The basophil degranulation test (BDT) as an alternative to the prick test or CAP test for type I allergies

The basophil degranulation test (also known as basophil activation test [BAT] or CAST test) reproduces the allergic immediate type reaction in the test tube after addition of the suspected allergen to basophil granulocytes taken from the patient. The test thus resembles the reaction in the prick test but with the advantage of being independent of antihistamine ingestion, dermatographic urticaria and other factors that influence skin tests. There is also no risk of triggering anaphylaxis with an in vitro test.

The procedure involves the following steps:
1. Isolation of the basophil granulocytes from EDTA or heparin blood collected from the patient
2. Stimulation with the suspected allergen extracts, native materials or (new) recombinant allergen components
3. Measurement of the histamine-associated allergy mediators (leukotrienes) released in response with existing sensitisation
4. An increase in the leukotriene release > 200 pg/mL compared to baseline is considered evidence of an allergic sensitisation.

Advantages of the BDT
Unlike IgE detection in the CAP test, the test also detects basophil-bound allergen-specific IgE antibodies and is therefore very sensitive.

As a classic ‘in vitro provocation test’ the test is also suitable for the detection of immediate type hypersensitivity reactions not mediated by IgE (pseudoallergies/idiosyncrasies to some medications, work-place and environmental allergens, food additives and dyes).

Regarding sensitivity and specificity, the BDT has proven to be clearly superior in our laboratory compared to other in vitro provocation tests such as the histamine release test or the CD63 test.

Applications for the BDT test
Detection of IgE-mediated type I sensitisations:
1. To allergen extracts with negative or questionable specific IgE in the CAP test or prick test despite strong clinical suspicion.

The classic applications are:
- hymenoptera toxins (bees, wasps, hornets)
- house dust and flour mite allergens
- moulds
- animal dander (dog and cat hair)
- food
- α-amylase, latex, formaldehyde, etc.

2. To allergens that are not available for automated IgE measurement
- many medications (primarily NSAID)
- acrylates and other plastic components
- animal dander, yeasts, flour dust
- varnishes and resins, e.g., in the building industry
- latex gloves, disinfectants
- perfumes, solvents, biocides, etc.

The advantage of the BDT is that it can also be carried out on toxic and carcinogenic native materials because there is no contamination of the patient using this laboratory test. The native materials must be sent to the laboratory together with the blood sample.

3. To food dyes and food additives (17 substances in 4 screening groups, see reverse).

On the reverse you will find a list of the validated allergens available in the laboratory.
For allergens not listed an allergen sample (for medications tablet or ampoule and for other materials about 2 g or 0.5 ml of substance) must be sent together with the blood sample.

Materials required
For each allergen 2 ml fresh EDTA or heparin blood is required from the patient. The blood must not have been refrigerated and must arrive in the laboratory within 24 hours. The laboratory request is done using the request form ‘Special immunodiagnostics’ (Analysis 200) or on a referral form as ‘Basophil degranulation test for _________.

Do you have questions? Our serviceteam will be happy to support you: +49 (0)30 770 01-220.
The following allergens are always in stock as standard test allergens in the laboratory. For allergens not listed here, there is the option of sending in a sample which can be tested directly in the BDT (BDT special allergen).

### Medications
- **Antibiotics**
  - Amoxicillin
  - Ampicillin
  - Ceftazidime new
  - Cefadroxil new
  - Cefuroxime new
  - Cefloxacine
  - Cephalosporin C new
  - Clarithromycin new
  - Clavulanic acid new
  - Clindamycin new
  - Doxycycline new
  - Erythromycin new
  - Levofoxacin new
  - Maxilloxin new
  - Penicillin G
  - Penicillin V
  - Rifampicine new
  - Sulfamethoxazole new
  - Trimethoprim new
  - Tetracycline

- **Analgesics**
  - Aspirin/acetylsalicylicacid
  - Diclofenac
  - Ibuprofen
  - Indomethazin
  - Mefenamic acid new
  - Metamizole new
  - Paracetamol
  - Phenylobutazone new
  - Propyphenazone new

- **Local anaesthetics**
  - Articaine
  - Lidocaine
  - Mepivacaine new
  - Prilocaine
  - Ubatistine

