*National University of Pharmacy*

*Department of Pathological Physiology*

# *NEW APPROACHES TO ALLERGEN-SPECIFIC IMMUNOTHERAPY*

**Fida Sleiman**

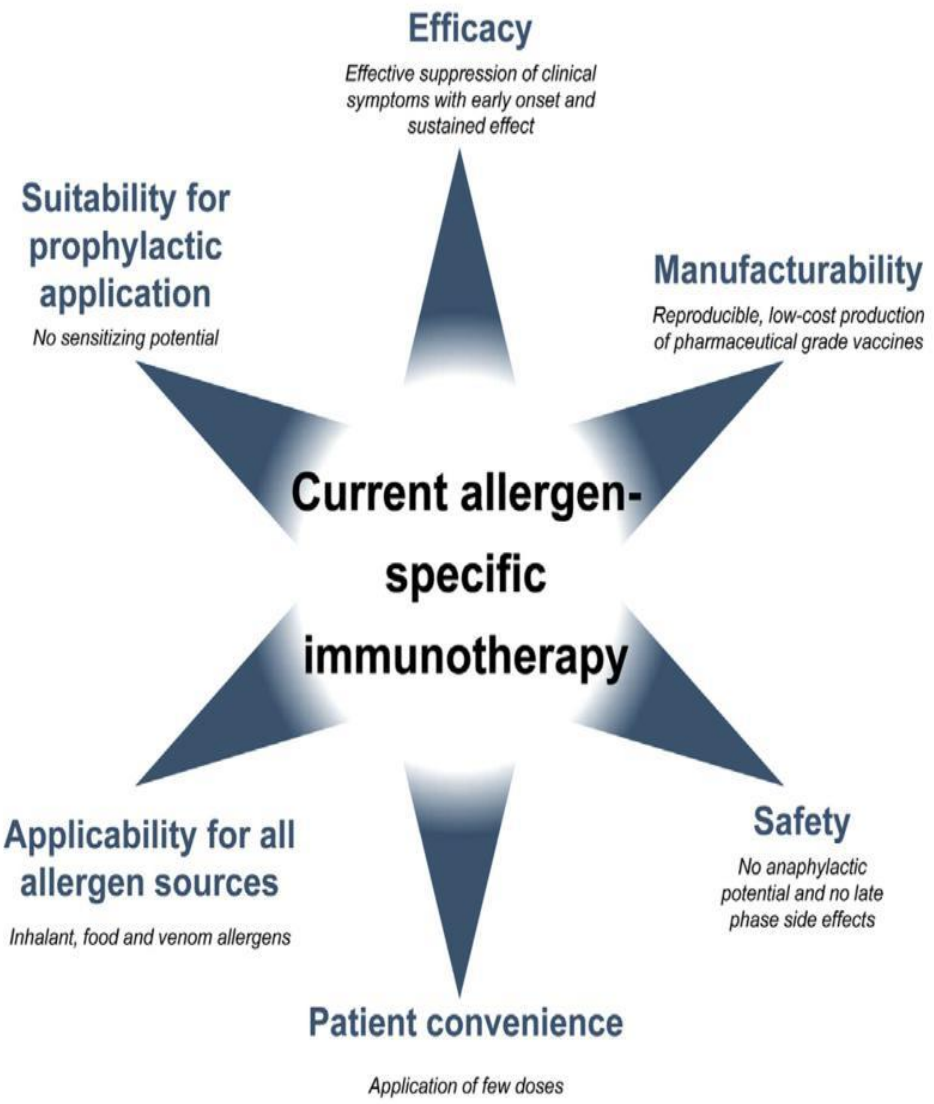
**S. Myronchenko**

# Allergen-specific immunotherapy (ASIT)

ASIT is a method of treating allergic diseases, which consists in introducing into the patient's body in increasing doses the allergen that causes the disease.

Its aim is to induce a tolerogenic response against the allergen of interest.

Moreover, ASIT reduces the risk of developing asthma, at least in the short term, in patients with allergic rhinitis. ASIT is also effective in patients with IgE-mediated food allergy and insect venom allergy, with allergic asthma and rhinoconjunctivitis.



