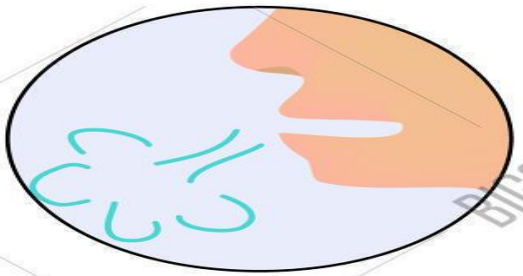
- **Dental management of Medically Compromised Patients**
- **Allergy**
- Allergy is an abnormal or hypersensitive response of the immune system to a substance introduced into the body. account for about 6% to 10% of all adverse drug reactions.
- **Aetiology and pathophysiology**
- Allergic diseases comprise a series of repeated reactions to a foreign substance, involving (1) immunologic hypersensitivity and elements of the.
- (2) nonspecific
- (3) specific (A-humoral, B-cellular) branches of the immune system. The initial function of the **humoral** and **cellular** branches of the immune system ❼ **recognition** of antigens; however, cells **and** chemicals from the *nonspecific* branch of the immune system ❼ act to *eradicate* antigens.

A-Humoral Immune System. B lymphocytes recognize specific foreign chemical (by the help of T lymphocytes and macrophages) ❼ transforms into plasma cell ❼ produces immunoglobulins (antibodies) specific for the antigen involved. Type I, type II, and type III hypersensitivity reactions involve elements of the humoral immune system.

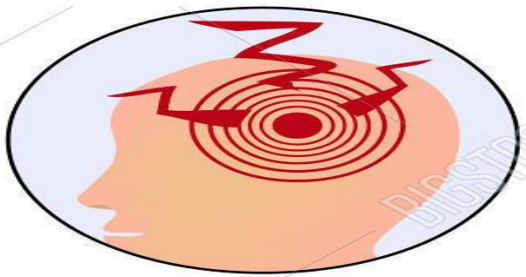
Type I hypersensitivity Is IgE-mediated hypersensitivity. This may be caused by food substances (e.g., shellfish, nuts, eggs, milk), **antibiotics**, and insect bites❼elease of chemical mediators from mast cells and basophils. Occur (usually) soon after **second contact** with an antigen. Include the following **types;**