- **Muscle relaxants**
  - Atracurium
  - Succinylcholine
  - Pancuronium new
  - Propofol new
  - Rocuronium new
  - Succamothion new
  - Vecuronium new

- **Beta-blocker**
  - Bisoprolol new
  - Atenolol new

- **ACE inhibitor**
  - Ramipril new

### Household allergens and animal epithelia
- **House dust and flour mites**
  - Acarus siro (d70)
  - Dermatoph. farin. (d2)
  - Dermatoph. pter. (d1)
  - Mite mixture contains house dust mites d1 and d2
  - Storage mite mixture contains Acarus siro d70, Glympahus domesticus (d73), laedophilus destructor (d74), Tyrophagus patens d72

- **Moulds**
  - Alternaria alternata
  - Aspergillus fumigatus
  - Aspergillus versicolor new
  - Botrytis cinerea
  - Candida albicans
  - Chaetomium globosum new
  - Cladosporum herbarum
  - Derstricum candium new
  - Malassezia pachydermatis new
  - Penicillium chrysogenum
  - Rhizopus nigricans
  - Trichophyton mentagrophytes
  - Stachybotrys spp.

- **Insects**
  - Anisakis new
  - Bee toxin (11)
  - Hornet toxin (175)
  - Paper wasp toxin (14)
  - Wasp toxin (13)

- **Animal epithelia**
  - Cat epithelium e1
  - Dog epithelium e2

- **Dental materials**
  - 2-hydroxyethyl metacrylate (HEMA)
  - Bisphenol A
  - BIS-HEMA
  - Butanediol-1,4-metacrylate (BDMA)
  - Camphorquinone
  - Diurethane dimethacrylate
  - Endoethane
  - Ethylene glycol dimethacrylate

- **Other**
  - Chlorhexidine
  - Methyl methacrylate (MMA)
  - N,N-dimethyl-4-toluidine
  - TEG-DMA

### Workplace allergens
- **Alpha amylase**
- **BTX**
- **Chlorpyrifs**
- **Dichlofluanid**
- **Formaldehyde**
- **Gutta-percha**
- **Tril(2-chloroethyl) phosphate**
- **Tril(2-butoxyethyl) phosphate**
- **Tril(2-ethylhexyl) phosphate**

### Food additives
- **Food colouring agent mixture I**
- **Food colouring agent mixture II**
- **Glutamate (glutamic acid)**
- **Cochineal red E124**
- **Benzoic acid**
- **Azorubine E122**
- **Amaranth E123**
- **Tartrazine**
- **Sodium nitrite**
- **Sodium metabisulphite, sodium salicylate**

### Grass pollens
- **Wheat**
- **Rye**
- **Barley**
- **Beta-lactoglobulin**
- **Brazil nuts**
- **Baker’s yeast**
- **Carp**
- **Cashew nuts new**
- **Casein (milk)**
- **Cauliflower**
- **Celery**
- **Chicken**
- **Cinnamon**
- **Cocoa beans**
- **Cod**
- **Coddish**
- **Coffee beans**
- **Coriander**
- **Corn**
- **Crayfish**
- **Duck**
- **Eel**
- **Egg yolks (chicken’s egg)**
- **Egg white (chicken’s egg)**
- **Garlic**
- **Gluten (gliadin)**
- **Goose**
- **Grapefruit**
- **Grapes Garlic**
- **Halibut**
- **Hazelnuts**
- **Herring**
- **Hops**
- **Kiwi fruit**
- **Lamb**
- **Lemon**
- **Lobster**
- **Mandarin**
- **Milk (cow’s milk)**
- **Miso**
- **Miso**
- **Noggin**
- **Peach**
- **Peanuts**
- **Pear**
- **Peas**
- **Pineapple**
- **Pistachios**
- **Pork**
- **Potaotes**
- **Prawns**
- **Oats**
- **Orange**
- **Rice**
- **Rye**
- **Salmon**
- **Sesame**
- **Soy**
- **Strawberries**
- **Tea (black)**
- **Tomatoes**
- **Turkey**
- **Vanilla**
- **Walnuts**
- **Wheat**

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