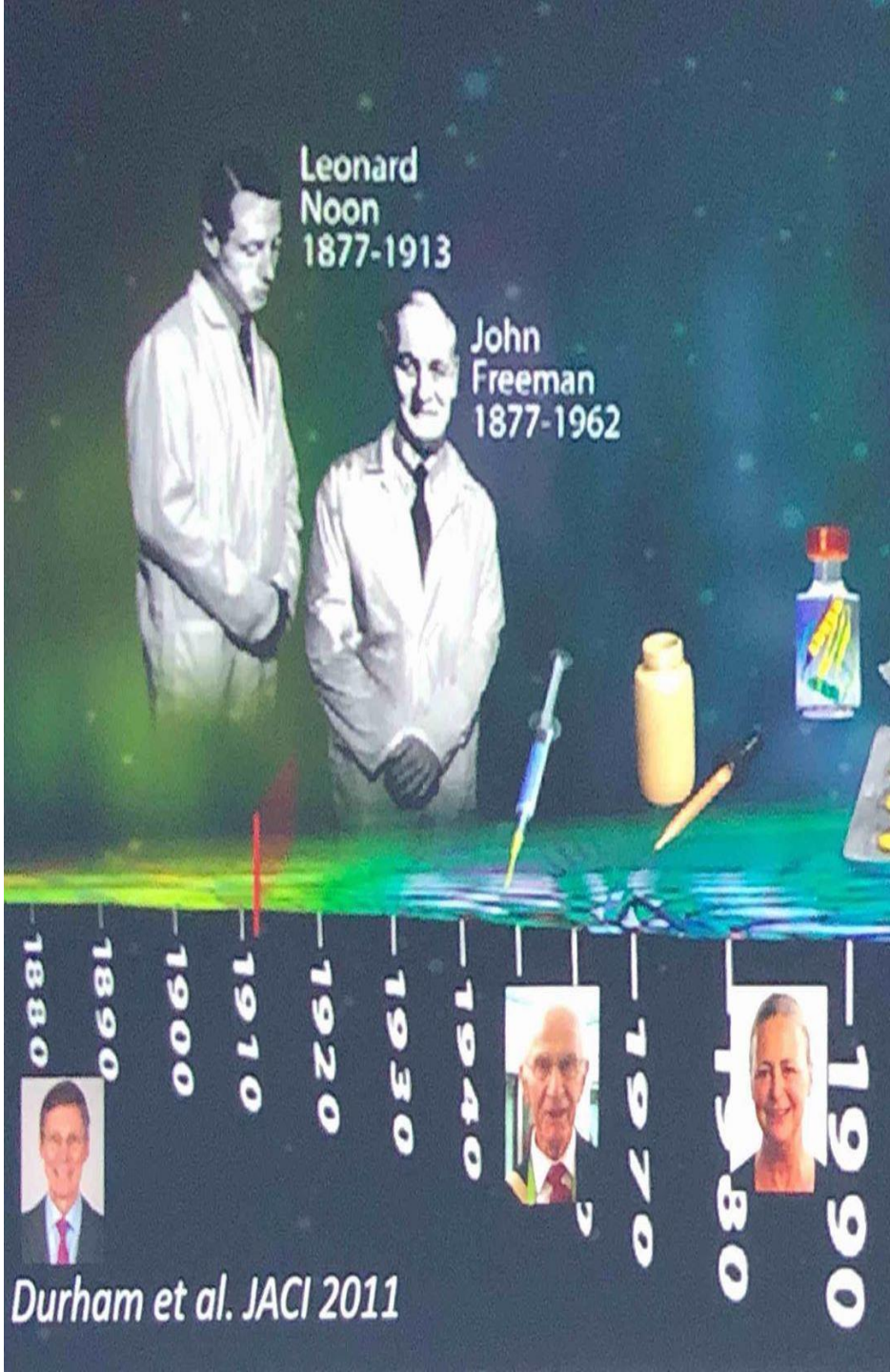
# History

The British physicians Noon and Freeman were the first researchers to test pollen allergen immunotherapy in a patient cohort.

