Allergy and Related Testing
Allergy & Immunology Awareness Program

Prepared by:
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Allergy and Immunology
This book contains general medical information which cannot be applied safely to any individual case. Medical knowledge and practice can change rapidly. Therefore, this book should not be used as a substitute for professional medical advice.
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Allergic illnesses and conditions affect about 30% of the population in varying degrees of severity and in all forms such as food allergies, skin allergies (eczema), chest allergies (asthma), allergic rhinitis as well as drug allergies or insect sting/bite allergies.

Despite the differences in the presentation of these allergies, their mechanisms appear to be quite similar. As such, we found it to be our duty at the Allergy and Immunology Awareness Program (AIAP) to put together an Arabic/English booklet briefly explaining these mechanisms and the tests used in the diagnosing process including how to prepare for these laboratory tests, be it blood tests or testing performed on the body.

We have used several medical publications from international medical centers as references for this work.

We hope this booklet is sufficient to serve the intended purpose. Please reach out to us with your feedback at: Madeli@hamad.qa
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The public sometimes incorrectly uses the word allergy to refer to a disease or almost any unfavorable or adverse reaction. We frequently hear someone say, “I have allergies;”, “He’s allergic to hard work,” or “She’s allergic to everything that’s red.” In reality, allergies are reactions that are usually caused by an overactive immune system. These reactions can occur in a variety of organs in the body, resulting in diseases such as asthma, allergic rhinitis, and eczema.

Our immune system is made up of a number of different cells that come from organs throughout the body principally the bone marrow, the thymus gland, and a network of lymph nodes and tissue scattered throughout the body, including the spleen, gastrointestinal tract, tonsils, and the adenoid (an olive-shaped structure that is located at the top of the throat behind the nose).

The immune system protects the body against disease by singling out and destroying foreign invaders, such as viruses and bacteria. In an allergic reaction, the immune system overreacts by producing antibodies called Immunoglobulin E (IgE). These antibodies travel to cells that release chemicals, causing an allergic reaction against a normally harmless substance, such as pollen or animal dander. These allergy-provoking substances are called allergens. This reaction usually causes symptoms in the nose, lungs, throat, sinuses, ears, lining of the stomach or on the skin.

Each type of IgE has specific “radars” for each type of allergen. That’s why some people are only allergic to house dust mites for example (they would only have the IgE antibodies specific to house dust mites); while others experience allergic reactions to multiple allergens because they have many more types of IgE antibodies.

It is not yet fully understood why some substances trigger allergies and others do not, nor why some people have allergic reactions while others don’t. A family history of allergies is the single most important factor that puts you at risk of developing allergic disease.

Risk Factors:
Around a quarter of the population suffer from some form of allergic disease, and the number is increasing. Although allergies can develop at any age, they most commonly show up during childhood or early adulthood. A search of family medical histories of a child with allergies will usually turn up a close relative who also has allergies. If one parent, brother, or sister has allergies, there is a 25% chance that a child will also have allergies. The risk is much higher if both parents are allergic. But the child will not necessarily be allergic to the same substances as the parents or always show the same type of allergic disease (e.g., allergic rhinitis, asthma, eczema).

Symptoms Associated With Allergies:

**Eyes, Ears, Nose, Mouth**
- Red, teary, or itchy eyes
- Puffiness around the eyes
- Sneezing
- Runny nose
- Itchy nose, nose rubbing
- Postnasal drip
- Nasal swelling and congestion
- Itchy ear canals
- Itching of the mouth and throat

**Lungs**
- Hacking dry cough or cough that produces clear mucus
- Wheezing (noisy breathing)
- Feeling of tightness in the chest
- Low exercise tolerance
- Rapid breathing; shortness of breath
Skin
- Eczema (patches of an itchy, red skin rash)
- Hives (welts)

Intestines
- Cramps and intestinal discomfort
- Diarrhea
- Nausea or vomiting

Miscellaneous
- Headache
- Feelings of restlessness, irritability
- Excessive fatigue

Common Allergens
People get allergies from coming into contact with allergens. Allergens can be inhaled, eaten, or injected (from stings or medicine) or they can come into contact with the skin.

