**Bronchopneumonia Caused by Propionibacterium acnes**

G. Claeys¹, G. Verschraegen¹, C. De Potter², C. Cuvelier², R. Pauwels³

*Propionibacterium acnes* was identified as the pathogen in a case of subacute lung infection by examination of an open lung biopsy specimen. The patient was a 65-year-old male with exacerbation of chronic lung disease. The organism was isolated in pure culture and was present in large numbers on Gram stain. Histological examination demonstrated active interstitial fibrosis; macrophages laden with *Propionibacterium acnes* antigen were revealed using a peroxidase-antiperoxidase stain. This is the first report of subacute infection of pulmonary tissue due to this organism.

*Propionibacterium acnes* is a major inhabitant of human sebaceous follicles and is known to play a role in the pathogenesis of acne (1). Since *Propionibacterium acnes* is often present in high numbers on skin and mucosa, it is difficult to assess whether it plays a pathological role when it is isolated from a clinical specimen. Focal infections of the central nervous system, eyes, endocardium and catheters in situ have been reported (2–8). We report a case of subacute infection of pulmonary tissue due to this organism. To the best of our knowledge this is the first case reported of such infection with *Propionibacterium acnes*.

**Case Report.** A routine chest radiograph in a 65-year-old man with chronic obstructive pulmonary disease (COPD) revealed a reticular nodular infiltrate. Chronic eosinophilic pneumonia was diagnosed. The patient used systemic corticoids on his own initiative but was asked to stop oral steroids. Seven months later the patient reported complaining of increasing dyspnoea and had production of mucoid sputum. There were no new infiltrates suggestive of pneumonia. An open lung biopsy revealed active interstitial fibrosis, superimposed on changes typical for COPD. Cultures of the biopsy specimen grew *Propionibacterium acnes*. The patient was cured by treatment with amoxicillin given for six weeks.

**Histological and Microbiological Investigations.** Examinations of sections of the lung parenchyma revealed a diffuse active interstitial pneumonia and the presence of young connective tissue and inflammatory cells in the interstitium. Prominent type II alveolar cells and an increase of the alveolar macrophages were observed. The inflammatory infiltrate of the interstitium consisted of lymphocytes and macrophages. The amount of collagen was slightly increased. However, areas of dense acellular interstitial scar tissue were not observed and few neutrophils were seen in the infiltrate (Figure 1). A tissue Gram stain (9) revealed numerous intracellular organisms in the macrophages. No acid-fast bacilli were observed.

Part of the biopsy was ground and inoculated on the following culture media: Tryptic Soy Agar supplemented with 5 % sheep blood and Gono-coccal Culture Agar supplemented with Isotivalex which were incubated in 5 % CO₂; Viane Levure Sang agar (VLS) which was incubated anaerobically; and Rosenow broth, thioglycolate broth, eosin methylene blue agar, mannitol salt agar and Sabouraud agar. For detection of mycobacteria we used Ogawa agar combined with the Bactec radiometric technique (BBL, USA), without decontamination pretreatment of the sample. Growth was observed only on the liquid media and on VLS after six days. Growth was more luxuriant after subculture and colonies were visible after overnight incubation. The organism was a pleomorphic gram-positive bacillus which showed enhanced growth under anaerobic conditions and production of catalase and indole. On the basis of these findings and the profile number (4002504) obtained in the API 20A system (bioMérieux, France), the isolate was identified as *Propionibacterium acnes*.

Polyclonal antibodies directed against the patient’s isolate were obtained by immunizing a rabbit subcutaneously with a formalin-killed suspension of the strain. The antibodies obtained were used in a classical peroxidase-antiperoxidase stain. Deparaffinized sections of the biopsy were immersed in methanol containing 0.03 % hydrogen peroxide, 5 % bovine serum albumin, rabbit anti-*Propionibacterium acnes* serum, goat anti-rabbit monoclonal antibodies, rabbit peroxidase complex and 3–3' diaminobenzidine with 0.01 % hydrogen peroxide, and rinsed in tap

¹Department of Bacteriology, ²Department of Pathology, and ³Department of Internal Medicine, University Hospital, De Pintelaan 185, 9000 Ghent, Belgium.
water. Control sections were prepared by omission of the primary antibody. The specificity of the serum was verified with 20 aerobic and 10 anaerobic bacteria belonging to different species. Using this stain the macrophages in the interstitial infiltrate stained intensively (Figure 2).

After exsanguination of the rabbit, several white nodes, each with a diameter of 1–3 cm, were observed around the injection site. Bacteriological examination of these nodes revealed numerous gram-positive rods on Gram stain which failed to grow on culture. Histological examination revealed granulomas surrounded by fibrous tissue and consisting mainly of epitheloid macrophages and Langhans giant cells, while only a few lymphocytes were observed. Numerous microorganisms were seen in the macrophages, which were positive in the immunoperoxidase stain.

Subcutaneous injection of living organisms in a rat also resulted in the formation of caseous nodes with a similar histological appearance. On culture of node samples Propionibacterium acnes grew in pure culture and in large numbers, colonies only growing after prolonged incubation, as was the case in our patient.

**Discussion.** Propionibacterium acnes, formerly known as Corynebacterium parvum (10), causes profound changes in the reticuloendothelial system (11, 12), and has been used as adjuvant therapy of tumors especially in animals but also in humans (11, 13). It can resist killing or persist undegraded in macrophages and tissue (14, 15). The highest resistance is observed in post-log phase cells or cells pretreated with tetracycline or chloramphenicol (16).

The bacterium is known to cause formation of granulomas in animals (12). This was confirmed in our animal experiments. Clinically Propionibacterium acnes resembles mycobacteria, but its intrinsic virulence is much lower.

Besides causing acute infections, cases of chronic meningitis, endophthalmitis, recurrent endocarditis and botryomycosis due to Propionibacterium acnes have been reported (2–8, 17, 18). Characteristic of these infections is the absence of systemic signs of infection such as leucocytosis or fever and a poor response to antibiotic treatment. On the basis of anecdotal reports, raised antibody levels and a higher prevalence of the microorganism in the tissue of patients than of controls, Propionibacterium acnes has been suggested to be the aetiological agent in Kawasaki disease (19, 20), sarcoidosis (21) and rheumatoid arthritis (22). Serological confirmation of this conjectured association is difficult because of the high prevalence of seropositivity in the general population (22). Bacteriological culture results are not reliable, especially when not carried out quantitatively, because of the frequent presence of Propionibacterium acnes on the skin and mucosa and because of the possible occurrence of small numbers of the organism in pathological or even normal tissue (21).

It can be concluded that Propionibacterium acnes was not a contaminant in our patient but represented a true cause of infection because the isolate was present in large numbers in a normally sterile sample. It is difficult to determine which features were due to invasion with the organism and which were due to the underlying condition.

Physiological abnormalities of the respiratory tract due to COPD and the use of corticosteroids were factors possibly promoting invasion of the isolate in our patient's lungs. We conjecture that