

# Rhino-Rheo-Manometric (R.R.M.) nasal provocation test

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## SUMMARY

*The nasal provocation test — which has been considered till now too much time-consuming and troublesome for the patient — becomes rapid and simple by the use of the rhino-rheo-manometry.*

*It is possible, by this method, to evaluate the conductance of a single nasal fossa and its reduction after allergen challenge.*

*The results of tests performed in patients suffering from extrinsic perennial nasal atopy by *Dermatophagoides pt.* have proved that the test becomes rapid and not troublesome by using the rhino-rheo-manometry. This method, giving a provocation threshold, may be used both in diagnosis and control of specific immunotherapy.*

THE reaction which follows the contact between the specific allergen and the nasal allergic mucosa is clinically quite similar to the patient spontaneous reaction. As referred in literature, one may use pollen or aqueous allergen extract to provoke the nasal crisis even with increasing dose, in order to find a provocation threshold.

The nasal provocation test is not widely used in practice being usually limited to patients with clashing dubious skin response and positive clinical story, or to study the effect of drugs on the nasal area.

Its limited use is due too to the fact that it is time-consuming and also troubles the patient who, very often, presents nasal disturbances requiring an immediate symptomatic therapy.

It is evident, on the other hand, that, if the provocation test was more simple and rapid and less troublesome for the patient, it would regularly be used for the diagnosis and for the control of the specific immunotherapy.

This paper reports the results obtained with the use of the rhino-rheo-manometry (R.R.M.) during provocation test. These results justify our actual systematic use of this method.

## MATERIALS AND METHODS

Fifty-five patients suffering from never treated nasal atopy caused by *Dermato-*

phagoides pt. (*D. pt.*) underwent the test. They were classified on the basis of the provoked skin response, by injecting into the dermis 0.02 ml. of commercial watery diagnostic extract (Lofarma, Milano). We deemed doubtful every response clashing with the clinical story, and every response without pseudopodes but with an average diameter at least 10 mm. wider than that of control. On the basis of intensity, on the contrary, positive responses were evaluated from 1 to 3 plus. Six perennial nasal atopic patients from *Parietaria off.* (*P.O.*) with negative response to *D. pt.* (*D. pt.*-negatives) underwent the nasal provocation test as control. The nasal challenges were followed by rhino-rheo-manometry (RRM) using an

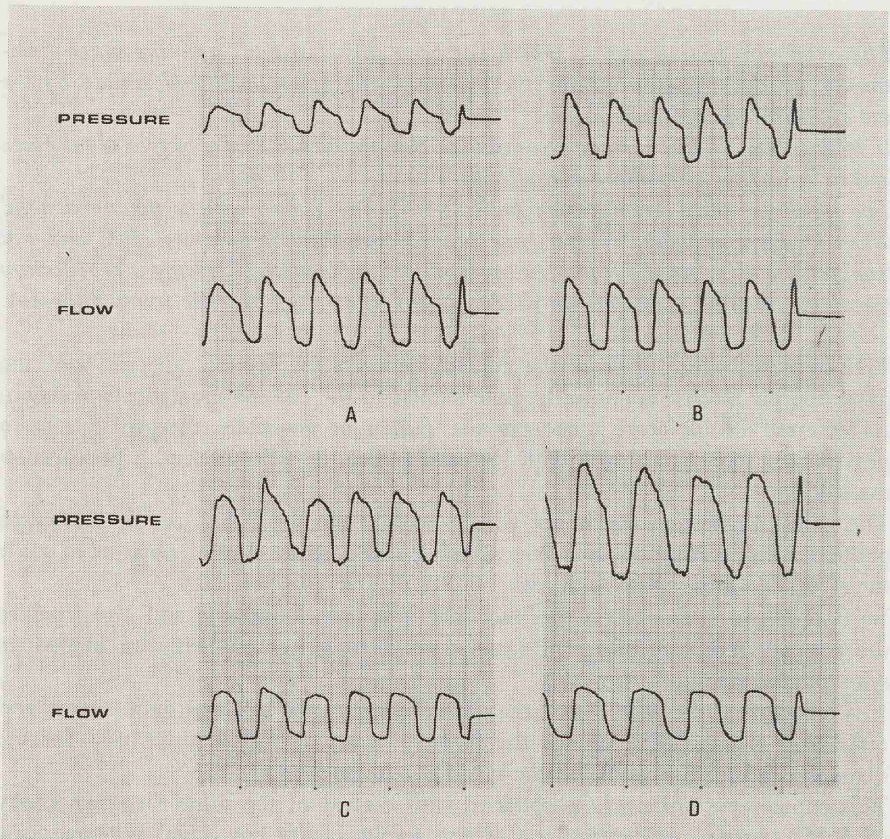


Figure 1. RRM provocation test in naso-sinusal atopy by *Dermatophagoides pt.* The basal value of the nasal conductance was calculated after spray of solvent only (A), and its reduction, following a challenge with 10 PNU (B), 50 PNU (C) and 100 PNU (D) of the specific allergen, resulted respectively 59.1%, 75.1% and 82.8%.

