

## Introduction

Basophil activation test (BAT) is a real immunological reaction reproduced in vitro.

This test allows to study, in vitro the mechanism of hypersensitivity type I. It is developed to analyse and quantifie the activated basophils and their response to a specific allergen.

This assay uses flow cytometry to measure the expression of activation markers "CD203<sub>c</sub>" on the surface of basophils that are upregulated following the Cross-Linking of IgE receptor.

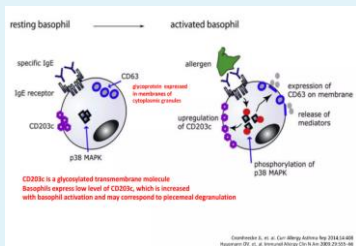


Fig 1 : Upregulation of basophil

In this study, two groups of basophils are identified ;

\*Resting basophils : are identified as CRTH<sub>2</sub><sup>+</sup> CD3<sup>-</sup> and CD203<sub>c</sub><sup>LOW</sup>

\*Activated basophils : are identified as CRTH<sub>2</sub><sup>+</sup> CD3<sup>-</sup> and CD203<sub>c</sub><sup>HIGH</sup>

## Objective

The major objective of our study is to apply BAT to evaluate the drug allergies using the flow cytometry technique

## Methodology

It is a prospective study carried out in the Immunology Department of Military Hospital of Instruction of Tunisia over a period from November 2022 to June 2024.

➔ For this test, heparinized blood was tested with injectable suspected drugs.

The doses of allergens inducing basophil activation can be extremely variable between individuals. For the same subject, the activation can be induced with different concentrations, however, in practice at least, three dilutions will be tested (1:100, 1:1000 and 1:10000).

Drugs have low molecular weight and are considered as monovalent that's why we have to add a carrier protein so they become bivalent and bind to IgE (the protein is Bovine Serum Albumin BSA).

It is also critical, to note that this test should be applied six weeks after the allergic reaction to ensure that the granule pool is optimal and the basophils are reconstituted.

➔ The result of each tested tube will be compared to controls; negative and positive

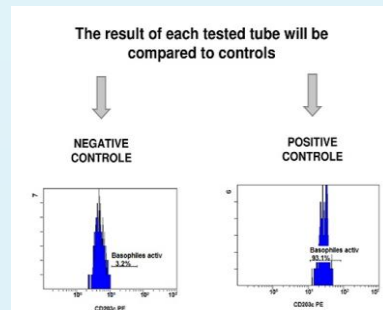


Fig 2 : Negative and Positive controls results

## Results

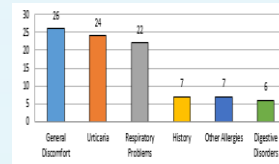


Fig 3 : Prevalence Of Observed Symptoms

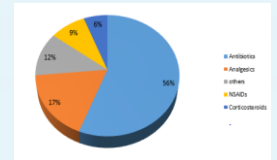


Fig 4 : Tested Drugs

In total, 35 tests were applied over a period of 19 months with 54.2% female and 42.8% male.

Almost the majority of patients had a general discomfort 74%. 68.5% of patients experienced urticaria reactions , 62.8% with respiratory problems and 17% with digestive disorder. Only 7% of patients had a history with drug allergies reaction.

The concerned molecules are ; Antibiotics (56%), Analgesics (17%), NSAIDs (9%), corticoids (6%) and other drugs were tested (12%).

➔ Regarding the results of BAT only 3 tests were positive ; NSAIDs (mefenamic acid 1%), Antibiotic (cefexime) and Iron chelators

Tab 1 : Summary Data For Positive BAT

	PATIENT A	PATIENT B	PATIENT C
Sexe	F	F	F
Age	16 years	37 years	18 years
Drug	NSAIDs	Antibiotic	Iron Chelators
Tested Molecule	Mefenamic acide 1%	Cefexime	Deferasirox
Time between allergy reaction and BAT	6 weeks	6 weeks	8 weeks
Mean of tested basophils	986	1125	1036
% CD203 <sub>c</sub> <sup>high</sup>	8.6%	8.1%	10.8%
Negative Control % CD203 <sub>c</sub> <sup>high</sup>	31.8%	15.7%	30.5%
Positive Control Maximum of activation	59.1%	55.5%	68%



Fig 5 : Basophils Response According to Tested Dilutions For Each Positive BAT

## Conclusion

Drug hypersensitivity reactions have become very common and are life-threatening issues.

BAT is considered a highly effective and specific tool for studying and identifying the main cause of drug allergies, which can be triggered by the active substance and/or excipients. In this study, we were able to apply BAT for the first time to diagnose drug allergies.