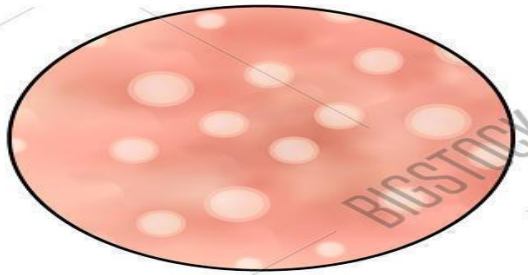
Allergy Symptoms



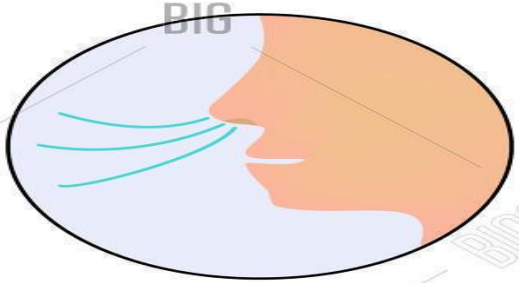
COUGH



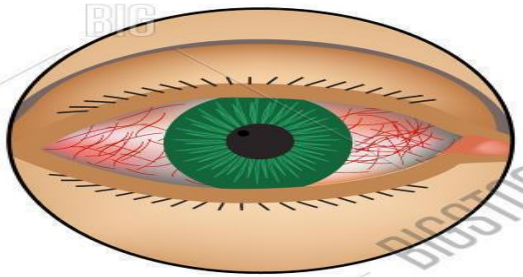
HEADACHE



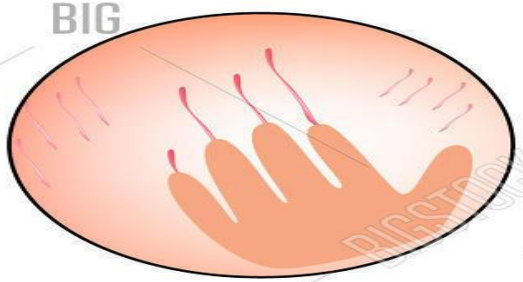
SKIN RASH



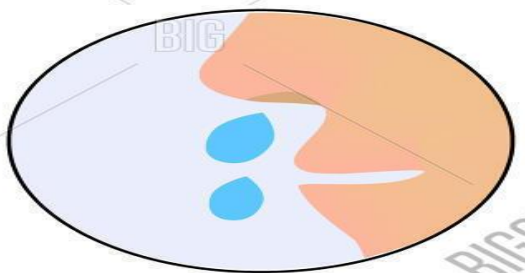
SNEEZING



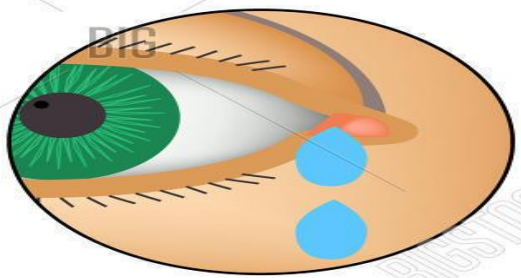