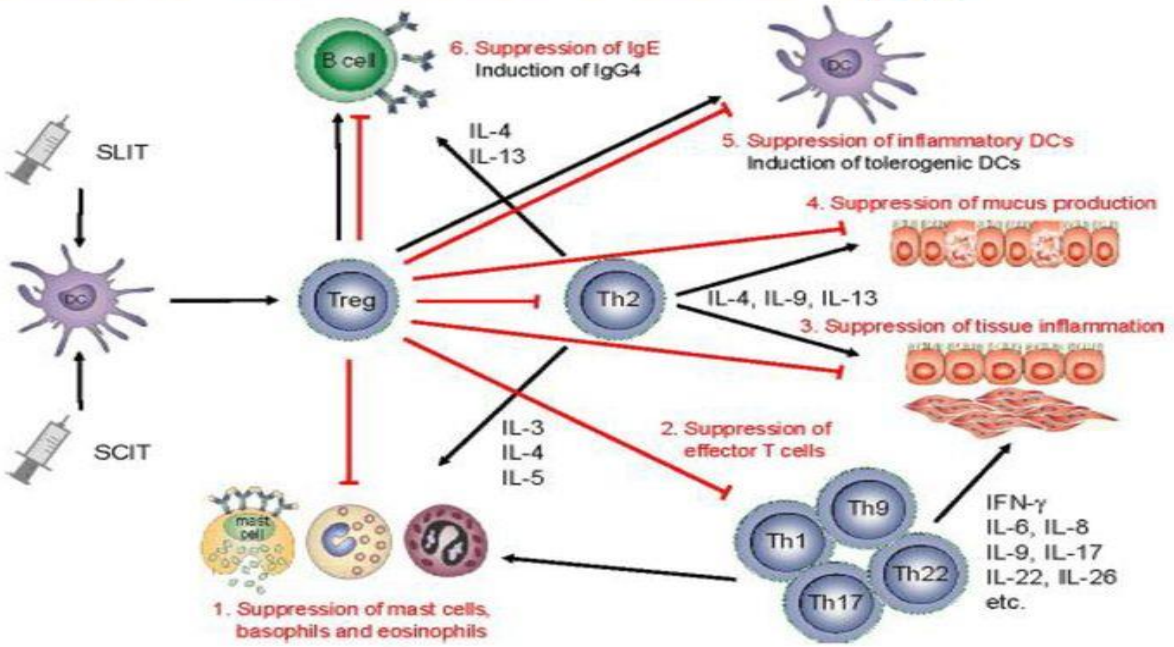
Noon and Freeman, researchers at the Department of Therapeutic Inoculation at St. Mary's Hospital in London, published their findings in The Lancet in 1911.

Building on the observations of his predecessors Bostock, Blackley and Dunbar, Noon noted that hay fever patients "sometimes become cured" and that this was possibly because they "have had the good fortune to develop an active immunity against the toxin."

He hypothesized that by injecting hay fever patients with small amounts of a pollen "toxin", a state of immunity could be achieved



