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IS "HAY-FEVER" A CORRECT DESCRIPTION OF DISEASES CAUSED BY ALLERGIC REACTIONS TO POLLEN

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SUMMARY

"Hay fever" is the comprehensive term for allergic pollen reactions. In allergen challenge tests with extracts of rye pollen (*Secale cereale*) either by inhalation or oral ingestion it could be shown with the thrombopenic index by Storck that pollen allergy is not only a reaction of the affected organ e.g. the eyes, the nose or the bronchi but a systemic immunological reaction of the total organism. Therefore, it is concluded that the term "hay fever" better demonstrates these general reactions than the term "pollinosis". This should be included in the considerations of further research on allergic diseases.

1. INTRODUCTION

Since BOSTOCK (1819), BLACKLEY (1873) and PHOEBUS (1862) published their observations on the "catarrhus aestivus" and VON PIRQUET (1906) introduced the term "allergy", several investigations on this phenomenon have been published. The differences with regard to specific organ sensitization to pollen antigens like conjunctivitis, rhinitis or bronchial asthma could not be explained till today.

The local distribution of pollen, their concentration in the aeroplancton and the climatic and vegetation conditions of the different pollen producing plants are well known. Even their distribution over great distances and high altitudes has been studied (LINSKENS et al. 1986).

The biological and physico-chemical data of several pollen species and their allergens have been described in detail by STANLEY & LINSKENS (1985). In their monography STANLEY & LINSKENS came to the conclusion, that "hay fever" is the most exact term for "pollen-allergy", because the hypersensitivity reaction of the human organism following pollen exposition is a systemic reaction including different organs and not only the mucous membranes.

This conclusion was also reached by SCHATA et al. (1983), who described infertile periods of pollenallergic women during the pollen season and intact ovulation during the remaining of the year. This conforms the consideration that the allergic reaction is a general reaction of the human organism and for example influenced by the interaction with the endocrinium.

SCHADEWALDT (1980) reports that the term "hay fever" was introduced at about 1820 in the medical terminology as one of fifty different terms for this

disease. So STICKER (1906) wrote in his monograph: "It is unintelligible how the name 'hay fever' was all of a sudden so widespread in southern England in 1828 that Bostock assumed it as well-known."

Anglo-american authors still use the term "hay fever", whereas in european countries the term "pollen-allergy" or "pollinosis" is more common.

It was our intention to prove, whether the allergic reaction caused by pollen allergens could be shown as a general systemic answer of the organism.

JORDE et al. (1977) could show that oral ingestion of pollen allergen extracts induces bronchial asthma as well as inhalation of these extracts in patients with proven sensitization to these pollen. In the following years we tried to find out whether any regulars could be set up that persons with inhalative pollen allergen sensitization could also be challenged by oral ingestion of the actual allergen.

In the past years several authors discussed the problem of objectivation of the immunological systemic or organic reaction following the oral challenge test with different allergens. According to the report of STORCK (1983) we continued his studies about the transitory decrease in platelets – the "thrombopenic index" – as a systemic immunological reaction of the organism following an allergen challenge test either by inhalation or oral ingestion.

2. METHOD

20 patients (18 to 30 years old; 12 female and 8 male) suffering from pollen allergic symptoms as conjunctivitis, rhinitis and bronchial asthma due to a sensitization to grass pollen allergens, especially cultivated rye (*Secale cereale*) were challenged with a commercial allergen extract of rye pollen prepared for provocation tests in the usual allergen concentration.

The sample of the patients was randomised, so they started either with the inhalation of 1.0 ml of the extract and got the same amount to drink in the same concentration after one week. Patients starting with oral challenge continued with inhalation one week later. Before and 10, 20, 30, 60 and 120 minutes after the starting point of the challenge test the total airway resistence, an objective parameter of bronchial obstruction, was measured by bodyplethysmography at the same points of time when platelets in capillary blood samples were counted by an electronic thrombocounter.

All challenge tests were performed at 8.30 a.m. to get nearly standardized conditions. The study was performed in winter – during absolute pollen free season – and all patients were symptom free.

3. RESULTS

The mean values of the total airway resistance as measured by bodyplethymography and the number of platelets in the periphere blood in percentage of the number of platelets before the challenge test are shown in *figs. 1* and *2*. *Fig. 1* shows the data of the inhalation tests; a statistic significant increase of

