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Allergy Testing

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Introduction

Allergic rhinitis affects over 50 million Americans, and asthma affects approximately 20 to 30 million, which commonly has an allergic component.[1] Allergies are becoming more common in urbanized communities. As such, more primary care providers are providing or recommending allergy testing. The most common testing done by primary care physicians is serum IgE, as they are relatively easy to interpret and compare.[2] As physicians use more antibiotics, there is an increase in reported antibiotic allergies compared to years past. However, fewer than 10% of patients that believe they are allergic to penicillin actually have a true allergy.[3] To establish certainty, some are sending patients for allergy testing. An allergist will perform skin testing while others are using oral challenges. Oral challenges and skin testing are becoming more common with food allergies, as there has also been a significant increase in food allergies. There are four different varieties of allergy testing. In the primary care setting, easily obtainable IgE serum levels are the norm. Further testing is typically by specialists and includes, the classic skin prick test, intradermal testing, and patch testing.

Specimen Collection

Serum Testing

Serum IgE testing is obtainable by simple blood work; the clinician must specify each specific antibody for which they want testing. A suspected anaphylactic reaction to a drug requires the collection of two samples, with specific timing noted after the anaphylactic response, for mast cell tryptase.[3]

The other forms of allergy testing do not require specimen collections.

Procedures

Skin Prick Testing

Concentrations of 1 to 10 or 1 to 20 g/L of each allergen plus a positive and negative control is placed on the skin at least 2cm apart from each other. A specialized device is then used to scratch the skin and introduce the allergen below the outer layer of skin. The positive control is typically histamine dichloride 10g/L concentration, and the negative control is usually glycerinated saline histamine at the same concentration. Test reading occurs at 10 minutes for the controls and 15 to 20 minutes for the allergens.[2] In a sensitive individual, the mast cells in the skin bound to IgE will degranulate in response to the allergen, resulting in a wheal or hive at the site.[4]

Intradermal Testing

Each allergen is injected intradermally to make a wheal, similar to the placement of a tuberculin test. This test also uses positive and negative controls. If performing a skin prick test at the same time, the same controls can be used. A positive result is a wheal of a minimum 5mm, or any reaction larger than the negative control.

Patch Testing

A patch with the allergen is placed on the skin, usually the back, for 48 hours. The test is then read 15 to 60 minutes after removal of the patch.[1]

Indications

There are multiple indications for allergy testing; the most common causes are as follows, persistent asthma, suspected drug allergy, suspected insect allergy, suspected food allergy, seasonal rhinitis, rhinoconjunctivitis, and rhinitis with otitis media.[5] Intradermal skin tests are usually used for food allergies, although the IgE serum tests are becoming more popular, and for some foods can be more predictable. Intradermal testing is often more specific than skin prick and can be used after a negative skin prick to confirm, however, there is a higher risk of anaphylaxis. If performing an IgE test and there are unexpected results when considering the history, skin prick testing should be done to solidify the diagnosis of an allergy.[1] IgE serum testing is not reliable for suspected drug allergies.[3] Patch testing is usually used to confirm or diagnose allergic contact dermatitis.

Normal and Critical Findings

Skin Prick and Intradermal Testing

The positive control usually produces a 3mm wheal, however, if it does not, any allergen that is 3mm or larger would be considered positive.[1] There is a high sensitivity for food allergies, approximately 90%, but the specificity is about 50%. Therefore, skin prick testing should not be a screening tool for food allergies. For this reason, skin prick testing should not be used to screen for food allergies, because it can lead to unnecessary food restrictions in the diet.[2] When testing food allergies, milk and egg are the most common identified food allergies.[4] The results of the skin prick testing can be combined with the serum IgE results to make a more informed diagnosis. The results from skin and intradermal tests alone cannot be used to form a diagnosis; history must correlate. If after skin and serum testing, there is not a definite diagnosis, then allergen challenge may be appropriate.

Serum IgE Testing

High levels of IgE do not correlate with the severity of the reaction. The results of serum tests require analysis along the context of the patient's history and clinical exam, and diagnosis cannot be made strictly on IgE levels. Similarly, even with low levels, a patient can still at risk for anaphylaxis. A big advantage to IgE serum results is there is no subjectivity or potential for operator error, and the results can be compared and reviewed at later times.[2]

Patch Testing

The results need to be read by a trained technician. Wheat is the most common food allergy found by skin patch testing.[4]

Interfering Factors

Skin Prick Testing

Patients should stop taking the following medications; antihistamines 1 week prior, H2 blockers 48 hours prior, tricyclic antidepressants for up to 2 weeks prior, omalizumab 6 months earlier. Patients that have had an anaphylaxis episode within 30 days should not undergo skin prick testing because they can have false negative results.[1] Test results can be complicated by eczema and other skin conditions. [3] Furthermore, the allergen specimens can have different concentrations and can have varying degrees of reactions in testing.[5]

Serum IgE testing

High levels of antibodies do not always correlate with the severity of the allergies, or reactions. Antihistamines do not interfere with results, and the IgE levels do not undergo alteration by a recent allergic reaction.[2]

Skin Patch Testing

The results can be hard to differentiate between a true positive allergic reaction and a skin irritant.[1] Since the mechanism of the allergic reaction is different, there is no interference of the results with antihistamine treatment.

Complications

Anaphylaxis is a potential complication for any allergy testing involving the introduction of an allergen to the patient. With that in mind, however, intradermal testing has a higher risk of systemic reactions than skin prick testing.[1]

Patient Safety and Education

Skin Prick Testing

Patients with uncontrolled asthma, reduced lung function, atopic dermatitis, acute or chronic urticaria, dermographism, active angina, cardiac arrhythmias, elderly, pregnant women, and those not in good overall health, are more likely to have adverse effects, and/or difficulty with the treatment of adverse effects. They are not at a higher risk of anaphylaxis.^[1] As such, this population may fare better with serum IgE testing instead.

Clinical Significance

Allergy testing can prevent serious medical emergencies for patients. It can also predict potential non-life-threatening reactions for patients. Knowing the allergy profile in patients with other confounding medical problems can decrease further medical complications, and decrease office and hospital visits. In particular, allergy-induced asthmatics can recognize the triggers and can know when to avoid them and when they are at higher risks for asthma exacerbations. Being able to exert some control can help them manage their asthma more appropriately at home. By doing this, they can potentially decrease their medication use, office visits, hospital visits, and improve their overall health and well being.

Questions

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References

1. Tourlas K, Burman D. Allergy Testing. Prim. Care. 2016 Sep;43(3):363-74. [PubMed: 27545728]
2. National Clinical Guideline Centre (UK). Drug Allergy: Diagnosis and Management of Drug Allergy in Adults, Children and Young People. National Institute for Health and Care Excellence (UK); London: Sep, 2014. [PubMed: 25340226]
3. Kulis M, Wright BL, Jones SM, Burks AW. Diagnosis, management, and investigational therapies for food allergies. Gastroenterology. 2015 May;148(6):1132-42. [PMC free article: PMC4793977] [PubMed: 25633563]
4. Önell A, Whiteman A, Nordlund B, Baldracchini F, Mazzoleni G, Hedlin G, Grönlund H, Konradsen JR. Allergy testing in children with persistent asthma: comparison of four diagnostic methods. Allergy. 2017 Apr;72(4):590-597. [PubMed: 27638292]
5. Anyane-Yeboa A, Wang W, Kavitt RT. The Role of Allergy Testing in Eosinophilic Esophagitis. Gastroenterol Hepatol (N Y). 2018 Aug;14(8):463-469. [PMC free article: PMC6170891] [PubMed: 30302061]

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