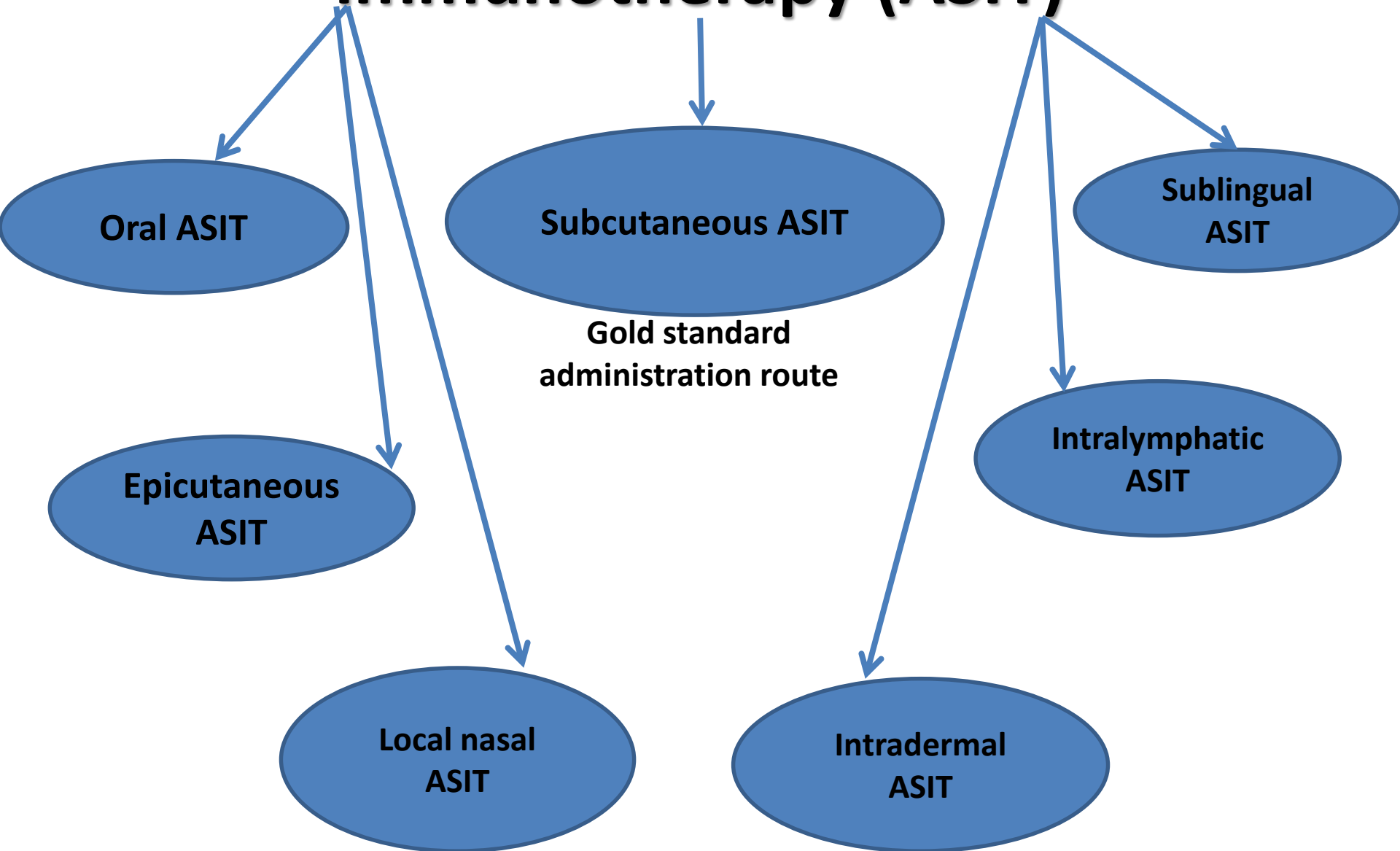
# Mechanisms of Allergen-Specific Immunotherapy






- An allergen is taken up by regional dendritic cells leading to the induction of regulatory T cells. These cells suppress allergic responses directly and indirectly by the following mechanisms.
- 1. Suppression of mast cells, basophils and eosinophils.
- 2. Suppression of effector T cells.
- 3. Suppression of inflammatory cell migration to tissues and tissue inflammation.
- 4. Suppression of mucus production.
- 5. Suppression of inflammatory dendritic cells and induction of tolerogenic dendritic cells.
- 6. Suppression of allergen-specific IgE and induction of IgG4 from B cells.

# Routes of allergen specific-immunotherapy (ASIT)



# Subcutaneous immunotherapy

**extract is administered subcutaneously**

**It is an effective treatment of IgE-mediated allergies, but it requires repeated allergen injections with a risk of systemic allergic reactions.**