EYE REDNESS



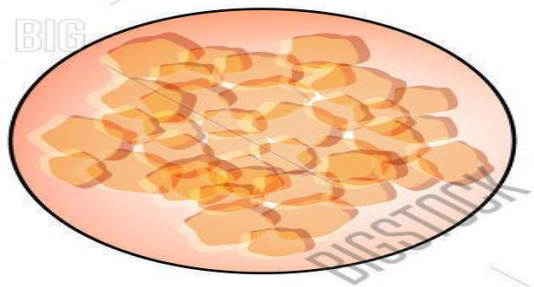
ITCHY SKIN



RUNNY NOSE



LACRIMATION FROM THE EYES



BURNING AND DRY SKIN

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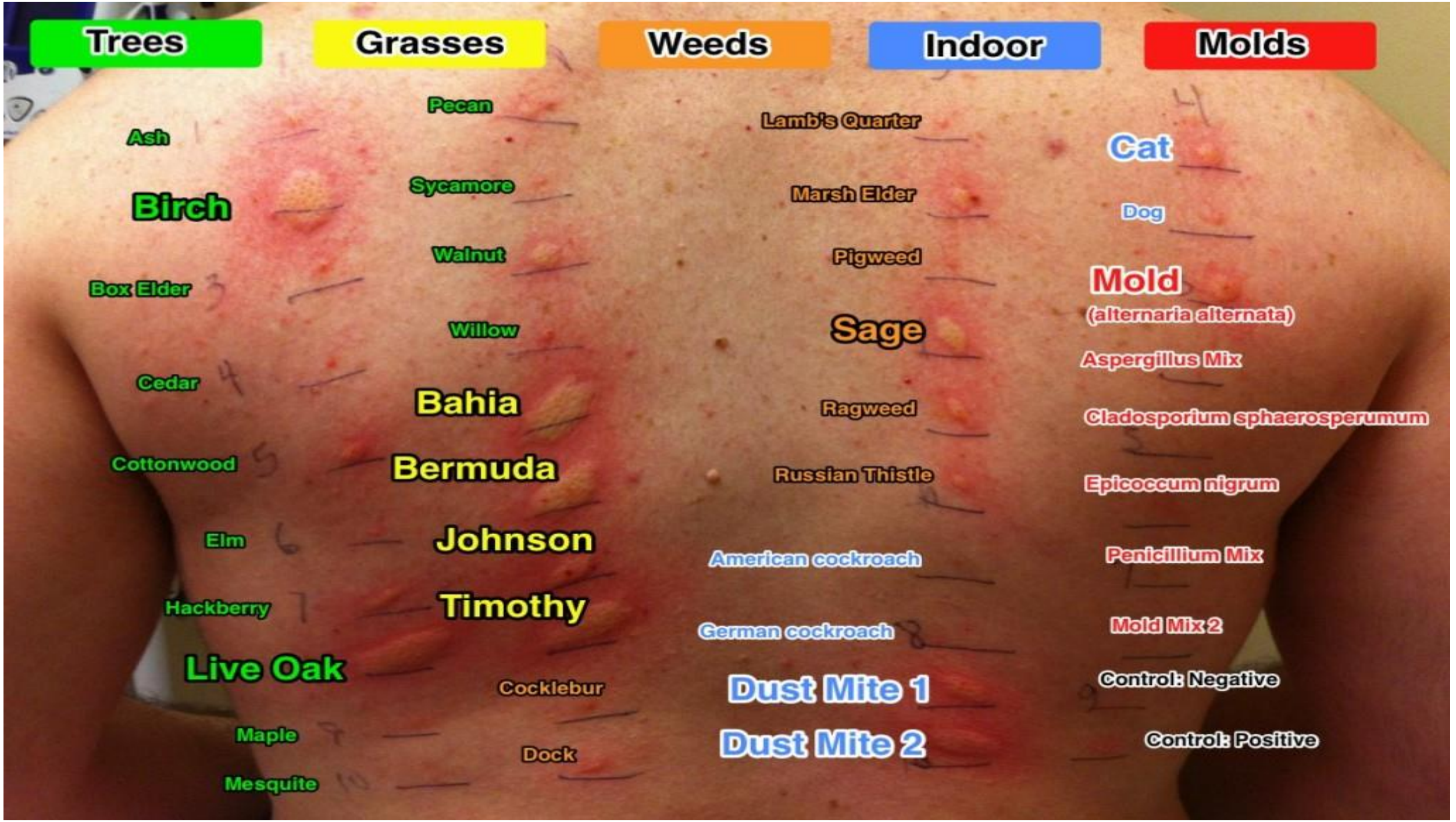
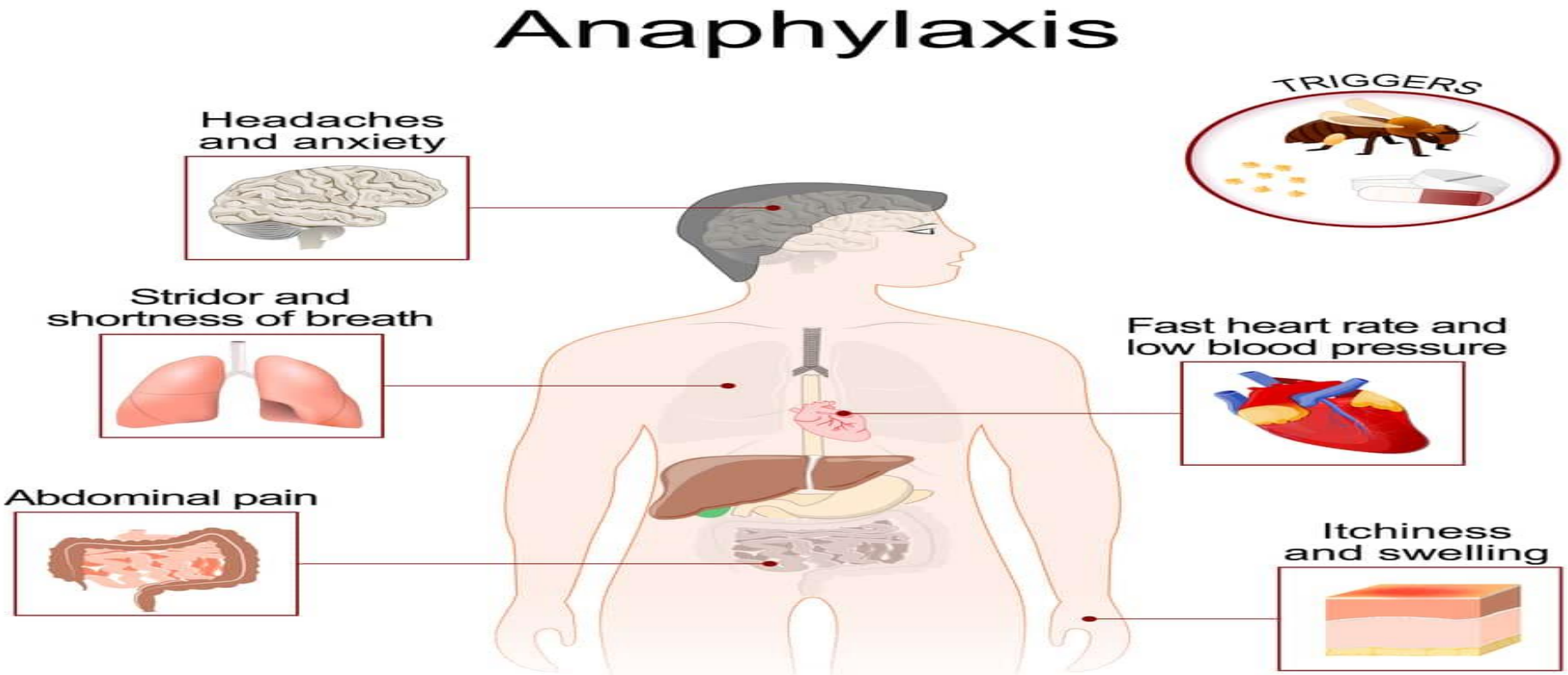
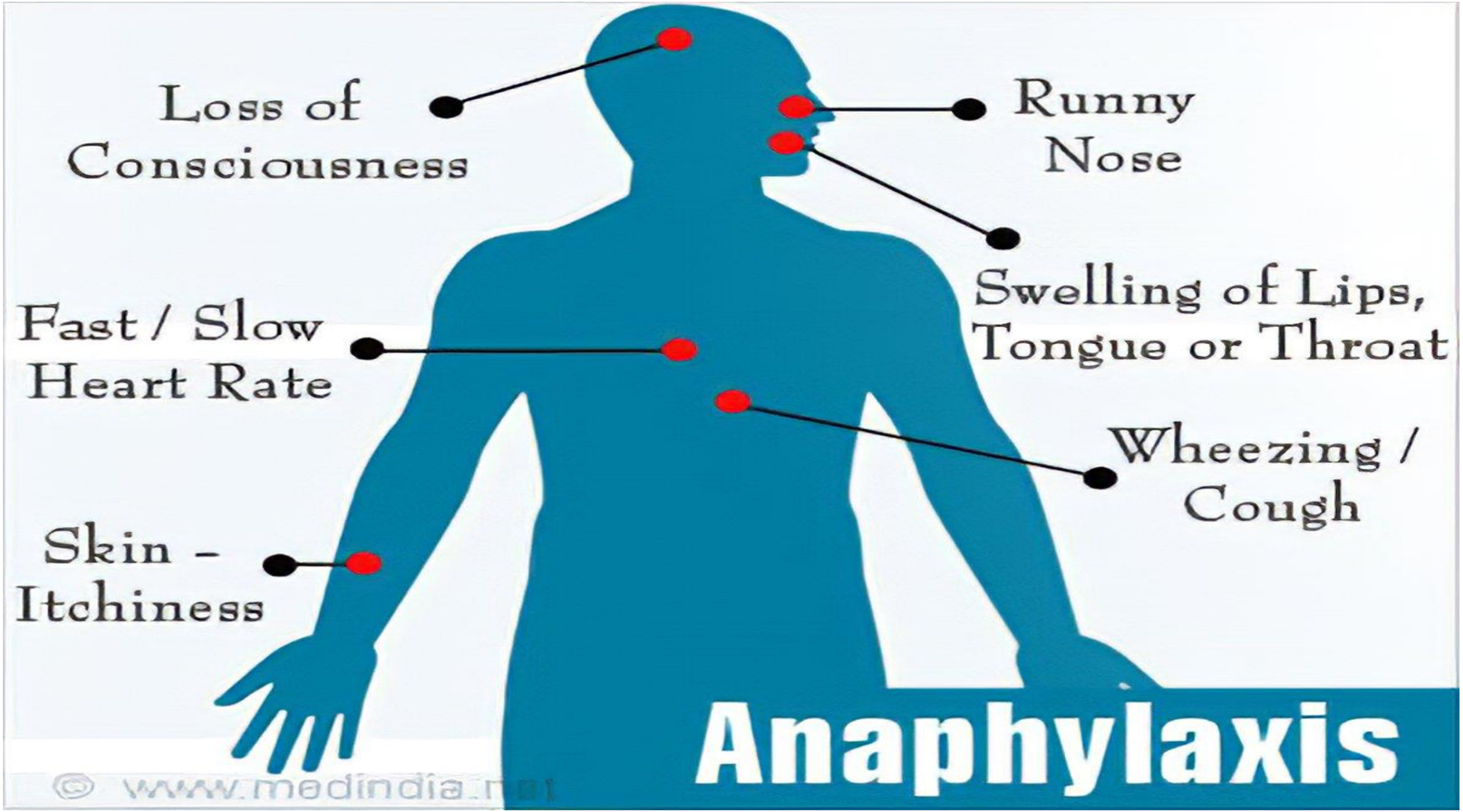