Some of the more common allergens are:
- Pollens from trees, grasses, and weeds
- Dust mites that live in bedding, carpeting, and other items that hold moisture
- Animal dander from furred animals such as cats, dogs, horses, and rabbits
- Some foods and medicines
- Venom from insect stings
- Molds, both indoor and outdoor

When to Suspect an Allergy:
Allergies can result in various types of conditions. Some are easy to identify by the pattern of symptoms that invariably follows exposure to a particular substance; others are more subtle and may masquerade as other conditions. Here are some common clues that should lead you to suspect you may have an allergy.

- Patches of bumps or itchy, red skin that won’t go away
- Development of hives—intensely itchy skin eruptions that usually last for a few hours and move from one part of the body to another.
- Repeated or chronic cold-like symptoms, such as a runny nose, nasal stuffiness, sneezing, and throat clearing, that last more than a week or two, or develop at about the same time every year.
- Nose rubbing, sniffing, snorting, sneezing, or dripping nose
- Itchy, runny eyes
- Itching or tingling sensations in the mouth and throat
- Coughing, wheezing, difficulty breathing, and other respiratory symptoms
- Unexplained bouts of diarrhea, abdominal cramps, and other intestinal symptoms.
# Common Allergic Conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Triggers</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaphylaxis</td>
<td>Foods, medicines, insect stings, latex, and others</td>
<td>Skin, gut, and breathing symptoms that may get worse quickly. Severe symptoms could include trouble breathing and poor blood circulation.</td>
</tr>
<tr>
<td>Asthma</td>
<td>Cigarette smoke, viral infections, pollen, dust mites, furry animals, cold air, changing weather conditions, exercise, airborne mold spores, and stress.</td>
<td>Coughing, wheezing, trouble breathing (especially during activities or exercise); chest tightness</td>
</tr>
<tr>
<td>Contact dermatitis</td>
<td>Skin contact with poison ivy or latex, household detergents and cleansers, or chemicals in some cosmetics, shampoos, skin medicines, perfumes, and jewelry</td>
<td>Itchy, red, raised patches that may blister if severe. Most patches are found at the areas of direct contact with the allergen</td>
</tr>
<tr>
<td>Eczema (atopic dermatitis)</td>
<td>Sometimes made worse by food allergies or coming in contact with allergens such as pollen, dust mites, and furry animals. May also be triggered by irritants, infections, or sweating.</td>
<td>A patchy, dry, red, itchy rash in the creases of the arms, legs, and neck. In infants it often starts on the cheeks, behind the ears, and on the chest, arms, and legs.</td>
</tr>
<tr>
<td>Food allergies</td>
<td>Any foods, but the most common are eggs, peanuts, milk, nuts, soy, fish, wheat, peas, and shellfish</td>
<td>Vomiting, diarrhea, hives, eczema, trouble breathing, and possibly a drop in blood pressure (shock)</td>
</tr>
<tr>
<td>Urticaria</td>
<td>Food allergies, viral and bacterial infections, medicines, autoimmunodiseases, and Sometimes the cause is unknown.</td>
<td>Itchy skin patches, bumps (large and small) commonly known as welts that are more red or pale than the surrounding skin. Hives may be found on different parts of the body and do not stay at the same spot for more than a few hours.</td>
</tr>
<tr>
<td>Insect sting allergy</td>
<td>Primarily aggressive stinging insects such as honey bee, wasps, and ants</td>
<td>Anaphylaxis</td>
</tr>
<tr>
<td>Medication allergy</td>
<td>Various types of medicines or vaccines</td>
<td>Itchy skin rashes, anaphylaxis</td>
</tr>
</tbody>
</table>
Allergic Sinusitis is another common allergic disease often triggered by allergic rhinitis. Sinusitis is a swelling of the sinuses, which are hollow cavities within the cheek bones around your eyes and behind your nose.

An allergist / immunologist, often referred to as an allergist, is best qualified to treat allergic diseases. To determine if you have an allergy, your allergist will take a thorough medical history and do a physical exam. He or she may perform allergy skin testing, or sometimes blood testing, to determine which substance is causing your allergy.

