The Sequence of Symptoms, Sensitization and Bronchial Hyperresponsiveness in Early Occupational Asthma due to Platinum Salts

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Key Words

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Introduction

Methods

It is not known whether symptoms, sensitization or bronchial hyperresponsiveness are the most sensitive indicators of early occupational asthma. Prospective longitudinal studies in the workplace addressing this question gave inconclusive results [1-3]. The aim of this prospective study was to assess the sequence of symptoms, sensitization and bronchial hyperresponsiveness in workers occupationally exposed to platinum salts in a catalyst production plant in order to establish tools for a sensitive medical surveillance program.

During a 4-year period, 241 male employees of a catalyst production plant, among them 109 subjects with high exposure to platinum salts, were examined in a prospective longitudinal study. Subjects were investigated 6 and 12 months after the first examination, and then at intervals of 12 months. In the case of skin test conversion from negative to positive, intervals were chosen as at the beginning of the study. All subjects were transferred to other parts of the plant with no exposure (soluble platinum < 0.13 ng/m³) immediately after skin test conversion. Symptoms were recorded by a questionnaire. Skin prick tests were performed with hexachloroplatinic acid 0.01 mol/l (positivity criterion: ≥4mm wheal diameter). Total IgE was

measured with Phade-zym PRIST (Kabi-Pharmacia, Freiburg, Germany). FEV₁ was measured with a pneumotachograph (CustoVit, CustoMed, Munich, Germany). Bronchial hyperresponsiveness was assessed with histamine 8 mg/ml, administered in doubling doses from 1 to 63 cumulative breaths with a jet nebulizer (Inhalierboy, Pari, Starnberg, Germany). Bronchial responsiveness was expressed by the slope of a line extending from the origin of the dose-response curve to the last data point [4].

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Results

Discussion

Eight operators and one workman, previously without work-related symptoms, demonstrated a conversion from a negative to a positive skin test. At the time of skin test conversion, work-related symptoms were present in five subjects (shortness of breath in two), and an increase in bronchial responsiveness to histamine was demonstrated in two subjects. Two individuals showed a marked increase in total IgE, but for the whole group, total IgE did not show an increase after skin test conversion. FEV₁ was in the normal range in all subjects throughout the study.

During the follow-up period of 12 (range 6-24) months after removal, skin tests became negative or smaller in the eight operators, but were unchanged in the workman. Symptoms improved, but were still reported by two subjects (rhinitis by the workman, asthma by one operator). Bronchial responsiveness to histamine decreased in those subjects who had shown a clear increase at the time of skin test conversion.

The sequence of parameters in beginning occupational asthma due to platinum salts found in this study was: skin sensitization → symptoms → bronchial hyperresponsiveness. If this is applicable to other occupational allergens, the assessment of symptoms and, if available, immunological assessment should be the basic tools for medical surveillance programs. Serial assessments of bronchial hyperresponsiveness are probably less sensitive. If immunological assessment is not feasible, serial assessments of bronchial responsiveness to nonspecific stimuli should be considered. In the case of catalyst production workers and surveillance intervals of 1 year, the medical program was effective in preventing occupational asthma due to platinum salts.

References

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