Trees
Grasses
Weeds
Indoor
Molds
Ash
Birch
Box Elder
Cedar
Cottonwood
Elm
Hackberry
Live Oak
Maple
Mesquite
Pecan
Sycamore
Walnut
Willow
Bahia
Bermuda
Johnson
Timothy
Cocklebur
Dock
Lamb's Quarter
Marsh Elder
Pigweed
Sage
Ragweed
Russian Thistle
American cockroach
German cockroach
Dust Mite 1
Dust Mite 2
Cat
Dog
Mold
(alternaria alternata)
Aspergillus Mix
Cladosporium sphaerosperumum
Epicoccum nigrum
Penicillium Mix
Mold Mix 2
Control: Negative
Control: Positive

- *Anaphylaxis*
- Antigen-IgE antibody complexes form on the surface of **mast** cells ❼ **histamine** released ❼smooth muscle of the **bronchi** contraction + increased vascular permeability ❼acute respiratory compromise + cardiovascular collapse.



- *Atopy*
- Influenced by hereditary factors. Hay fever, asthma, urticaria, and angioedema are **examples** of atopic reactions. ***Lesions*** include **urticaria** (superficial lesion of the skin), and **angioedema** (lesion in the deep dermis or subcutaneous tissues) ❼ diffuse enlargement of the lips, infraorbital tissues, larynx, or tongue.
- There are many types of **angioedema**. Three types of interest to dentistry;
- **#Acquired (allergic-based)**
- #Drug-induced ❼ due to impaired *bradykinin* degradation ❼ vasodilation, increased tissue permeability and enema. Occur after administration of certain drugs, such as angiotensin converting enzyme inhibitors.


