Hyperreactivity

Hyperreactivity to everyday irritants and stimuli may be IgE mediated (IgE allergy) or non-IgE (hyperreactivity). Distinguishing between the two types of hyperreactivity may influence the treatment strategy for a patient. Examples of hyperreactive diseases and their triggers are listed in Table 1.

Distribution of IgE allergy and non-IgE hyperreactivity

IgE allergy most frequently begins in early life and can last a lifetime. Non-IgE hyperreactivity tends to appear later in life (Figure 1). Hence, tests for IgE allergy tend to be most useful in children and young adults.

Hyperreactive diseases present differently according to age:

- In the neonate, dermatological symptoms and IgE-mediated conditions caused by foods are the most common.
- Later in childhood, airways symptoms appear (as a result of airborne allergens).
- In older children, symptoms from the airways prevail, with an increasing frequency up to the age of 10 to 15 years.
- In adults, hyperreactivity from the airways still constitutes the majority of allergic problems, but after the age of 30 an increasing number of patients experience skin reactions, non-IgE-mediated reactions from the airways, and non-specific symptoms from the connective tissue of the gastrointestinal tract, brain etc. Venom allergy most often appears in adults.

Tests used in the diagnosis of IgE-mediated allergy

Once evidence of hyperreactivity is established, allergy testing plays a significant role in the diagnosis of allergy (Table 2). It is important to note that an allergy test cannot have 100% specificity and sensitivity. Changing the cut-off level to improve one parameter will often worsen the other parameter. Hence, cut-off levels are set to maximise both sensitivity and specificity.

Total IgE

In the routine investigation of allergy, total IgE correlates poorly with symptoms of disease. Total IgE can be used as a guide to manage severe atopic dermatitis, but is not of use in allergic rhinitis and asthma. It can be used to assess patients with allergic bronchopulmonary aspergillosis. Elevated IgE can be seen in immunodeficiency as well as parasitic infections.

Allergen-specific IgE

Specific IgE may be determined from a range of allergens, using a non-isotopic variation of the radioallergosorbent test (RAST). The results are not affected by medications.

The sensitivity and specificity of RAST varies widely with the allergen being tested, with many published diagnostic cut-offs, though these may vary in different populations.

Hyperreactive diseases present differently at different ages:

- In children under 2 years of age, atopic dermatitis and food allergy are most common. Egg and peanut are the most common food allergens leading to disease at present.
- A variety of symptoms can start in the first 2 years of life, but typically manifest around 4 to 5 years of age with allergic rhinitis and/or asthma.
- Asthma presentation increases until the late teens, though new allergic disease after the teenage years is uncommon.
- In adult life, many new onset allergies cannot be demonstrated to have IgE as the cause. These are best termed sensitivities, as their pathologic basis is often uncertain.
- Venom allergy most commonly presents in adulthood, and reactions in those over 50 years of age may lack cutaneous features (e.g. isolated hypotension).

TABLE 1: Triggers of hyperreactive diseases

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>IgE allergy</th>
<th>Non-IgE hyperreactivity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Specific IgE triggers</td>
<td>Non-specific triggers</td>
</tr>
<tr>
<td>Anaphylaxis</td>
<td>Animal dander</td>
<td>Acetylsalicylic acid (Aspirin)</td>
</tr>
<tr>
<td>Asthma</td>
<td>Food allergens</td>
<td>Cold air</td>
</tr>
<tr>
<td>Conjunctivitis</td>
<td>Insect venom</td>
<td>Exercise</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>Mould spores</td>
<td>Pollution</td>
</tr>
<tr>
<td>disturbances</td>
<td>Pollen</td>
<td>Pressure</td>
</tr>
<tr>
<td>Rhinitis</td>
<td>Temperature</td>
<td>Strong odours</td>
</tr>
<tr>
<td>Urticaria</td>
<td>Water</td>
<td></td>
</tr>
</tbody>
</table>

TABLE 2: Testing for IgE-allergy

<table>
<thead>
<tr>
<th>Symptoms characteristic of IgE-allergy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questionnaire, case history, clinical history</td>
</tr>
</tbody>
</table>

Verify hyperreactivity

Hyperreactivity provocations, elevated eosinophil levels in blood or target organ. (If patient shows no reaction to hyperreactivity provocations, look for another disease.)

