

Inov8 Air Disinfection Combats Dust Mite Allergies

Why Use the Inov8 Solution?

- Effective against airborne dust mite allergens.
- Effective against dust mite allergens in fabrics such as bedding, carpets and soft furnishings.
- Destroys the allergens' protein structure through a known chemical oxidation process.
- Low energy consumption.
- Discreet, silent and easy to use.



“The patients and staff noticed better quality of air and freshness within the area covered by the Inov8 AD system.”

*Professor Sam Lingam,
MD (HONS) FRCPCH FRCP DCH DRCOG,
Paediatrician,
The Harley Street Doctors Organisation.*

Hydroxyl Radicals Provide a Solution to Age-old Problem of Dust Mite Allergies.

Close relatives to ticks and spiders, dust-mites are insects that are very small in size, measuring around 400 µm in length. This makes them barely visible to the naked human eye. The mites usually live in house dust and feed on dead exfoliated human skin and other organic matter such as plant materials, mould and fungi.



— 100 microns (scale)

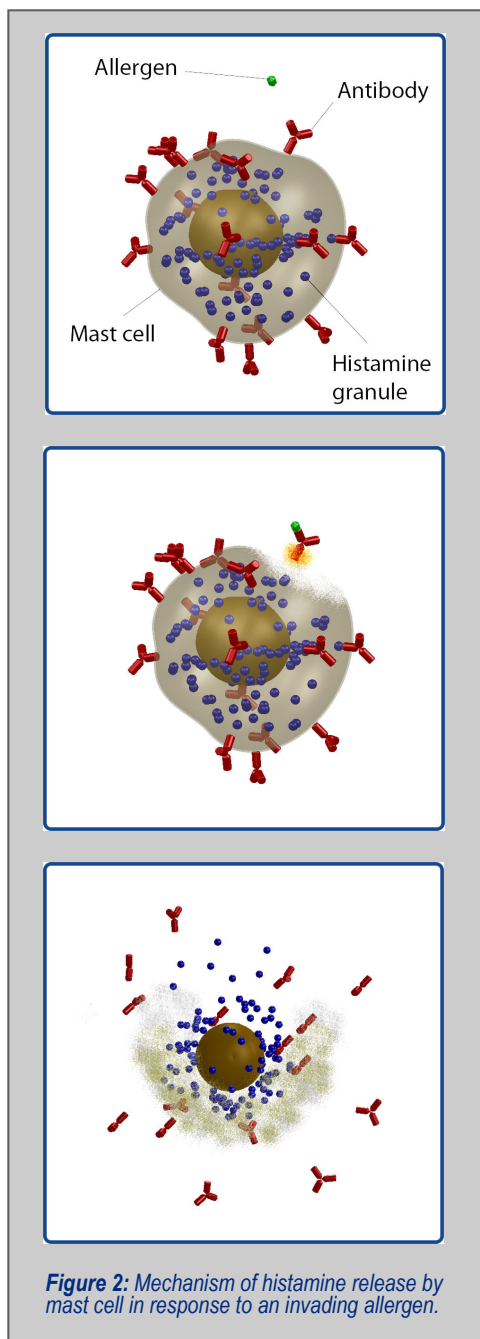
Figure 1. Dust mites on fabric material

House dust mites secrete faecal matter approximately 20 times each day and it is the protein content of the faeces that causes allergic reactions in humans. This can range from an itchy nose and eyes to breathing difficulties or even severe asthma.

The faeces produced by dust mites are very small and light enough to float in the air. This means that they can be easily inhaled. Allergens usually enter the respiratory system through the nose. Mast cells in the airways release mediators which trigger the allergy attack. This attack is an overreaction of the body's immune system to the invading allergens that have bonded with antibodies.

Mast cells are one of the human body's principal defences against allergens and are found in connective tissue and mucous membranes. One of its biological functions is innate immunity including involvement in host defence mechanisms against parasitic infestations, tissue repair, etc.

Mast cells in particular contain pockets of granules rich in histamine and heparin that cause allergy if triggered by invading allergens. In allergy sufferers Immunoglobulin E (IgE) antibodies present on the surface of mast cells (Fig.2, see overleaf) trigger the release of histamine when allergens stick to these IgE antibodies. This irritates the mucous membrane in the upper airways which manifests itself through coughs and sneezes, for example.



Mechanism of Allergy Reduction by Hydroxyl Radicals

There is an abundance of air purification technologies on the market. Oxidation systems are particularly effective at removing pollutants from the air and purifying it of dust mite allergens. The most important oxidizing agent in atmospheric chemical reactions is the **hydroxyl radical (OH[•])**, which plays a central role in the oxidation of many organic compounds through a series of cyclic chain reactions. Hydroxyl radical reactions are considered very important in the pathogenesis of many diseases.

Inov8 AD air disinfection technology instantly denatures the allergen Der p1 and Der f1 found in house dust. This is achieved by oxidising their protein structures, for example protein *backbone* damage (Garrison WM (1987)) due primarily to a hydrogen atom abstraction at the alpha carbon. This process leads to backbone fragmentation.

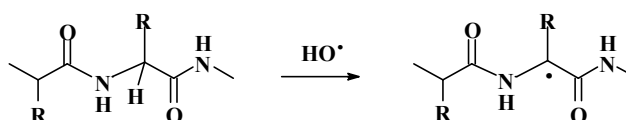


Figure 3. Mechanism of protein backbone oxidation by abstraction of a hydrogen atom.

Side-chain damage is another possible protein oxidation mechanism (Singh J & Thornton J M (1992)) and can occur through hydrogen abstraction or oxygen addition. Both hydroxyl radical initiated oxidation mechanisms result in a modified allergen structure. This is no longer recognized by the body's immune system and therefore histamine and other chemical mediators are not released. An allergic reaction is therefore prevented.

In summary, the AD air disinfection technology is effective at denaturing the allergens' protein structure through a well known chemical oxidation process. This oxidation capability has also been extensively proven against many bacteria, viruses and fungi.

Inov8 AD air disinfection technology can be very effective throughout the home. The hydroxyl radicals attack allergens in the air and also in their preferred habitat, i.e. in bedding and pillows, carpets, clothes, for example.

Inov8 is always striving to attain the highest accolades for air disinfection and is actively pursuing a leadership strategy in providing clean indoor air by continuously applying scientific principles and rigorous testing where appropriate.

References:

Garrison WM (1987) Reaction mechanisms in the radiolysis of peptides, polypeptides, and proteins. *Chem Rev* 87:381-398 -9920.

Singh J & Thornton J M (1992). *Atlas of Protein Side-Chain Interactions*, Vols. I & II, IRL press, Oxford.