- Allergy symptoms are the result of a chain reaction that starts in your immune system.

- If you have a family history of allergies, you are at a much higher risk of developing allergic disease.

- The types of allergic diseases include allergic rhinitis, eczema, hives, asthma and food allergy.

- Food, medications, insect stings and or exposure to latex can trigger anaphylaxis, which is a serious allergic reaction that happens very quickly and in some instances may be fatal.

- If you (or anyone you are with) begins to have an allergic reaction, call for an ambulance immediately.

Best Management:
Identifying and avoiding the things you’re allergic to is the best management.

Allergy testing: When it is needed and when it is not
Allergy tests may help find allergies to things you eat, touch, or breathe in. They are usually skin or blood tests.

However, allergy tests alone are generally not enough. It is important to have a doctor’s exam and medical history first to help diagnose allergies. If the exam and medical history point to allergies, allergy tests may help find what you are allergic to. But if you don’t have symptoms and you haven’t had a medical exam that points to an allergy, you should think twice about allergy testing. Here’s why:

Allergy tests, without a doctor’s exam, usually are not reliable.
Many laboratories offer Allergy screenings. But the results of these tests may be misleading.

The tests may say you have an allergy when you do not. This is called a “false positive.”

Unreliable test results can lead to unnecessary changes in your lifestyle.
If the test says you are allergic to some foods, such as wheat, soy, eggs, or milk, you may stop eating those foods. You may end up with a poor diet, and unnecessary worries, frustration, or food costs. If the test claims you are allergic to horses for example, you may give up a beloved habit of riding them.

And tests for chronic hives—red, itchy, raised areas of the skin that last for more than six weeks—can show something that may not look normal but is not a problem. However, this can lead to anxiety, and a cycle of more tests.

The wrong test can be a waste of money.
Allergy tests can cost a lot. Your health insurance may not cover the costs of these tests. And without a doctor’s exam, the test may not even tell you what is causing your symptoms or how to treat it.

Are allergy tests safe?
Testing done by an allergist is generally safe and effective for adults and children of all ages.

The professionals who perform allergy tests including skin prick testing have emergency medicines and equipment standing by for the very rare occurrence of a serious reaction. They are trained in the reversal of these symptoms.

It is important that allergy testing is directed by a healthcare professional with sufficient allergy/immunology training and prompted by your medical history.
Types of Allergy Tests

1. IgE Skin Tests: This type of testing is the most common.
This test is called a skin prick test, also known as a puncture or scratch test, and it checks for immediate allergic reactions to as many as 40 different substances at once. This test is usually done to identify allergies to pollen, mold, pet dander, dust mites and foods.

It is a way of getting the suspected allergen into the body and in contact with cells of your immune system safely to see if they react to it.

How is the test done?
Suspected causes of allergy (such as pollens, danders, foods, etc) are mixed with liquid to make a solution. After cleaning the test site with alcohol, a drop of each solution is then placed on the skin. Up to 10 or 12 drops of different solutions may be placed on the skin. The skin is marked to show which liquid has been placed where. Then, the skin beneath each drop is pricked with a very thin needle. Just the very surface of the skin is pricked. However, this is enough to let a tiny amount of solution into the skin. A new needle is used for each allergen.

To see if your skin is reacting normally, two additional substances are scratched into your skin's surface:
- Histamine. In most people, this substance causes a skin response. If you don't react to histamine, your allergy skin test may not reveal an allergy even if you have one.
- Glycerin or saline. In most people, these substances don't cause any reaction. If you do react to glycerin or saline, you may have dermatographism. Test results will need to be interpreted cautiously to avoid a false allergy diagnosis.

The skin is then observed for a reaction. If a reaction occurs, it happens within 20-30 minutes.