Search for allergens

Small scale (if skin prick test is not available): total IgE, specific IgE to allergen panels. Specialty scale: standard and additional skin prick tests; specific IgE, histamine release, environmental analysis, allergen provocation in target organ.

Positive allergy test (specific IgE)

Mild/Moderate/Severe IgE allergic hyperreactivity condition verified.

Negative allergy test (non-specific IgE)

Mild/Moderate/Severe non-IgE allergic hyperreactivity condition verified.
Testing for IgE allergy
For example: allergic rhinitis, atopic dermatitis, acute food reactions (< 2 hours)

- Allergen specific IgE (RAST®)
- Skin prick tests

<table>
<thead>
<tr>
<th>Symptoms suggestive of IgE-mediated allergy:</th>
</tr>
</thead>
<tbody>
<tr>
<td>wheeze, sneezing</td>
</tr>
<tr>
<td>acute urticaria</td>
</tr>
<tr>
<td>anaphylaxis</td>
</tr>
</tbody>
</table>

Search for allergens:
- Allergen specific IgE (RAST®)
- Skin prick tests

Is IgE disease considered highly likely clinically?

IgE allergy confirmed
- Allergen-specific IgE may give low positives which have little clinical meaning—clinical interpretation is essential.

Is IgE disease considered highly likely clinically?

Consider other mechanisms of disease
- Refer to Allergist/Immunologist for specialist investigation

RAST® Tests
Although RAST® tests are available for a range of allergens (see back page), Medicare Australia limits rebates based on the number, type and frequency of tests.

An extended RAST® panel can be performed for an additional fee.

Extended RAST® Food Panel

<table>
<thead>
<tr>
<th>Almond</th>
<th>Banana</th>
<th>Cashew</th>
<th>Codfish</th>
<th>Cow's milk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Egg white</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hazelnut</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Mango</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Peanut</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Rice</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sesame seed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Shrimp (prawn)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Soybean</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Walnut</td>
</tr>
</tbody>
</table>

Extended RAST® Inhalant Panel

<table>
<thead>
<tr>
<th>Acacia</th>
<th>Aspergillus</th>
<th>Bahia grass</th>
<th>Bermuda grass</th>
<th>Blomia tropicalis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cat dander</td>
<td>Cladosporium</td>
<td>Common ragweed</td>
<td>Dog dander</td>
</tr>
<tr>
<td></td>
<td>Eucalyptus</td>
<td>Horse dander</td>
<td>Johnson grass</td>
<td>Penicillium</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Perennial rye grass</td>
</tr>
</tbody>
</table>

Peanut RAST® Risk Assessment

Peanut RAST®
- Ara h2

This panel helps to determine the significance of positive peanut skin or RAST® tests, and is useful in determining who needs to be challenged and who is definitely allergic to peanut.

It is recommended that all peanut allergic children are reviewed by a specialist allergist, immunologist or paediatrician to determine if peanut allergy is present.

To order please request extended RAST® tests
- Extended Food RAST®
- Extended Inhalant RAST®
- Peanut RAST® Risk Assessment

Skin prick tests
Skin tests for a range of allergens (Table 3) are usually performed on the volar aspect of the forearm. Sullivan Nicolaides Pathology performs a standard panel for children (2 to 16 years), and one for adults. Antihistamines and neuropsychiatric medications, amongst others, may cause false negatives. Antihistamines should be avoided 4 days prior to testing.

As with RAST®, skin test sensitivity and specificity varies widely with the allergen.

Reference

Testing for medication, venom and latex allergy
Sullivan Nicolaides Pathology does not perform skin testing for medication, venom and latex allergies. Patients should be referred for specialist allergy/immunology advice.

