Pneumocystis carinii Colonization in the Absence of Immunosuppression

Christine Armbruster, MD[1], Andreas Hassl, PhD[2], Stefan Kriwanek, MD[3]

[1] 2nd Medical Department, Pulmologisches Zentrum Vienna, Austria
[2] Clinical Institute of Hygiene, University of Vienna, Austria
[3] 1st Surgical Department, Krankenanstalt Rudolfstiftung, Vienna, Austria

AIMS:

A prospective study was undertaken to evaluate the incidence and the course of *Pneumocystis (P.) carinii* colonization in immunocompetent patients with severe pulmonary diseases. A further perspective was to determine the diagnostic values of different detection methods.

Materials and Methods:

Over a 18 month period in 1994/95 838 HIV-antibody negative patients with acute respiratory illness underwent bronchoscopy on an outpatient basis. Inclusion criteria were: normal immunological function, no immunosuppressive or cytotoxic therapy in case history and no specific therapy against *P. carinii*. 77 patients met these criteria of whom 44 were male. The mean age was 49.8 years (range: 22-87 years). They did not receive any cytotoxic drugs or corticosteroids before and after bronchoscopy. An informed consent was obtained after the nature of the procedure had been fully explained. Bronchoscopies, processing of the BALF samples, and P.carinii PCR were performed according to Armbruster et al.; Hopewell et al.; and Wakefield et al. (1,2,3). The samples were tested with a DIFT too (Cellabs Pty Ltd, Sydney, Australia). Smear staining and cultures were carried out for isolation and identification of bacteria and mycobacteria. Each patient underwent a chest roentgenogram (postero-anterior, lateral view), and an arterial blood gas measurement (AVL 947, AVL, Graz, Austria).

Measurements of immunological functions were done by blood cell count and flowcytometry (the cells were stained with fluorescein isothiocyanate and phycoerythrine, FACS Prep., Becton Dickinson, San José, CA) in peripheral blood and BALF. Kinetic nephelometry (ARRAY 360 system, Beckman Instruments Inc., Fullenton, CA) was performed also. The patients were followed up for a mean of 120.5 days (range: 4 - 845 days). They were evaluated biweekly by physical examination and arterial blood gas measurements. Mean values, medians, and standard deviations were calculated using SPSS 6.0.1 (Krankenanstalt Rudolfstiftung, Vienna, Austria).

Results:

In five of 77 HIV-antibody negative and immunocompetent patients a colonization with *P. carinii* could be proven by corresponding positive test results in DIFT and PCR. Diff-Quick was negative in all cases. The characteristics of the five P. carinii colonized patients are listed in Table I. During the mean 95 days of follow up none of the colonized patients developed clinical signs of PCP. The respiratory symtoms of the 77 patients did not meet the Centers of Disease Control (CDC) criteria for a presumptive PCP diagnosis (4) and they vanished during treatment of the underlying diseases, which are listed in Table II. The findings on chest roentgenograms, the results of the arterial blood gas analyses and the mean number of CD4+- and CD8+ T-lymphocytes are shown in Table III.

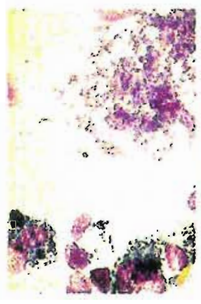

Figure 1: May Grünwald-Giemsa staining of *P. carinii* in a BALF sample according to Hopewell et al. (2)

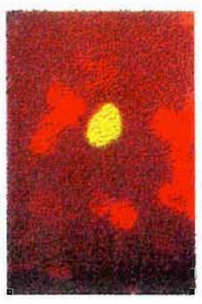

Figure 2: Direct immunofluorescence test of *P. carinii* in a BALF sample (DIFT; Cellabs Pty Ltd., Sydney, Australia)

Figure 3: Identification of *P. carinii* in a BALF sample by PCR according to Wakefield et al. (3)

Table I: Characteristics of the five patients with *P. carinii* colonization

No	sex	chest roentgenogram	$PaO_2/PaCO_2$ (kPa)	results of Diff-Quik	DIFT	PCR	CD4+/CD8+ cells/mm³	pulmonary disease	follow up in days/alive/outcome
1	m	bilateral consolidation	10.30/5.32	-	+	+	1600/660	tuberculosis	28/+/no PCP
2	f	bilateral consolidation	9.58/5.05	-	+	+	1390/600	bronchogenic carcinoma	155/+/no PCP
3	m	unilateral pleural effusion	10.50/4.12	-	+	+	850/300	pleuritis (Mycobacterium tuberculosis)	lost
4	f	unilateral consolidation	10.24/5.19	-	+	+	1510/520	tuberculosis	28/+/no PCP
5	m	unilateral consolidation	10.51/5.05	-	+	+	not done	bacterial pneumonia	5/+/no PCP

Table II: Underlying pulmonary diseases:

pulmonary disease	number (%)
lung edema[a]	12 (15.6)
Mycobacterium tuberculosis infection	20 (25.9)
Bacterial pneumonia[b]	13 (16.9)
Bronchogenic carcinoma	9 (11.7)
Acute bronchitis[c]	6 (7.8)
Bacterial pneumonia + pleural effusion	3 (3.9)
Others[d]	14 (18.2)

[a] lung edema was diagnosed by physical finding of foamy secretions
[b] bacterial pneumonia was diagnosed if pathogenic bacteria were isolated and identified by culture
[c] acute bronchitis was consistent with isolation of pathogenic bacteria in bronchial secretions and the physical appearance of the airways
[d] "Others" summarizes rather rare pulmonary diseases in this group of patients like atypical mycobacteriosis, lung fibrosis, alveolitis and malignant pleural effusions

Table III: Chest roentgenograms, blood gas analyses, CD4+/CD8+ cells; (n=77)

Chest roentgenograms

findings	number of cases (%)
unilateral consolidations	38 (49.3)
bilateral consolidations	20 (25.9)
interstitial patterns	10 (13.0)
unilateral plural effusions	8 (10.4)
pneumothorax	1 (1.3)

Blood gas analysis

mean PaO_2 (kPa)	10.57 ± 1.4
mean $PaCO_2$ (kPa)	4.93 ± 0.48
mean $P(A-a)O_2$ (kPa)	3.11 ± 1.3

CD4+/CD8+ cells, immunoglobulins, granulocytes

cell type	mean number (median number)
CD4+ cells/mm³	879 ± 446 (810)
CD8+ cells/mm³	553 ± 289 (530)

Normal values of immunoglobulins and granulocytes proved the relative competence of the immune systems of the patients.

Conclusions:

1. In contrast to immunocompromised patients highly sensitive detection methods have to be employed to identify immunocompetent colonized persons.
2. *P. carinii* is rarely found and it is not a pathogen in the lungs of immunocompetent individuals.
3. Colonization does not warrant specific therapy.

References:

1. Armbruster Ch, Pokieser L, Hassl A: Acta Cytol 39 1089-1093, 1995
2. Hopewell PHC, Luce MJ: Chest 87:104-112, 1985
3. Wakefield AE, Pixley FJ, Banerji S, Sinclair K, Miller RF, Moxon ER, Hopkin JM: Lancet 336:451-453, 1990
4. CDC:MMWR 41: RR17:1-19, 1992