- A reaction is considered to be 'positive' when the skin under a drop of solution becomes red and itchy. Also, a white, raised swelling called a weal (or wheal) surrounds the red central area of any skin reaction that may look like a mosquito bite. A nurse will then measure the bump's size.
- A weal takes about 15-20 minutes to reach a maximum size, and then
fades over a few hours. A reaction is considered to be 'negative' when the skin remains normal. This means that you are not allergic to the substance in the solution. After the nurse records the results, he or she will clean your skin with alcohol to remove the marks.

You generally won’t have any other symptoms besides the small hives where the tests were done, which go away within 30 minutes to a few hours, although they can persist for a day or two. Very rarely, allergy skin tests can produce a severe, immediate allergic reaction. If you develop a severe allergic reaction in the days after a skin test, call your doctor right away and/or visit the emergency room.

The accuracy of skin tests can vary. You may react differently to the same test performed at different times. Or you may react positively to a substance during a test but not react to it in everyday life. A correlation between your history of symptoms and the scratch test is essential.

Skin tests are best performed in the physician’s clinics to assure the test results are read properly and to minimize the risk of rare side effects as it has appropriate emergency equipment and medications.

Note: The size of the wheal does not relate to the severity of symptoms.
Skin Test contraindications and complications

Certain people would not be suitable for skin prick testing. This includes:

- Patients with severe skin disease. If conditions such as eczema or psoriasis affect large areas of skin on your arms and back – the usual testing sites – there may not be enough clear, uninvolved skin to undergo an effective test.
- Patients who are highly sensitive to suspected allergens. You may be so sensitive to certain substances that even the small amounts of them used in skin tests could trigger a severe allergic reaction (anaphylaxis).
- Pregnant women should not be tested.
- Patients with severe asthma. They can be tested but should have their asthma well under control before the visit, and should arrive with their blue inhaler (bronchodilator e.g.: Ventoline) for the visit.

- Patients on certain medications:

  Medications that can interfere with skin tests include:

  Antihistamines, such as Allegra, Aerius and Reactin, Claritin, Benadryl, Chlor-Trimeton, Zyrtec, and others

  Tricyclic antidepressants, such as amitriptyline, doxepin (Sinequan), and/or tryptaline

  Heartburn medications, in the class called H2 Blockers or the Histamine 2 Blockers such as cimetidine (Tagamet) and ranitidine (Zantac)

Bronchodilators (like salbutamol) for asthma do not affect the test. Short term low dose oral corticosteroids also have no effect.

You should not take (ANY) antihistamines 7 days before the test, as they may dampen any allergic response during the test. Talk to your healthcare provider if you have any questions.

Examples of anti-histamine containing medicines are:

- Clarinix
- Claritin
- Zyrtecs
- Allegra
- Fenistil
- Benadryl
- Atarax
- Histop
- Tricyclic anti-depressants
2. Skin injection test (Intradermal tests):
If your prick skin tests are negative but your physician still suspects you might have allergies, more sensitive “intradermal” tests may be used in which a small amount of allergen is injected within the skin (intradermal test). The injection site is examined after about 15 minutes for signs of an allergic reaction. Your doctor may recommend this test to check for an allergy to insect venom or penicillin. Intradermal tests are more sensitive than prick tests, and may be used when prick test results are inconclusive.

3. Blood Tests (Specific IgE in the blood):
This test involves drawing blood. The test measures the amount of IgE antibody in the blood. The body makes this type of antibody when trying to fight off allergy causing substances. Because the test is a blood test, the results may not be available as rapidly as skin tests. IgE blood tests are generally used when skin tests might be unsafe or won’t work, such as if you are taking certain medications, or have a skin condition that may interfere with skin testing, or if you have a long history of allergy symptoms.

The test results show whether you are making antibodies to certain allergens and thus whether you are sensitive to these allergens.

- An allergist has specialized training to perform and interpret allergy testing. Once you receive your test results, your allergist can work with you to develop a treatment plan to manage your allergies.
- Skin testing combined with a physical examination and medical history of your symptoms is the most reliable, cost-effective and rapid approach to determining what you are and are not allergic to.