TABLE 3: Skin prick test allergen panels

<table>
<thead>
<tr>
<th>Children 2–15 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Food</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Insect: Mite</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Pollen: Grass</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Control</td>
</tr>
<tr>
<td>Histamine, Negative</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adults</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal</td>
</tr>
<tr>
<td>Cat pelt</td>
</tr>
<tr>
<td>Dog dander</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Food</td>
</tr>
<tr>
<td>Cod fish, cow's milk</td>
</tr>
<tr>
<td>egg, peanut, prawn/</td>
</tr>
<tr>
<td>shrimp, soybean, wheat</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Insect: Mite</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Mould</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Pollen: Grass</td>
</tr>
<tr>
<td>Bahia grass, Plantain, Rye grass, Southern grasses (Bermuda, Johnson, Kentucky, Blue, Orchard, Red top, Sweet vernal, Timothy)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Pollen: Tree</td>
</tr>
<tr>
<td>Acacia, Eucalyptus, Pine mix (lodgepole, Western yellow)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Pollen: Weed</td>
</tr>
<tr>
<td>Ragweed mix (Giant, short)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Control</td>
</tr>
<tr>
<td>Histamine, Negative</td>
</tr>
</tbody>
</table>

Your Pathologist – Dr Daman Langguth FRACP FRCPA

At SNP, allergy testing is performed by members of a skilled and experienced team lead by Dr Daman Langguth.

Dr Langguth is a clinical pathologist who trained in rheumatology and immunology in Perth and Brisbane. His areas of expertise are auto-immune disease, allergy and immune deficiency.

Dr Langguth is committed to allergy research and is at present working on a project investigating Australian grass pollens, in particular the role of paspalum (Bahia grass) in allergic rhinitis.

He is also committed to maintaining and improving professional standards and guidelines in immunopathology and general pathology through membership of a number of state and national committees.

Dr Langguth is available for consultation.
T: 07 3377 8698  E: immunologist@snp.com.au
How much do allergy tests cost?
Medicare Australia provides limited rebates for allergy tests.

Skin Prick Tests
Skin prick tests are not bulk billed.

RAST* Tests
Standard Panels
Medicare Australia limits rebates for RAST tests to a maximum of 4 allergens per pathology request and a maximum of 4 RAST test episodes per year.
Bulk billing is available on request.
Extented RAST* panels are not bulk billed.

Where can I have my tests done?
Skin prick tests
Skin prick tests are only performed under medical supervision at the following centres.
Appointment required.

<table>
<thead>
<tr>
<th>Centre</th>
<th>Contact Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brisbane</td>
<td>P. (07) 3863 2714</td>
</tr>
<tr>
<td></td>
<td>Regional</td>
</tr>
<tr>
<td>Aspley</td>
<td>P. (07) 54597 1400</td>
</tr>
<tr>
<td>Capalaba</td>
<td>P. (07) 3245 9700</td>
</tr>
<tr>
<td>Ipswich</td>
<td>P. (07) 3282 8571</td>
</tr>
<tr>
<td>Sunnybank</td>
<td>P. (07) 3345 1648</td>
</tr>
<tr>
<td>Taringa</td>
<td>P. (07) 3331 3700</td>
</tr>
<tr>
<td>Buderim</td>
<td>P. (07) 4051 5922</td>
</tr>
<tr>
<td>Cairns</td>
<td>P. (07) 6622 4571</td>
</tr>
<tr>
<td>Lismore</td>
<td>P. (07) 5593 1155</td>
</tr>
<tr>
<td>Southport</td>
<td>P. (07) 5573 8881</td>
</tr>
</tbody>
</table>

RAST* Tests
RAST* tests are performed at all collection centres. Appointment required for children. See www.snp.com.au for collection centre locations.

Patient Brochures
Sullivan Nicolaides Pathology offers a range of brochures about allergies and testing of allergies.

Allergens and their diagnosis (Item 34106)
Inhalant Allergy – Extended RAST* (Item 34109)
Food Allergy – Extended RAST* (Item 34108)

RAST* Allergens – allergens in brackets are members of the same family and may cross-react in vitro.