The provocation threshold may be considered the 10 PNU dose. This patient showed only a slight hyper-secretion after the 50 PNU dose and nasal itch after the 100 PNU dose. During the test the not challenged nasal fossa was shown only in few patients slight changes (increase or reduction of conductance).

always calibrated Cottle P.F. 2001 apparatus (I.C.S., Addison, Ill., U.S.A.). By this apparatus it is possible to evaluate, at the same time, the flow and the pressure of a single nasal fossa, therefore the nasal conductance:

$$C = \frac{\text{liters per minute}}{\text{mm H}_2\text{O}}$$

The apparatus has been equipped with time integrators of the tracings of the flow and the pressure and also with a memory device connected to a digital voltmeter which allows the direct reading of final values.

The more suitable nasal fossa for the test was chosen by a preliminary RRM. Then, ten minutes after spray of solvent, with a second RRM we have found the basal value of C. The first challenge was than done with 10 PNU of the specific allergen, followed after 10 min. by RRM and annotation of symptoms and rhinoscopic signs.

After about half an hour the second challenge was carried out and than the third followed by the respective controls.

## RESULTS

The RRM-recordings of a positive nasal provocation test are shown in fig. 1, A-D. The results of provocations test carried out in our patients are shown in Table 1.

TABLE 1  
RRM provocation test in 55 D.pt.-positive and 6 D.pt.-negative patients

Skin pos.	Nr tests + Nr exam.	Threshold		
		10	50 PNU	100
—	0/6	—	—	—
±	10/14	2	4	4
+	10/12	2	7	1
++	9/13	5	4	—
+++	12/16	3	7	2

We can observe, first of all, that all D. pt.-negative controls showed a negative nasal provocation test. Than it is to be pointed out the frequent positivity of nasal provocation in patients with dubious skin positivity ( $\pm$ ).

Among other things it is to stress that, among patients of this group only those with almost negative skin response clashing with the clinical story were negative, while on the contrary all patients with dubious skin response because devoid of pseudopodes, resulted to be positive in the nasal provocation test.

It is evident when examining D. pt.-positive patients with skin response from 2 to 3 plus that there is no relation between nasal provocation test positivity and skin response degree; on the contrary some of these patients with ++, +++ had a negative provocation test. We can explain all that not with a possible wrong interpretation because of considerable aspecific reactions, but, thinking of a possible non correspondence between skin and nasal mucosa, perhaps for an accumulation of blocking antibodies in the atopic district.

We observed different behaviours examining the positive responses to the nasal provocation test.

The basal C of the stimulated fossa has sometimes showed a rapid pronounced drop after one of the allergen doses, or an initial slight drop always followed, at the greater dose, by further reduction. Therefore the first drop of the basal C may clearly suggest a positivity of the test. Now we consider as valid the first reduction of the basal C only if dropping of 25%.

We were allowed by the results of our study to attribute to every patient with positive nasal provocation test a provocation threshold indicated by the allergen PNU dose reducing 25% minimum the basal C. We deem that the per cent global drop of the basal C may be another sign of the nasal mucosa responsiveness, because we could not find any evident change in tests repeated in a short time in the same patients.

On the basis of the behaviour of symptoms and signs recorded during the test we may conclude that RRM method is very sensitive showing clearly the nasal response without substantially troubling the patient.

Only 10% of patients suffered slight disturbances such as early nasal stenosis and some sneezes, following generally a reduction of nasal conductance under 60% of basal values. The persistence of those disturbances required a symptomatic therapy only in two patients with high nasal reaction after 10 PNU already.

#### CONCLUSION

Nasal provocation test, even if useful in diagnosis and control of the specific therapy, is not widely used because it is time-consuming and disturbs the patient. Using R.R.M. the provocation tests may be carried out in about 2 hours and without any important disturbance for the patient. The behaviour of nasal conductance gives the minimum individual provoking dose, that is a threshold expressed in allergen PNU. We hope that an evaluation in RAST units shall be realized in the future.

This threshold can be useful to control the effects of the specific immunotherapy. Another important data could be the mucosa responsiveness to the allergen specific provocation at the threshold dose.

#### RÉSUMÉ

L'épreuve de provocation nasale, considérée jusqu'aujourd'hui trop longue et plutôt désagréable pour le malade, devient rapide et simple si on utilise la rhino-rheomanométrie, par laquelle on peut calculer rapidement la conductance d'une seule fosse nasale, et sa réduction après stimulation spécifique.

Les résultats des épreuves de provocation nasale effectuées en cas de rhinopathie extrinsèque perenne par *Dermatophagoides pt.* ont démontré que la rhino-rheo-manométrie rend l'épreuve plus rapide (2 hs. environ) et pas désagréable pour la plupart des malades. L'épreuve, qui indique un seuil de provocation en PNU, peut être utilisée soit pour la diagnose soit pour un contrôle de l'immunothérapie spécifique.

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