Basophil activation test: do not lose control

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Basophils, as mastcells, represent the military arm of IgE-mediated immune response. Plasma cells-secreted IgE sensitize mast cells and basophils by binding to FcεRI. Subsequent exposure to the allergen leads to the activation of these cells by bridging/cross-linking of FcεRI receptors. The release of various mediators such as histamine, leukotrienes, prostaglandins and cytokines is responsible of cutaneous symptoms (e.g., urticaria or angioedema), respiratory symptoms (e.g., asthma), and in some cases anaphylaxis.

Basophil Activation Test (BAT) is an amazing “in vitro” method, able to simulate the encounter between basophils and the allergen and to assess the subsequent cellular activation by analysing the expression of activation markers on cell surface by flow cytometry. CD203c (a member of ectonucleotide pyrophosphatase/phosphodiesterase family) and CD63 (a protein associated with intracellular vesicles membranes) are the most reliable basophils activation markers presently available (1-3).

The test is performed using whole blood rather than isolated leukocytes, due both to the simpler and faster manipulation of the method, but also for the belief that leaving basophils in their natural environment ensures a better functionality (4).

Until ten years ago, BAT was used as a diagnostic method in drug allergy, with controversial results in terms of sensibility and specificity of different drugs evaluated.

During the last years, several scientists have shown the usefulness of BAT as a functional assay, able to analyse the cellular activation threshold toward an allergen. In this way, BAT has been used to monitor the development of tolerance in children with food allergy before oral challenges (5,6). Other data showed the usefulness of BAT in the evaluation of tolerance induction in venom-allergic patients treated with specific immunotherapy (SIT), in order to predict the outcome of SIT and clinical sensitivity of the patient (7).

In the light of this novel use of BAT in allergy diagnosis and monitoring, the paper by Pereira Santos et al. about “the expres-
basophil intrinsic reactivity into account. The best evaluation of specific allergen basophil activation is performed by applying the following formula: [allergen basophil activation (%) / anti-FcεRI (%)] x 100. This formula allows to relate BAT result after allergen stimulus with intrinsic basophil reactivity at the time when the test was performed, and to standardize the data. Clearly, a basophil activation of 45% after allergen stimulation in a patient showing a positive control of 50% has to be evaluated in a different way from the same percentage of activation if the same patient shows a positive control of 80% in another moment of his life.

In conclusion, BAT is a useful method to evaluate basophil reactivity and sensitivity to an allergen, and could be probably used as a biomarker in monitoring drug and/or SIT treatment in IgE-mediated diseases. However, even if you are struck by the charm of this test, remember… NOT TO LOSE CONTROL.

References