Loss of Consciousness
Runny Nose
Swelling of Lips, Tongue or Throat
Fast / Slow Heart Rate
Wheezing / Cough
Skin - Itchiness
Anaphylaxis
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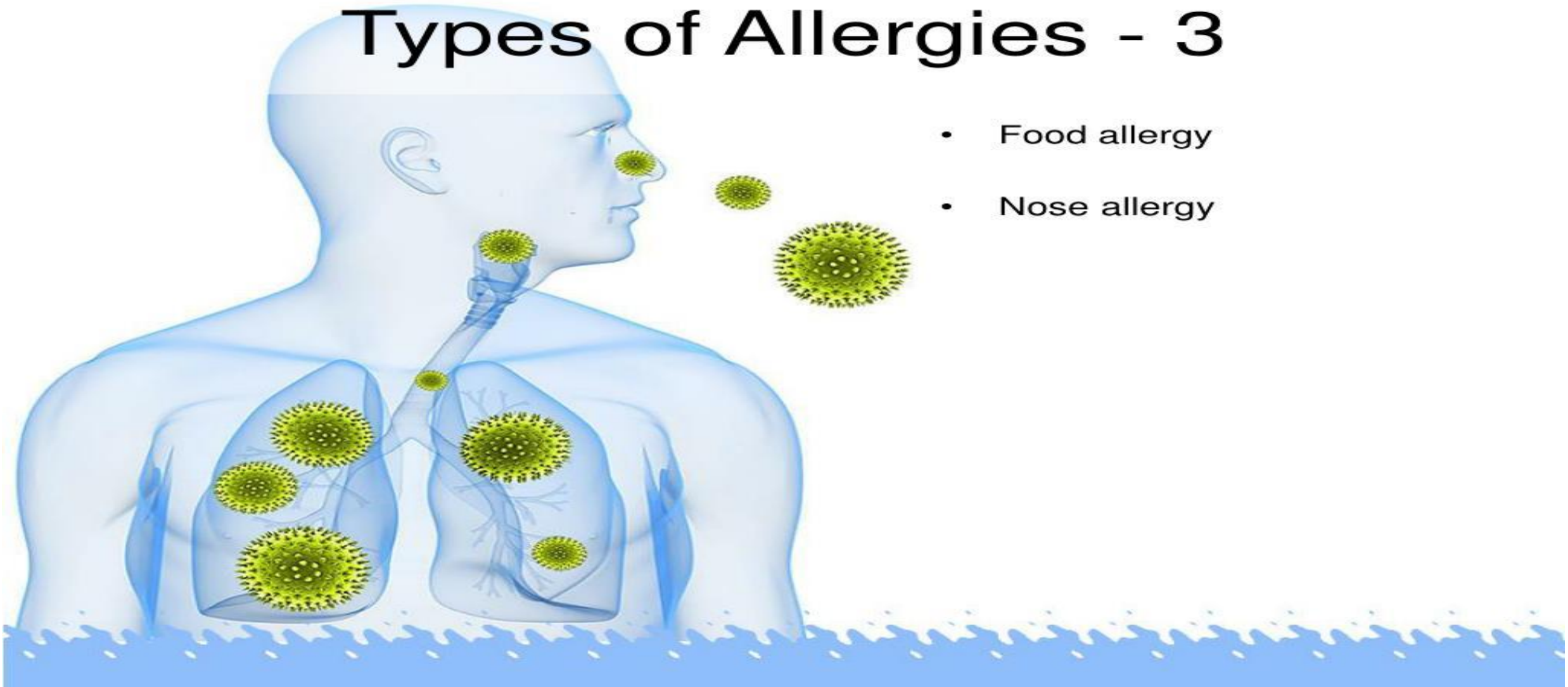
- **#Hereditary** ❼ due to a deficiency or dysfunction of complement C1 inhibitor, which can be triggered by **trauma** ❼ activation of the complement cascade and Hageman factor (factor XII) and overproduction of *bradykinin* ❼ vasodilation, increased tissue permeability and edema.

- **Type II Hypersensitivity Reactions.** (**cytotoxic** reactions) These reactions are IgG-or IgM-mediated. (e.g. transfusion reaction caused by mismatched blood and Rhesus incompatibility).

Types of allergic reaction / hypersensitivity

	Type I	Type II	Type III	Type IV
Immune system involvement	IgE	IgG or IgM	IgG and IgM	T cells
Examples of reactions	**Contact urticaria** (bee sting reaction), local and systemic **anaphylaxis**, seasonal hay fever, food allergies and drug allergies.	Red blood cells destruction after transfusion of mismatched blood type.	Rheumatoid arthritis, systemic lupus erythematosus.	**Allergic contact dermatitis**, type I diabetes mellitus, multiple sclerosis.
Relevance to EOs	**Rare, but can happen with essential oils.**	NOT relevant to essential oils.	NOT relevant to essential oils.	**Can happen with essential oils.**

- **Type III Hypersensitivity Reactions.** (immune complex–mediated) immune complexes➐ in blood vessels ➐ vasculitis. Clinical examples include systemic lupus erythematosus and streptococcal glomerulonephritis.



- ***B-Cellular Immune System***. (Delayed immune system), T lymphocytes play the central role (by production of various cytokines) ❼ecognize and eradicate antigens (e.g. viruses, tubercu-losis, and leprosy) in cells or tissues.

- **Type IV Hypersensitivity Reactions**. Involve the **cellular** immune system. Dendritic cells and Langerhans cells, present the antigen (e.g. metal jewellery, perfumes, rubber products, chemicals such as formaldehyde, and medicines such as topical anaesthetics) to undifferentiated T lymphocytes. These reactions usually are **delayed** (48 to 72 hours after contact with antigen). **These include;**

- 1- Infectious-type allergic reactions; e.g. tuberculin skin test ❼ characterized by induration, erythema, swelling, and sometimes ulceration at the site of injection.
- 2- **Contact** allergy; Low molecular weight substance (Not antigenic) comes in contact with a tissue component (primarily a protein) ❼ antigenic complex ❼ hapten (or one half of an antigen) ❼sensitization of T lymphocytes. Example; Poison ivy
- 3- Graft rejection; occurs when organs or tissues from one body are transplanted into another body, when donor and recipient are genetically not identical, or the host immune response has not been suppressed enough.
- 4- Graft-versus-host reaction; Rare and occurs **in** bone marrow transplant **recipients** ❼ due to deficient cellular immune system (e.g. due to irradiation). *Lymphocytes* transferred to the host attempt to *destroy host* tissues.

- ***C-Nonallergic Reactions***. Other agents may cause mast cells to release their mediators without inciting a true allergic reaction;
- **e.g.** Chronic urticaria; caused by certain *drugs (e.g. anaesthetics)*, temperature changes, and emotional states (there is no **antigen-antibody** reaction), result from damage to the mast cells ❼eferred to as anaphylactoid or anaphylaxis-like reactions.
- **Note**; Management of anaphylactic and anaphylactoid reactions clinically similar ❼ Both are viewed as true allergic reactions.





