

Editorial

A tribute to Tiffeneau's original contribution in the current issue of the journal

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The late, distinguished first editor of the European Respiratory Journal, Dr Jean-Claude Yernault (1), presented a remarkable account of the achievements of the French physiologist Robert Tiffeneau (1910–1961) in the field of spirometry (2). Tiffeneau is indeed principally known for what is referred to as the 'Tiffeneau index,' according to the expression widely used in English-speaking countries (and sadly, rarely used in French-speaking countries), i.e. the ratio of FEV₁ over forced vital capacity (this is different from what was initially proposed by Tiffeneau as the 'capacité vitale en souplesse'). However, another important contribution made by Tiffeneau is less commonly acknowledged. Tiffeneau proposed that the reactivity of the airways to an inhaled allergen is conditioned by both the nonspecific reactivity of the bronchi and the level of immunological reactivity, as expressed in his 1958 original contribution in the following way: '...la sensibilité pulmonaire aux allergènes résulte: a) non seulement du degré de l'allergie pulmonaire qui régit la quantité de médiateurs bronchoconstrictifs libérés par l'apport allergénique, b) mais aussi du degré de la sensibilité pulmonaire aux agents bronchoconstrictifs (acétylcholine, histamine)' (3).

This relationship was revisited by Dr Frederick E. Hargreave and his pupil Dr Donald Cockcroft in a series of articles published from 1979 onwards in which they proposed prediction equations that were designed to set the concentration of an allergen that would cause an immediate fall in FEV₁ of 20% by using the concentration of the allergen that caused a 3-mm wheal on skin prick testing and methacholine PC20 (4–6). In the current issue of the journal (7), Quirce et al., who acknowledge Tiffeneau's contribution in the very first reference they

quote, extend these results to various allergens (cereals and enzymes) that cause baker's asthma, the most frequent cause of occupational asthma due to high-molecular-weight agents. By performing 42 specific inhalation challenges that caused immediate bronchoconstriction in 24 subjects with baker's asthma, the authors found a highly significant (r value close to 0.9) formula that accurately predicts the allergen PC20 by using the skin endpoint threshold concentration producing a 2-mm wheal diameter and methacholine PC20. Moreover, as derived from the proposed equation, Quirce et al. found that the degree of immunological reactivity by skin testing had more weight than methacholine PC20 in determining allergen PC20. This is in accordance with the findings by Lemièrre et al., who found that subjects with occupational asthma to various high-molecular-weight agents could still react even if their methacholine PC20 went back to normal after years of avoidance of exposure, those with the highest persisting IgE-mediated reactivity reacting at a lower dose (8). Therefore, the message is: both immunological reactivity and nonspecific bronchial reactivity influence the degree of specific bronchial reactivity to an allergen, but the latter is the principal determinant and still plays a role in the absence of increased nonspecific reactivity.

Besides enhancing the message from Tiffeneau's original contribution, the article by Quirce et al. is extremely helpful for centers that use or are considering using specific allergen challenges (still referred to as the 'gold standard') with baker's allergens in the investigation of occupational asthma. Using the regression equation proposed by Quirce et al. is likely to make these tests safer and more frequently used. Similar studies should be

carried out with occupational allergens that can reliably be used for skin testing, such as animal-derived allergens, platinum salts, latex, etc. Efforts should also be made to standardize these allergens and assess their allergenic

content. Furthermore, proposing quantification of the levels of specific IgE, not only skin prick testing, in the prediction equation should be considered.

References

1. Vermeire P, De Vuyst P. In memoriam Jean-Claude Yernault, 1943–2004. *Eur Respir J* 2005;**25**:1–2.
2. Yernault JC. The birth and development of the forced expiratory manoeuvre: a tribute to Robert Tiffeneau (1910–1961). *Eur Respir J* 1997;**10**:2704–2710.
3. Tiffeneau R. Hypersensibilité cholinergo-histaminique pulmonaire de l'asthmatique. Relation avec l'hypersensibilité allergénique pulmonaire. *Acta Allergol* 1958; Suppl. V:187–221.
4. Cockcroft DW, Ruffin RE, Frith PA, Cartier A, Juniper EF, Dolovich J, Hargreave FE. Determinants of allergen-induced asthma: dose of allergen, circulating IgE antibody concentration, and bronchial responsiveness to inhaled histamine. *Am Rev Respir Dis* 1979;**120**:1053–1058.
5. Cockcroft DW, Murdock KY, Kirby J, Hargreave F. Prediction of airway responsiveness to allergen from skin sensitivity to allergen and airway responsiveness to histamine. *Am Rev Respir Dis* 1987;**135**:264–267.
6. Cockcroft DW, Davis BE, Boulet LP, Deschesnes F, Gauvreau GM, O'Byrne PM, Watson RM. The links between allergen skin test sensitivity, airway responsiveness and airway response to allergen. *Allergy* 2005;**60**:56–59.
7. Quirce S, Fernandez-Nieto M, Escudero C, Cuesta J, de las Heras M, Sastre J. Bronchial responsiveness to bakery-derived allergens is strongly dependent on specific skin sensitivity. *Allergy* 2006;**61**:1202–1208.
8. Lemièrre C, Cartier A, Malo JL, Lehrer SB. Persistent specific bronchial reactivity to occupational agents in workers with normal nonspecific bronchial reactivity. *Am J Respir Crit Care Med* 2000;**162**:976–980.