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The classification of allergic rhinitis and its cytological correlate

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The nasal cytology pattern differs between mild and moderate/severe allergic rhinitis.

In clinical practice, most individuals with allergic rhinitis (AR) are managed by general practitioners, who refer to specialists only a small fraction of patients. The most relevant factor influencing such a decision seems to be the severity of AR itself (1). The Allergic Rhinitis and its Impact on Asthma (ARIA) document, published in 2001 and updated in 2008 (2), introduced a classification of AR based on its duration and severity. Thus, AR is classified as intermittent or persistent for duration and mild or moderate/severe for severity, according to the impact on daily activities. Usually, severity is more relevant than duration in choosing the treatment, because it partly correlates with the intensity of inflammation (3). Nonetheless, the relationship between the severity of AR and the underlying inflammation has not been specifically addressed. Thus, we studied such a relationship by nasal cytology, which is a simple diagnostic tool for identifying and quantifying nasal inflammation.

Patients with AR solely due to grass pollen and healthy subjects were evaluated. Diagnosis of AR was clinical, requiring the presence of the four typical symptoms only during the grass pollen season. Sensitization to grass was confirmed by prick tests with a panel of extracts (Stallergenes-Italy, Milan, Italy) including the allergen most common in the study region. Severity of AR was defined according to the ARIA classification being patients untreated (2). Healthy controls had no symptoms and negative skin prick tests. Nasal cytology was performed during the grass pollen season, being free of medications since at least 1 week. Scrapings were collected from the inferior turbinate, using a Rhino-probe (Arlington Scientific, Springville, UT, USA), transferred on a glass slide, air-dried, and stained by May–Grunwald–Giemsa (4). Fifty microscopic fields were read at 1000×, and cell count (neutrophils, eosinophils, mast cells, and lymphocytes) was expressed, per each type, as percentage of total leukocytes. Unpaired *t*-test was used for comparison.

Sixty-two patients (34 men, age range 18–56) and 18 healthy subjects (10 men, age range 18–57) were studied. Thirty patients were sensitized to other allergens, mainly mite, but they were symptom-free out of the grass pollen season. 67.8% of patients had intermittent AR (33.9% moderate/severe), and 32.2% had persistent AR (17.7% moderate/severe). Those patients with moderate/severe AR had significantly more mast cells and lymphocytes than those with mild AR, with a relatively smaller number of neutrophils and eosinophils (Table 1). Of note, mast cells and/or lymphocytes could be detected in only three of 30 patients with mild rhinitis (intermittent or persistent) and in 19 of 32 patients with moderate/severe rhinitis. No difference in cell counts was found when comparing intermittent and persistent AR (Table 1). Healthy subjects displayed only a negligible number of cells.

The ARIA guidelines were introduced to provide evidence-based recommendations for the diagnosis and management of AR. The grading of severity was one of the most relevant innovations although it is recognized that the two-class system can be improved (5). Currently, application of ARIA guidelines is not optimal, and possible interventions to improve the implementation have been suggested, including

Table 1 Cell count, as percentage of the total white cells (mean ± SD), according to duration and severity of rhinitis

	Intermittent + persistent		
	Mild (*N* = 30)	Moderate/severe (*N* = 32)	*P*
Neutrophils	88.1 ± 5.3	76.8 ± 10	0.046
Eosinophils	11.3 ± 6.2	13.8 ± 11	0.01
Mast cells	0.3 ± 1	5.8 ± 3.4	0.001
Lymphocytes/plasma cells	0.7 ± 1.3	3.1 ± 1	0.001
	Mild + moderate/severe		
	Intermittent (*N* = 42)	Persistent (*N* = 20)	
Neutrophils	82.1 ± 7.8	78.1 ± 15	NS
Eosinophils	13.6 ± 9.7	17.1 ± 9.8	NS
Mast cells	11.1 ± 8.6	10.7 ± 6.8	NS
Lymphocytes/plasma cells	5.6 ± 2.5	6.4 ± 3	NS

encouraging physicians and patients to understand how and why recommendations were made (6). Nasal cytology, which is cheap and easy to perform, could help the physicians, including general practitioners and allergists, in assessing the biological expression of AR in individual patients. In fact, the present study demonstrate that the ARIA classification of AR severity is truly associated with different patterns of inflammatory cells, because patients with moderate/severe AR display an increased number of mast cells/lymphocytes, and that the intermittent/persistent nature of the disease does not influence the cytological pattern. Indeed, a certain degree of correlation between inflammation and severity has been recently described by Liu et al. (7), who, nevertheless, studied only moderate/severe AR using nasal biopsies, which are not feasible in everyday practice, whereas nasal cytology can be proposed as an office procedure. Whether the choice of the treatment according not only to clinical severity but also to cytological findings may improve the adherence to guidelines should be evaluated in specific studies.

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Author contributions

All authors equally contributed in designing the study, analyzing the data, and preparing the manuscript. MG and NQ also performed the cytological analyses.

Conflict of interest

Dr Franco Frati is the Medical Director of Stallergenes Italia. Dr Cristoforo Incorvaia is a scientific consultant for Stallergenes Italia. There is no conflict of interest to declare for the remaining authors.

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