- **MEDICAL MANAGEMENT**
- **A- Atopy**
- - injections to gradually desensitize.
- - Move to an area that does not contain the antigen (asthmatic patients) or treated with systemic steroids
- - Hay fever or urticaria are treated with antihistamines.
- **B- Contact dermatitis**
- - Variety of treatments; topical steroids, have been used.
- **C- From a dental standpoint;**
- - Patient treated for allergies ❼ncreased chance of being allergic to another substance.
- - Use of steroids as allergy treatment ❼ reaction to stress may be impaired

- **DENTAL MANAGEMENT**
- Medical Considerations
- - History must be expanded ❼determine exactly what the offending substance was
- - Six common aspects should be considered to *avoid provoking allergic* reactions;

- **FIRST: Local Anaesthetics**.
- **I-** Differentiate signs and symptoms of **true** allergy (D) to those cause by **other** reactions (A, B & C) most often associated with local anesthetics;

- **A- Toxic reaction**
- a- Causes
- 1- intravenous injection of the aesthetic solution.
- 2- Excessive amounts of an aesthetic
- 3- vasoconstrictor.
- b- Signs and symptoms
- 1- Talkativeness
- 2- Slurred speech
- 3- Dizziness
- 4- Nausea
- 5- Depression
- 6- Euphoria
- 7- Excitement
- 8- Convulsions

- **B- Vasoconstrictor reaction; Signs and symptoms: -**
- 1- tachycardia,
- 2- apprehension,
- 3- sweating,
- 4- hyperactivity.

- **C- Psychomotor reactions;**
- 1- Hyperventilation
- 2- Vasovagal syncope (bradycardia, pallor, sweating)
- 3- Sympathetic stimulation (anxiety, tremor, tachycardia, hypertension)

- **D- True allergic reactions**
- I- If the **history** supports a true allergic reaction to a local anaesthetic ❼ Signs and symptoms (**Soft tissue swelling, Urticaria, Swelling, Skin rash, Chest tightness, Dyspnea, shortness of breath, Rhinorrhoea, Conjunctivitis**) these steps should be followed
- A- Patients allergic to local anaesthetics and the type caused the allergic reaction can be identified
- i. New anaesthetic with a different basic chemical structure (Ester. Amide) can be used

- **When administering an alternative anesthetic to a patient with a history of a local anaesthetic allergy, these steps should be followed:**
- 1. Inject slowly, aspirating first to avoid I.V. injection.
- 2. Place 1 drop of the solution into the tissues.
- 3. Withdraw the needle, and wait 5 minutes to see what reaction occurs
- 4. Aspirate before giving the second injection.

- B- Patients who have been allergic to local anaesthetics but cannot identify which type caused the allergic reaction
- a- Attempt to contact the previous dentist involved, or
- b- An antihistamine (e.g., diphenhydramine [Benadryl]; 1% solution of diphenhydramine that contains 1: 100,000 epinephrine) can be used as the local anesthetic, or
- c- The patient may be referred to an allergist for provocative dose testing (PDT)

- **SECOND: Penicillin**.
- A- Take medical history on all patients, including penicillin previous contact and/or reactions as well as allergic reactions to other agents

- **Notes**;
- - Skin testing for allergy to penicillin is reliable
- - Sensitizing a patient to penicillin seems highest with Topical application and least with Oral administration

- B- If penicillin is needed in dentistry;

- 1- Patient is allergic to penicillin
- i- Treated with an alternative antibiotic.

- **Examples; Erythromycin or clindamycin for the treatment of oral infection or clindamycin for prophylaxis against infective endocarditis.**

- **ii- Drugs that may cross-react, including ampicillin, carbenicillin, and methicillin, should be avoided.**

- **Cephalosporins are often used as alternatives to penicillin, however cephalosporins cross-react in 5% to 10% of penicillin-sensitive patients ❼kin testing is recommended**
- 2- Patients with a negative history of allergy to penicillin
- a- Can be treated with the drug when indicated (**oral** route).
- b- Patient is observed for 30 minutes after the first dose
- c- Do not use penicillinase-resistant penicillin unless infection is caused by penicillinase-producing staphylococci.
- d- Patient should seek immediate care if any of the signs or symptoms of an allergic reaction occur after leaving dental office.

- **THIRD; Analgesics.**
- **A- Aspirin**
- i- Causes prolonged prothrombin time and to inhibit platelet function ❼usually of little clinical importance, except in patients with a haemorrhagic disease or a peptic ulcer ❼avoided.
- ii- Aspirin provokes a severe hypersensitivity reaction (acute bronchospasm, rhinorrhoea, and urticaria) in some patients with asthma❼ be cautious
- iii- The dentist should be aware analgesic preparations that include salicylates.
- iv- Most NSAIDs have the potential for cross-sensitivity in patients who exhibit an asthma-like reaction to aspirin.

- **B- Codeine**; Is a narcotic analgesic that commonly is used in dentistry. Emesis, nausea, and constipation may occur with analgesic doses of codeine and should be differentiated form allergic reactions.