# Sublingual immunotherapy (SLIT)

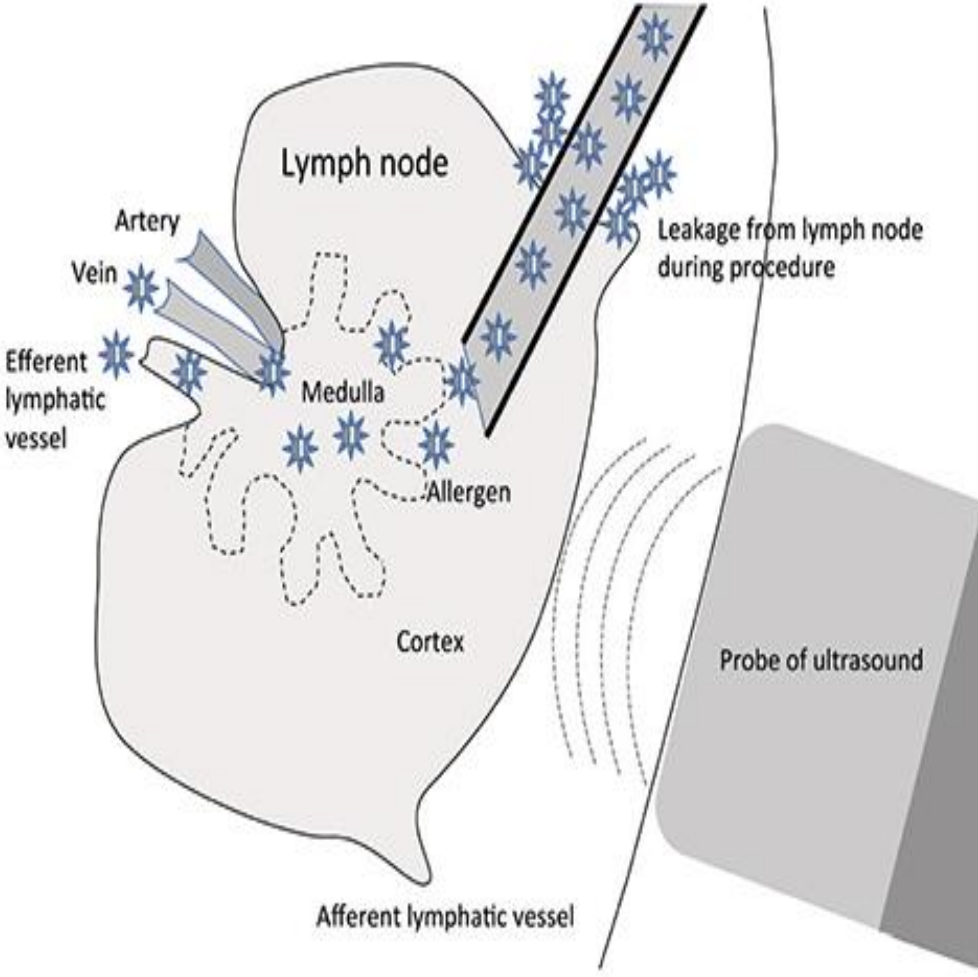
**extract is placed under the tongue**

SLIT is effective in decreasing both immediate- and late-phase symptoms, as well as the need for medication, in adult and pediatric patients with allergic rhinoconjunctivitis to either pollen. SLIT consists into the administration of high doses of natural-allergen extracts (pollens, mites or animal dander) as drops or tablets under the tongue, prior to swallowing. Only moderate adverse events occur locally at the start of the treatment, including oral pruritus, throat irritation or tongue swelling, but severe systemic reactions are extremely rare.

