Chemotactic activity was high in 8/10 patients but not demonstrable in controls. When anti C5a antibody was added to patient BAL fluid a significant inhibition ($p<0.05$) of chemotactic activity occurred (fig. 2).

These data support those of FOURNIER *et al.* [2]. The study shows that acute response in HP is associated with an influx of neutrophils into the lungs, whilst the subacute and chronic responses are associated with lymphocytosis.

To characterize the nature of neutrophil chemotactic factors we investigated the role of complement using anti C5a. Results showed that antibodies toward complement can diminish, without abolishing, neutrophil chemotactic activity. These data agree with those of YOSHIZAWA *et al.* [3] in patients with acute summer-type HP and indicate that in BAL fluid of patients with acute HP there are several neutrophil chemotactic factors. Release of LTB4 from macrophages or of high molecular weight neutrophil chemotactic factor from mastocytes are possible sources of chemotactic activity. Release of a neutrophil-specific chemotactic factor from stimulated alveolar macrophages is an alternative mechanism.

The results indicate the importance of local humoral immune response in development of HP. Presence of C1q in BAL suggests the existence of a mechanism which activates the complement cascade by the classic pathway, probably immune complexes. MOORE *et al.* [4] reported that, after inhalation challenge with pigeon antigen, serum complements did not become depressed in symptomatic pigeon breeders. WENZEL *et al.* [5] found C3 in the cytoplasm of macrophages. SODA *et al.* [6] reported significant amounts of C1q and C3 in BAL from patients with HP. Our results show that both C1q and C3 are secreted or concentrated in the respiratory tract of HP patients. Some reports have indicated that alveolar macrophages produce C3 and epithelial cells C_1I.

We found a strong increase in IgG/albumin ratio levels and presence of specific precipitins suggesting local production. Immunocomplexes were detected in 75% of patients.

These findings support the hypothesis that immune complexes are involved in the pathogenesis of early phase human HP. Results of immunohistochemical studies on transbronchial biopsies have been reported previously [1, 7].

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Functional activities of human alveolar macrophages

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Human alveolar macrophages (HAMs) from healthy subjects and patients with lung diseases are studied. In 1985, HAMs from control smokers were found to have an acid phosphatase (AP) activity 4–5 fold higher than nonsmokers, whilst HAMs from sarcoid patients had a decreased AP activity. Preliminary data on phagocytosis and intracellular killing in various lung diseases are shown in table 1.

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In the acquired immune deficiency syndrome (AIDS) the HAMs showed a severe impairment of antimicrobial function, accounting for frequent lung involvement. The killing percentage of lung tumours, although not significantly different, is lower than controls as is in AIDS patients, supporting data recently reported from other authors.

In our experimental system, mean phagocytosis and killing do not change significantly for a staphyloccus: HAM ratio range between 10:1 and 50:1. However, our preliminary results suggest a possible

Table 1. – Preliminary data on HAM phagocytosis and killing of *Staphylococcus aureus* ATCC 6538

	Cases	Phagocytosis		Killing	
	n	%	p*	%	p*
Controls	6	33±12	NS	86±11	NS
Lung cancer	7	31±16	NS	76±15	NS
Untreated sarcoidosis	16	29±9	NS	81±10	NS
Treated sarcoidosis	14	30±16	NS	87±10	NS
AIDS	14	19±7	<0.002	74±12	<0.03

*: p value, examined group *vs* controls (t-test); HAM: human alveolar macrophages; NS: nonsignificant; AIDS: acquired immune deficiency syndrome.

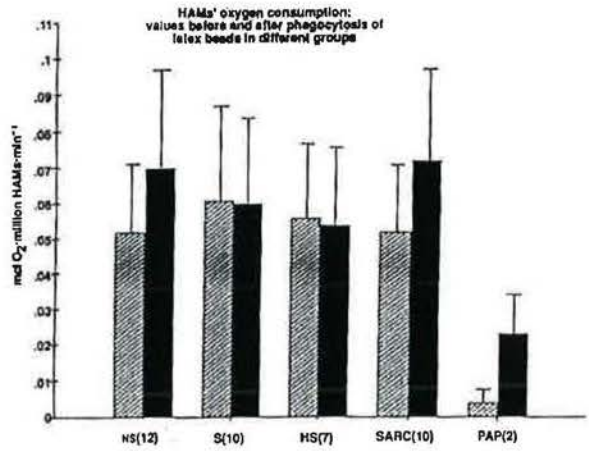

Fig. 1. – Oxygen consumption of human alveolar macrophages (HAMs): values before and after phagocytosis of latex beads in different groups. ▨: basal; ▬: latex; NS: nonsmokers; S: smokers; HS: heavy smokers; SARC: nonsmoker sarcoidosis; PAP: pulmonary alveolar proteinosis.

correlation between phagocytosis and killing. The percentage of intramacrophagic killing is almost constant, independent of the number of phagocytosed bacteria.

Many substances stimulate or depress phagocytosis and intracellular killing. We studied the effects of some antibiotic and anti-inflammatory agents [1, 2].

We also studied the oxygen consumption of HAMs in basal and stimulated conditions but we have only preliminary data due to difficulty in obtaining a sufficient number of HAMs from diagnostic BAL. It appeared that smokers (S) and heavy smokers (HS) had a basal oxygen consumption higher than nonsmokers (NS), although the differences were not significant (fig. 1). When latex beads were placed in contract with HAMs, the "respiratory burst" in nonsmokers was higher than in smokers (increase highly significant in NS, $p<0.001$; not significant in S and HS). HAMs from nonsmoking sarcoid patients (SARC) has the same basal oxygen consumption and "respiratory burst" as other nonsmokers. Finally, in two cases of pulmonary alveolar proteinosis (PAP) the basal HAM oxygen consumption was very low with a "respiratory burst" during phagocytosis increased about sixfold. This behaviour could have important pathogenetic and therapeutic implications.

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