- **FOURTH; Rubber Products.**
-
- i- **Anaphylaxis** may occur in the sensitized person after contact has been made with rubber gloves, rubber dam material, blood pressure cuffs, or any other product containing latex.
- ii- Latex-allergic persons have IgE antibodies for specific latex proteins.
- iii- Latex skin tests are a satisfactory for identifying sensitized individuals.
- iv- Nitrile gloves can minimize these adverse reactions.

- **FIFTH; Dental Materials and Products.**

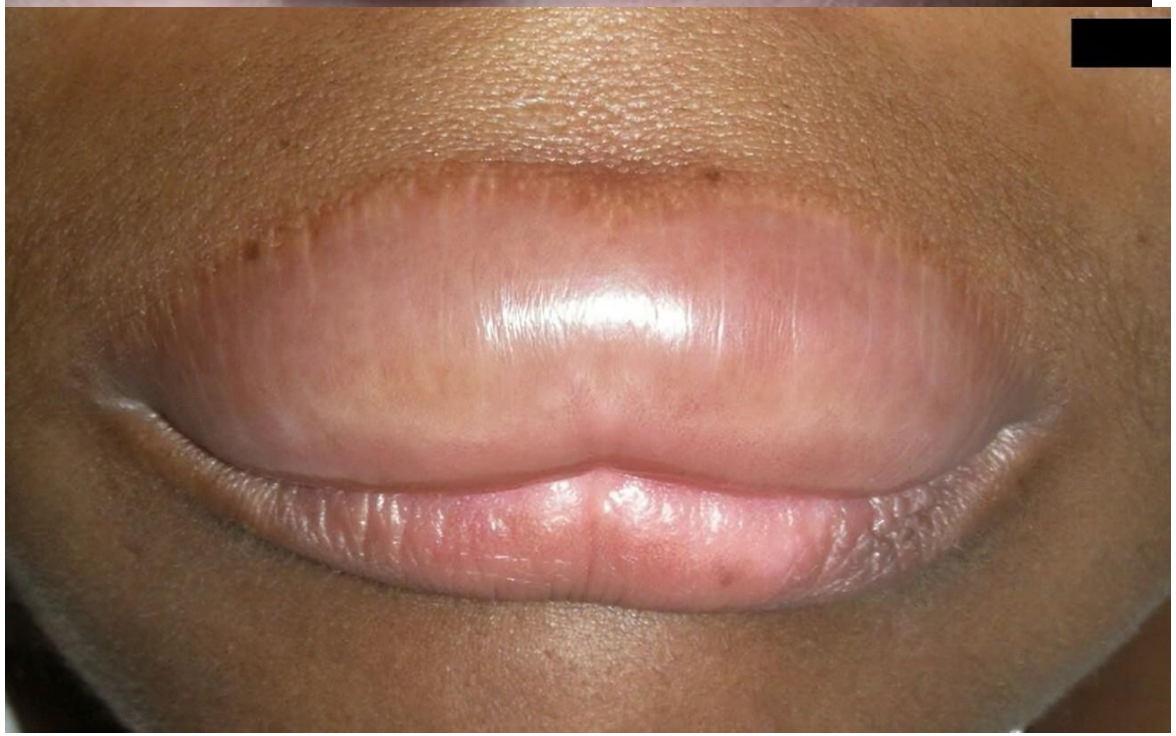
- i- Topical aesthetics can cause type I reactions consisting of urticarial swelling.
- ii- Mouth rinses and toothpastes containing phenolic compounds, antiseptics, astringents, or flavouring agents have been known to cause type I, type III, and type IV hypersensitivity reactions **involving** the oral mucosa or lips.
- iii- Hand soaps used by dental care workers reported as a cause of type IV reactions.
- iv- Some dental *agents* can lead to type IV hypersensitivity (contact stomatitis) (described in "Management of Oral Complications and Manifestations").

- **Management of Oral Complications and Manifestations**
- **A-Hypersensitivity**
- **I. Type I Hypersensitivity (Oral or Paraoral type I hypersensitivity, Atopic reactions) cause; Urticarial swelling (or angioedema)**

- 1- Signs and symptoms
- a. Reaction occurs soon after contact with antigen.
- b. Painless swelling (due to transudate from the surrounding vessels)
- c. Itching and burning may occur.
- d. May remain for 1 to 3 days.








Tipos de
angioedema
e tratamento

- **2. Treatment**
- a. Reaction not involving tongue, pharynx, or larynx and with no respiratory distress noted; requires 50 mg of diphenhydramine four times a day until swelling diminishes.
- b. Reaction involving tongue, pharynx, or larynx with respiratory distress noted requires the following:
- i. 0.5 mL of 1: 1000 epinephrine, IM or SC
- ii. Oxygen
- iii. Once immediate danger is over, 50 mg of diphenhydramine should be given four times a day until swelling diminishes.
- c. Further contact with the antigen must be avoided

- **Type III Hypersensitivity.**
- 1. Usually occur within 24 hours after contact with antigen (drug or dental material))
- 2. Consist of:
- a. Erythema
- b. Rash
- c. Ulceration

- **3. Treatment requires**
- a. Topical steroids or systemic steroids (in severe cases)
- b. Identification and avoidance/elimination of any further contact the antigen
- **Examples:**
- 1- Some cases of aphthous stomatitis

- **2- Allergic dermatitis to orthodontic appliances (rare); in patient with nickel hypersensitivity and a history of cutaneous/skin piercing.**
- **3- Erythema multiforme**
- a- immune complex reaction
- b- Polymorphous eruption of macules, erosions, and characteristic “target” lesions that are symmetrically distributed on the skin and/or mucosa.