What do the test results mean?
If the skin or blood test is negative for an allergen, then you probably do not have an allergy to that substance. If the test is positive for an allergen, it may mean you are allergic to that allergen. However, sometimes a test can be positive even if you are not allergic to it. The positive test result can be wrong sometimes because:

- You can sometimes continue to have a positive test result for many years to an allergy you have outgrown.
- You are allergic to a different substance that has some components similar to the allergen you were tested for. For example, you might have a positive test for soy if you have peanut allergy, or a positive test to wheat if you have a grass pollen allergy.

Test results are only one part of a larger picture that takes into account your medical history and current health. Sometimes a test needs to be repeated to check the first result. Talk to your healthcare provider about your results and ask questions.

What happens after the test?
An allergy specialist will interpret the results of the tests and suggest ways your allergy might be treated. Be sure to discuss your results with your healthcare provider and make sure you understand how best to care for your allergy symptoms.

4. Elimination diet:
For another check of possible food allergies, your healthcare provider may want you to avoid eating certain foods for a few weeks to see if allergy symptoms go away. During this time, you will need to keep a record of the foods that you eat and any symptoms you may experience. No foods or fluids may be consumed other than those specified. The diet is followed until all allergic symptoms are gone. Foods are then added back to the diet one at a time. If symptoms come back, you know which foods are safe to eat and which foods to avoid. This procedure must only be performed under medical supervision.

5. Oral Allergy Challenge / Oral Food challenges:
an oral allergen challenge may sometimes be required to confirm the diagnosis when the cause of a severe allergic reaction has not been confirmed. This will normally only be performed using foods or medications under the supervision of a clinical immunology or allergy specialist with appropriate resuscitation facilities readily available.

To check for food allergies, the patients are given gradually increasing amounts of a food/allergen while the provider watches for symptoms. This test should be done only by a trained professional who is ready to treat you if you encounter a severe allergic reaction.
How is patch testing done?
It is usually done in Dermatology clinics:

- On day one of testing, tiny amounts of up to 25 or more substances are applied as small patches to your skin. This is usually on your upper back. They are fixed on with non-allergic tape.
- After two days you return to the department and the patches are removed. The skin is examined to see if there is a reaction to any of the tested substances.
- After a further two days the skin is examined again in case you have a delayed reaction to any substance.

Which substances are tested?
There is a standard set of the most common substances which cause allergic contact dermatitis. These include: Metals, dyes, fragrances, chemicals, antibiotics like Neomycin, plants and sometimes foods. You may not recognize many of these, but they are common additives to ointments, clothes, leathers, and other everyday materials.

Also, if other allergens are suspected, your skin specialist may add in other patches, for example; chemicals found in your workplace, or your own cosmetics. You may be asked to bring in small samples of these things to be added to the set of patches. Remember, you can become allergic to something you have used many times before. For example, you can suddenly become allergic to a component in a favorite cosmetic which you have used many times before.

The test results
If you have a reaction to any of the substances, the physician will be able to tell you what it is, and what materials contain that substance.

What is allergic contact dermatitis?
This is a condition where you develop patches of inflammation on your skin (called dermatitis) when your skin reacts touching a specific substance. The patches of dermatitis are areas of skin which are itchy, red, and scaly.

They may also blister. The substance you react to is called an allergen. You are not born with this type of allergy – you must have previously come into contact with the allergen which has sensitized your immune system. Your skin then reacts with a rash when it comes into further contact.

Patch testing may help identify the exact cause. It is not an easy test to find every cause of dermatitis, but it often helps.
They will give you advice on how to avoid that substance. Avoiding the substance should prevent any further flare-ups of the rash. If no skin reaction occurs on patch testing then this can also be helpful to rule out allergic contact dermatitis as a cause of your skin problem.

7. **Lung Function Tests:**
Lung function tests (also called pulmonary function tests or PFTs).

The test checks how well the lungs work. The tests determine how much air the lungs can hold, how quickly air can move in and out of the lungs, and how well the lungs get oxygen into and remove carbon dioxide out of the blood. The tests can diagnose lung diseases, measure the severity of lung problems, and check to see how well treatment for a lung disease is working.