Food
Almond (apple, apricot, blackberry, cherry, nectarine, peach, pear, plum, raspberry, strawberry)
Apple (pear, quince)
Avocado
Banana (cucumber, latex, melons, squash, zucchini)
Barley (gluten, maize, malt, millet seed, oat, rice, rye, sorghum, wheat)
Beef (fork)
Brazi nut
Cashew
Cheese (cheddar)
Chicken meat (duck, goose, turkey)
Chicken Pea
Chocolate/Cacao
Coconut
Codfish (anchovy, bass, carp, drum, haddock, herring, mackerel, mullet, perch, sardine, snapper, sole, trout, whitefish)
Coffee
Corn (barley, gluten, malt, millet seed, oat, rice, rye, sorghum, wheat)
Crab (cray, lobster, shrimp, squid)
Egg white (chicken, duck, goose, turkey)
Egg yolk (chicken, duck, goose, turkey)
Garlic
Gluten (barley, maize, malt, millet seed, oat, rice, rye, sorghum, wheat)
Hazelnut
Lamb
Lobster
Macadamia nut
Mango
Milk (cow)
Oat (barley, gluten, maize, malt, millet seed, oat, rice, rye, sorghum, wheat)
Omega-3 G-3linlin
Onion (cheese, garlic, leek)
Orange (cummquat, grapefruit, lemon, lime, tangerine)
Oyster
Papaya
Peanut (ArArah2)
Peanut (bean, carob, lentil, pea, senna, soybean, tomato)
Pineapple
Pistachio
Pork (beef)
Potato (cayenne, chilli, eggplant, green pepper, tomato)
Prawn (cray, crab, squid, lobster)
Rice (barley, gluten, maize, malt, millet seed, oat, rye, sorghum, wheat)
Rye (barley, gluten, maize, malt, millet seed, oat, rice, sorghum, wheat)
Salmon
Sesame seed
Soybean (bean, carob, lentil, pea, peanut, senna, tamarind)
Squid
Strawberry (almond, apple, apricot, blackberry, cherry, nectarine, peach, pear, plum, raspberry)
Tomato
Tuna
Walnut
Wheat
Yeast (Baker’s and Brewer’s)

Animals
Cat epithelium
Chicken feathers
Cow dander
Dog dander
Horse dander

Grasses
Bahia/Paspalum (buffalo, common millet, Kikuyu, pear, red natal, spinifex)
Couch/Bermuda (Indian millet, Rhodes)
Johnson/Sorghum (Blady, canary grass, cocksfoot, creeping fag, blue gram, June, meadow foxtail, Phalaris, quaking grass, shorthair, sweet vernal, tall fescue, Timothy, wild oat, winter, Yorkshire fag)
Perennial rye grass
Sweet vernal grass

Insects
Cockroach
Honey bee venem

House dust mite Dermatophagoides pteronyssinus
Paper wasp venem
Storage mite Blomia tropicalis

Moulds
Alternaria alternata
Aspergillus fumigatus
Candida albicans
Cladosporium herbarum
Penicillium notatum

Trees
Eucalyptus
Melaleuca
Acacia (Indian Sirus, Mimosa)

Weeds
Common ragweed (cocklebur, cosmos, dahlia, sunflower)

Miscellaneous
Alphagal
Amoxicillin
Ampicillin
Latex
Morphine
Penicilloyl G
Penicilloyl V

Mixes (only three mixes may be ordered at any one time)
Cereals – buckwheat, corn, oat, sesame seed, wheat
Animal – cat epithelium, cow dander, dog dander, horse dander
Feathers – chicken, duck, goose, turkey
Fruits – banana, peach, apple, orange
Grasses – Bahia, couch, Bermuda, Johnson, Kentucky Blue, perennial rye, Timothy
Meats – beef, chicken, pork, lamb
Mould – Alternaria alternata, Aspergillus fumigatus, Candida albicans, Cladosporium herbarum, Penicillium notatum
Nuts – almond, brazil, coconut, hazel nut, peanut
Seafood – blue mussel (abalone, clam, scallop), codfish, salmon, shrimp, tuna
Staple foods – codfish, egg white, milk, peanut, soybean, wheat
Trees – Acacia, Eucalyptus, Melaleuca, Olive, White Pine, Willow
Weeds – common ragweed, mugwort, English plantain, lamb’s quarters, Russian thistle

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A subsidiary of Sonic Healthcare Limited • ABN 24 004 196 909
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