- c- Predisposing factor; drug allergy, herpes simplex infection, **Sulfa** antibiotics, Sulfonyl urea hypoglycemic agents (Rx of diabetes).

- **d- Treatment; (symptomatic)**
- 1- bland mouth rinse or syrup of diphenhydramine, and triamcinolone acetonide (Kenalog) in Orabase.
- 2- Severe involvement ❼ systemic steroids.
- 3- Causative drug should be withdrawn




a
b
c
d





- **Type IV Hypersensitivity. (Contact stomatitis)**
- 1- **Delayed** allergic reaction ❼ Contacts with allergic materials (dental materials, toothpaste, mouth rinses, lipsticks, face powders etc.) may have occurred **days before** the lesions appeared.
- 2- Dental materials (*agents*) can be involved in this type of reaction;
- a- Impression materials containing aromatic sulfonate in postmenopausal women
- b- Amalgam restorations ❼ mucosal whitish, reddish, ulcerative, or "lichenoid" lesions, could be due to
- i- Hypersensitivity to the silver in amalgam ❼ if restorations removed ❼esions most often cleared.
- ii- Toxic injury to the mucosa
- iii- Hypersensitivity to mercury

- **c- Dental composite (rare)**
- d- The acrylic monomer in denture construction
- e- Gold and nickel ❼ erythema and ulceration

- **B-Lichenoid Drug Eruptions.**
- 1- lesions (identical to those of lichen planus) in patients that have taken certain drugs before appearance of the lesions.

- 2- e.g. of such drugs; levamisole (Levantine) and the quinidine drugs. Other agents; thiazide drugs, gold, mercury, methyldopa, phenothiazines, quinidine, and certain antibiotics.

- 3- **Biopsy** of the lesion show a microscopic picture similar to that of lichen planus + eosinophils in the subepithelial infiltrate ❼elated to the cellular immune system ❼ considered contact stomatitis

- 4- Management; drugs withdrawal ❼ Lesions clear within several days (in most patients) or within a few weeks.

- **MANAGEMENT OF SEVERE TYPE I HYPERSENSITIVITY REACTIONS**
- Occur soon (within minutes) after exposure to antigen (injection, ingestion, or application of a topical aesthetic, medication, drug, local anaesthetic, or dental product). The dentist must take the following actions immediately (**initial procedures**);
- • Place the patient in a head-down or supine position.
- • Make certain that the airway is patent.
- • Administer oxygen.
- • Be prepared to send for help **and** to support respiration and circulation. The vital signs should be noted. The dentist may administer aromatic spirits of ammonia through inhalation, which encourages breathing through reflex stimulation.
- • If these initial steps have not solved the emergency problem, and the cause is highly likely to be allergic, an edematous-type or anaphylactic reaction should be considered.

- **Angioedema**. If an immediate type I hypersensitivity reaction has resulted in oedema of the tongue, pharyngeal tissues, or larynx, the dentist must take additional emergency steps to prevent death from respiratory failure. At this point, if the patient has not responded to the **initial procedures** and is in acute respiratory distress, **the following should be done:**

- • Call for medical help.
- • Inject 0.3 to 0.5 mL of 1: 1000 epinephrine by I.M. (into the tongue) or subcutaneous route.
- • Supplement with intravenous diphenhydramine 50 to 100 mg if needed.

- Support respiration, if indicated, by mouth-to-mouth breathing or bag and mask; the dentist should make sure the chest moves when either of these methods is used.
- • Check the carotid or femoral pulse; if a pulse cannot be detected, closed chest cardiac massage should be initiated.
- • Transport to medical facility if needed.
- **Anaphylaxis**. An anaphylactic reaction usually takes place within minutes but may take longer.
- - “Itching” of soft palate
- - Nausea, vomiting
- - Substernal pressure
- - Shortness of breath
- - Hypotension
- - Pruritus
- - Urticaria
- - Laryngeal oedema
- - Bronchospasm
- - Cardiac arrhythmias

- Unlike severe oedematous reaction, in which respiratory distress occurs first, both respiratory and circulatory components of depression occur early in the anaphylactic reaction. **Anaphylaxis often is fatal unless, immediate action is taken;**

- 1. Call for medical help.
- 2. Place patient in the supine position.
- 3. Check for open airway.
- 4. Administer oxygen.
- 5. Check pulse, blood pressure, and respiration.

- a- If any of the vital signs is depressed or absent, inject 0.3 to 0.5 mL 1: 1000 epinephrine into the tongue (I.M).
- b- Provide cardiopulmonary resuscitation if needed.
- c- Repeat intramuscular injection of 0.5 mL 1: 1000 epinephrine if no response (every 5 minutes).

- **Note:**
- Intramuscular injection of epinephrine into the thigh has been reported to provide higher plasma concentrations than those administered into the arm.