We will talk about the tests that are frequently used by the Allergist and Immunologists.
Spirometry is the first and most commonly used lung function test. It measures how much and how quickly the air can move out of the lungs. For this test, you breathe into a mouthpiece attached to a recording device (spirometer). The information collected by the spirometer may be printed out on a chart called a spirogram.

The most common lung function values are:

**Forced Vital Capacity (FVC).** This measures the amount of air you can exhale with force after you inhale as deeply as possible.

**Forced Expiratory Volume (FEV).** This measures the amount of air you can exhale with force in one breath. The amount of air you exhale may be measured at 1 second (FEV1), 2 seconds (FEV2), or 3 seconds (FEV3). FEV1 divided by FVC can also be determined.
Total Lung Capacity (TLC). This measures the amount of air in your lungs after you inhale as deeply as possible.

Functional Residual Capacity (FRC). This measures the amount of air in your lungs at the end of a normal exhaled breath.

Forced Expiratory Flow 25% to 75%. This measures the air flow halfway through an exhale.

Peak Expiratory Flow (PEF). This measures how much air you can exhale when you try your hardest. It is usually measured at the same time as your forced vital capacity (FVC).

Maximum Voluntary Ventilation (MVV). This measures the greatest amount of air you can breathe in and out during 1 minute.

Slow Vital Capacity (SVC). This measures the amount of air you can slowly exhale after you inhale as deeply as possible.
Not being able to follow instructions or make an effort during the tests.

**Residual Volume (RV).**
This measures the amount of air in your lungs after you have exhaled completely. It can be done by breathing in helium or nitrogen gas and seeing how much is exhaled.

**Expiratory Reserve Volume (ERV).**
This measures the difference between the amount of air in your lungs after a normal exhale (FRC) and the amount after you exhale with force (RV).

**Risks**
Lung function tests present little or no risk to a healthy person. Lung function tests are usually painless. You may cough or feel lightheaded after breathing in or out rapidly. You may find it uncomfortable to wear the nose clip. Breathing through the mouthpiece for a long period of time may be uncomfortable.

If you are given breathing medicine, it may cause you to shake or may make your heart beat faster. If you feel any chest pain or discomfort, tell the therapist right away.

If you have a serious heart or lung condition, discuss the possible risks with your doctor.

**Results**
The normal value ranges for lung function tests will be adjusted for your age, height, sex, and sometimes weight and race. Results are often expressed in terms of a percentage of the expected value. Most test results are available right away.

**Abnormal**
Test results are outside of the normal range for a person with healthy lungs. This may mean that some kind of lung disease is present. There are two main types of lung disease that can be found with lung function tests: obstructive and restrictive.

**Obstructive**
In obstructive lung conditions, the airways are narrowed, usually causing an increase in the time it takes to empty the lungs. Obstructive lung disease can be caused by conditions such as asthma.

FEV1 often increases after using medicine that expands the airways in people with reversible obstructive disease like asthma.

**Restrictive**
In restrictive lung conditions, there is a loss of lung tissue, a decrease in the lungs’ ability to expand, or a decrease in the lungs’ ability to transfer oxygen to the blood (or carbon dioxide out of the blood). Restrictive lung disease can be caused by conditions such, pulmonary fibrosis. Other restrictive conditions include some chest injuries, being very overweight (obesity), pregnancy, and loss of lung tissue due to surgery.

“Your doctor will talk to you about what it may be. With abnormal results, he may ask for more tests to be sure of what condition you may have to know how to treat you.”

**What Affects the Test**
Reasons you may not be able to have the test or why the results may not be helpful include:

- Using medicine, such as albuterol, that expands the lungs’ airways within 4 hours of the test.
- Using sedatives before the test.
- Eating food or drinks that contain caffeine before the test.
- Not being able to breathe normally because of pain.
- Pregnancy, obesity, or an enlarged stomach (after a large meal, for example).
Epilogue

We would like to thank you for giving us the opportunity to serve you. In our endeavor to improve our services, we would really appreciate to hear your feedback and opinion. We look forward to your continuous support and cooperation in achieving our goal which is helping you live a healthy life.

For any questions or suggestions, please contact us on email: madeli@hamad.qa

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