Lymphocyte B and T cell subsets in peripheral blood from patients with asbestosis

Peng Liming, Wang Xun

Abstract

Peripheral blood lymphocytes were analysed by indirect staphylococcus protein A (SPA) rosette assay using monoclonal antibodies that identify B cells, total T cells (OKT3⁺), helper-inducer T cells (OKT4⁺), and suppressor-cytotoxic T cells (OKT8⁺). The purpose of this investigation was to determine the characteristics of lymphocyte B and T subsets in peripheral blood, and the relation of the changes to radiographic abnormalities in workers exposed to asbestos.

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Subjects and methods

SUBJECTS

Two groups of subjects were investigated. Both were from a factory using chrysotile. The first group consisted of 55 subjects (age range 41-73) whose exposure to asbestos ranged from 12 to 34 years. x Ray films were read and classified using the International Labour Office classification of radiographs for pneumoconioses. Three subgroups of workers were identified: those with equivocal films (0/1), or abnormal films (1/1 and 2/2). The control group consisted of 40 industrial workers with no known exposure to asbestos (age range 31-67). All workers smoked less than six cigarettes a day.

Department of Occupational Medicine, Chongqing Medical University, Chongqing, PO Box 119, China
L Peng, X Wang

Methods

Lymphocyte B and T subsets in peripheral blood were analysed using the indirect SPA rosette assay as described by Weitao *et al.*¹

Statistical analysis was performed using software for standard statistical methods (analysis of variance).

Results

Results are shown in the table.

Discussion

Several immunological derangements have been shown in persons exposed to asbestos. The most consistent findings are an increase in B cell lymphocyte activity with increased concentrations of various immunoglobulins and autoantibodies, and defective T cell activity manifested by weak or absent delayed cutaneous reactions to common antigens such as tuberculin protein. A decrease in T lymphocytes in the blood has been reported and both subsets (helper/inducer and suppressor/cytotoxic) seem to be affected.¹

Our data are in agreement with most previous investigations of populations exposed to asbestos;²⁻⁶ showing aberrations of cell mediated immunity (decreased T cell numbers) and hyperactive humoral immunity (increased percentages of B cells). Differentiation of T lymphocyte subgroups showed that as a group subjects with exposure to asbestos had decreased percentages of OKT3⁺ and OKT4⁺ cells and OKT4⁺/OKT8⁺ ratio and an increased percentage of OKT8⁺ cells compared with controls. Among radiographic subgroups, subjects with normal radiographs were similar to controls, but there

Characteristics of lymphocyte B and T subsets in peripheral blood of workers exposed to asbestos and normal controls

Study groups	No of subjects	Duration of exposure to asbestos (y)	TLC ($\times 10^9$)	B cells	OKT3 ⁺	OKT4 ⁺	OKT8 ⁺	OKT4 ⁺ /OKT8 ⁺
Controls	40	0	2.35 (0.40)	7.50 (1.10)	62.74 (4.40)	39.6 (3.9)	25.5 (3.7)	1.59 (0.32)
Total asbestos group	55	23.20 (5.60)	1.93 (0.61)**	12.30 (2.30)**	56.80 (5.10)**	35.6 (4.8)**	28.3 (4.4)**	1.29 (0.32)**
0/1 worker group	5	26.20 (4.76)	1.82 (0.52)*	11.70 (1.80)**	61.80 (2.90)	39.4 (4.8)	26.0 (2.6)	1.53 (0.27)
1/1 worker group	38	23.42 (5.33)	2.05 (0.64)*	12.90 (2.20)**	57.37 (4.90)**	36.3 (4.3)**	27.6 (4.4)**	1.36 (0.32)**
2/2 worker group	12	21.38 (6.72)	1.57 (0.26)**	12.20 (2.50)**	52.96 (3.90)**	31.4 (3.5)**	31.6 (3.4)**	1.00 (0.09)**

*p < 0.05; ** < 0.01.

Figures are given in percentages of mononuclear cells in peripheral blood; values are expressed as mean (SD). TLC = Total lymphocyte count.

seemed to be a progressive decrease in percentages of OKT3⁺ and OKT4⁺ cells and the OKT4⁺/OKT8⁺ ratio, and an increase in percentage of OKT8⁺ cells in those with radiographic abnormalities. Also, there were no significant differences between the various asbestos exposures.

As immunoregulatory disturbance usually results from changes in B and T cell numbers, especially in T cell subpopulations and the OKT4⁺/OKT8⁺ ratio, study of these changes may help to investigate the immunological pathogenesis of asbestosis. The analysis of T cell subsets as well as B and T cell numbers may have diagnostic and predictive value for the asbestos related diseases.

- 1 Weitao T, Shujun M, Dan X. Determination of T-cell subsets in the peripheral blood using both direct and indirect SPA rosette. *Journal of Beijing Medical University* 1987;19:439-40.
- 2 deShazo RD. Present concepts concerning the pathogenesis of asbestosis and silicosis. *J Allergy Clin Immunol* 1982;70:41-9.
- 3 Peng L. The relationship between CMI and silicosis or asbestosis. *Journal of Occupational Health and Pathological Damage* 1989;4:49-52.
- 4 Özemesi M, Hillerdal G, Karlsson-Porra A, *et al.* Phenotypes of peripheral blood lymphoid cells in patients with asbestos-related pleural lesions. *Eur Respir J* 1988;1:938-42.
- 5 Anton-Culver H, Culver BD, Kurosaki T, *et al.* Immune response in shipyard workers with x ray abnormalities consistent with asbestos exposure. *Br J Ind Med* 1988;45:464-8.
- 6 Costable U, Bross KJ, Huck E, *et al.* Lung and blood lymphocyte subsets in asbestosis and mixed dust pneumoconiosis. *Chest* 1987;91:110-12.

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Examples of common forms of references are:

- 1 International Steering Committee of Medical Editors. Uniform requirements for manuscripts submitted to biomedical journals. *Br Med J* 1979;1:532-5.
- 2 Soter NA, Wasserman SI, Austen KF. Cold urticaria: release into the circulation of histamine and eosino-phil chemotactic factor of anaphylaxis during cold challenge. *N Engl J Med* 1976;294:687-90.
- 3 Weinstein L, Swartz MN. Pathogenic properties of invading micro-organisms. In: Sodeman WA Jr, Sodeman WA, eds. *Pathologic physiology: mechanisms of disease*. Philadelphia: W B Saunders, 1974:457-72.