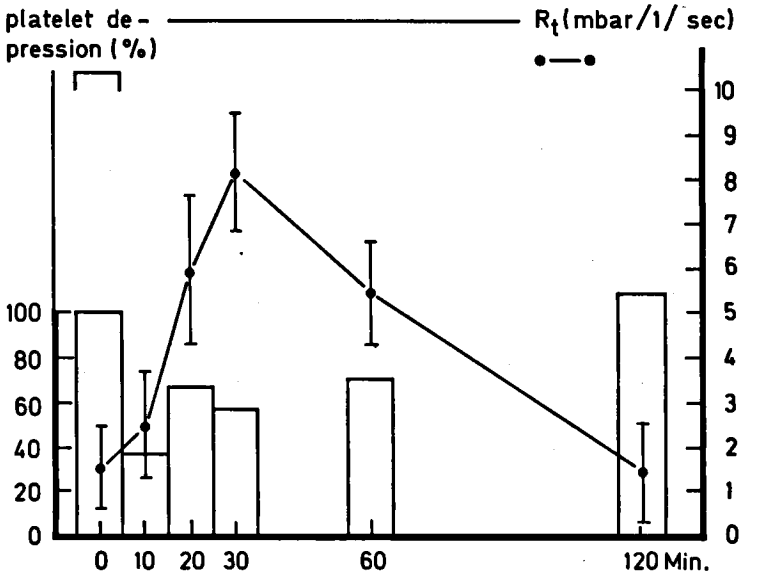

Fig. 1. Course of bronchial resistance (R_t = ●——●) and percentage of platelet count after inhala tion challenge with 1.0 ml allergen-extract of rye-pollen (*Secale cereale*).

the total airway resistance demonstrates the bronchial obstruction that all patients developed after inhalation. The significant decrease of the platelets over more than 20% also demonstrates the immunological systemic reactions of the organism.

In *fig. 2* the data of the patients with oral challenge tests are shown. It is demonstrated that 4 patients developed bronchial obstruction with a significant increase of the total airway resistance after the oral challenge test. Although 16 patients did not show a significant increase in total airway resistance, we found in all patients the significant decrease of the number of platelets in the capillary blood of more than 20%. All patients with a bronchial obstruction following the inhalation of the pollen extract also suffered from subjective symptoms. Only 5 of the patients with oral challenge test beside the 4 patients with bronchial obstruction showed subjective symptoms as nausea, fatigue, mental depression or migraine attack. In all cases these subjective symptoms were predicted by the greatest relative platelet decrease.

4. DISCUSSION

Two conclusions can be drawn from the reported results:

We could prove again that the transitory platelet decrease after allergen challenge tests as described by STORCK in 1983 is a highly specific and sensitive objec-

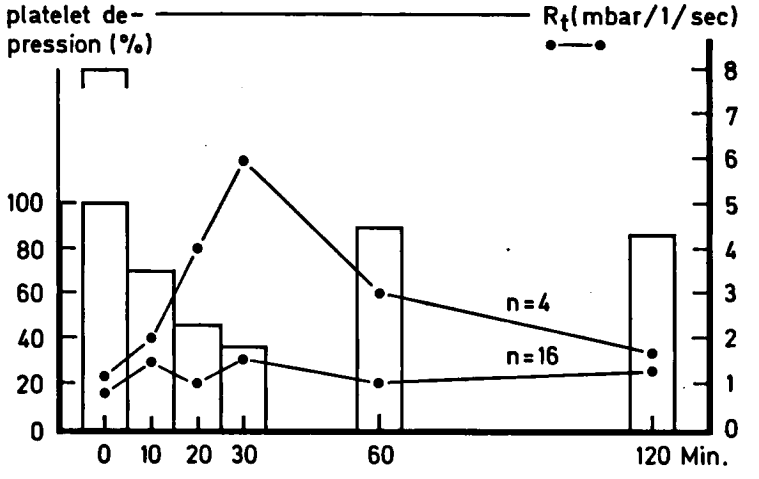

Fig. 2. Course of bronchial resistance (R_t = ●——●) and percentage of platelet count after oral challenge with 1.0 ml allergen-extract of rye-pollen (*Secale cereale*).

tivation of the immunological organ reaction, independent from the route of allergen invasion either by inhalation or by oral ingestion.

The second conclusion is that the platelet decrease after oral challenge without other objective or subjective symptoms also indicates a specific positive allergen challenge test and one needs lower concentrations of allergens to get positive results with this highly sensitive method. The results also put new accents in the objectivation of challenge tests and possibly solve the problems with different interpretations of the valuation of oral challenge tests by different authors. WORTMANN (1965) for example reports great success in oral hyposensitization with pollen allergen extract. LINSKENS (1974) demonstrated the persorption of whole pollen grains of *Secale cereale* and spores of *Lycopodium clavatum* after oral ingestion from the gastro-intestinal tract. SEIFERT (1976) could also demonstrate the resorption of immunogenic proteins from the gastro-intestinal tract. For the valuation of allergen challenge tests one has to postulate that not only the organ specific reactions are described and measured as far and exact as possible, but that the general systemic reaction of human organism has also to be observed. This could be objectivated for example by the platelet count in periphere capillary blood samples after allergen exposition.

In conclusion "hay fever" is the correct description of the diseases caused by allergy against pollen. Although the term "pollinosis" describes the actual allergen and includes the common knowledge about the typical symptoms as sneezing, eyes itching, bronchitis or bronchial asthma; it also tends to forget that pollen allergy is a immunological systemic reaction of the organism as our results show. In order to lead further research about allergic problems to a general view of the total human organism as the reacting system, one should point out the use of "hay fever" as the main term for the discussed diseases.

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