# Intralymphatic immunotherapy (ILIT)

**extract is injected directly into the lymph node**

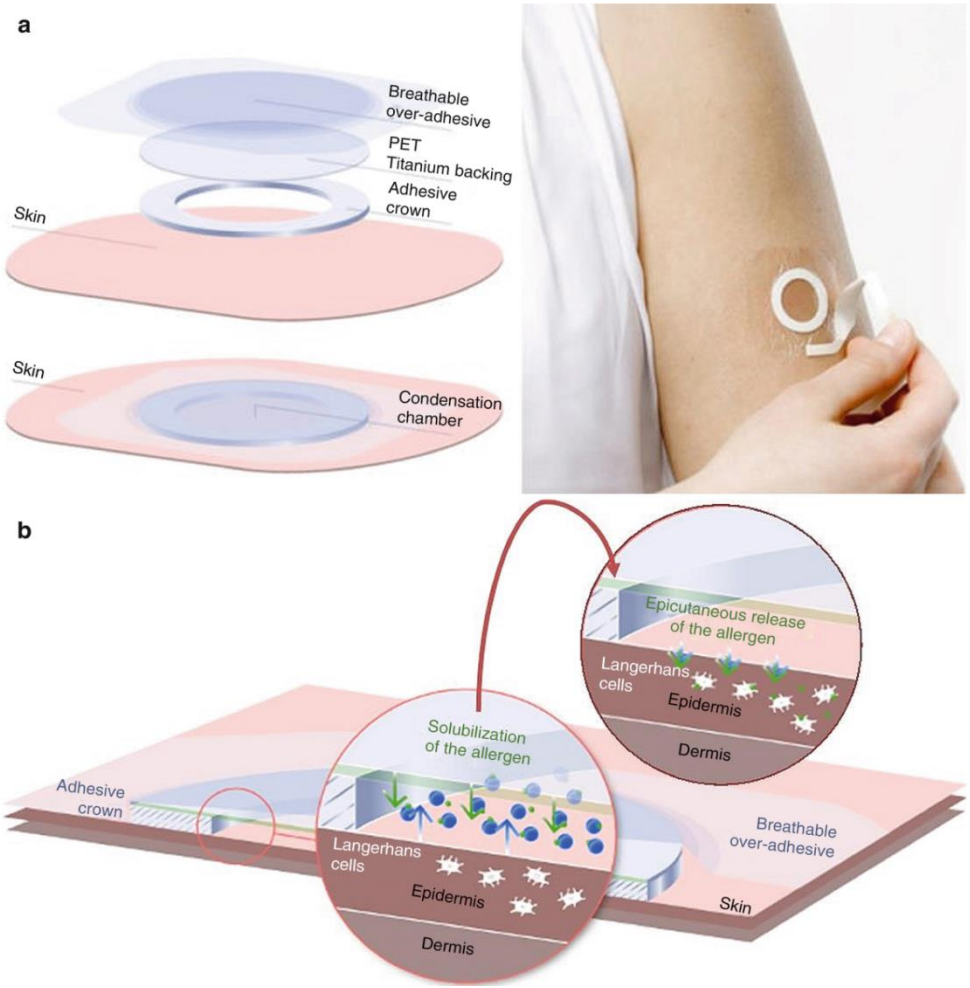
While AIT in general requires treatment periods over 3 up to 5 years, ILIT needs only three ultrasound-guided injections of low allergen doses into inguinal lymph nodes with 4-week time interval making the entire treatment possible within 2 months.



# Epicutaneous immunotherapy (EPIT)

**extract is applied in patch form to the skin**

**EPIT is minimally invasive and basically consists of the affixation of allergen containing patches to the epidermis over 6 weeks. EPIT is safe and efficacious in a dose-dependent manner after six patches only. EPIT is increasingly attracting attention because of its capacity to offer a safe, needle-free, and potentially self-administrable treatment option for IgE-mediated allergic diseases**



# Local nasal immunotherapy (LNIT)

**extract is applied to the nasal mucosa**

**LNIT consists of spraying allergen extracts in a soluble form into the nasal cavity.**

**Adverse effects are mainly limited to the site of administration. Subsequent intranasal vaccines based on allergen extracts in macronized powder forms or on allergen-coated strips enhance clinical efficacy, while decreasing local adverse effects in allergic patients.**

# Oral immunotherapy (OIT)

OIT is mainly applied as a treatment for adults and children with food allergies, including cow's milk, egg, peanuts, tree nuts, wheat, soy, fish and shellfish allergies. Owing to the risk of adverse effects, OIT requires the administration of small amounts of allergen (from micrograms to milligrams) by the oral route.

**extract is swallowed**

# Intradermal immunotherapy (IIT)

Intradermal allergen injections in doses known to illicit late skin responses, when given repeatedly at 2- to 4-week intervals, uppressed late cutaneous allergic responses and induced allergen-specific IgG antibodies.
But intradermal allergen has the potential to sensitize and tolerize against inhalant allergens and therefore is not recommended.

In conclusion, newer, more convenient, and safer routes of allergen immunotherapy are being examined thoroughly, and one day will provide more accessible and efficacious options for the treatment of allergic respiratory diseases.


# Thank you for attention!