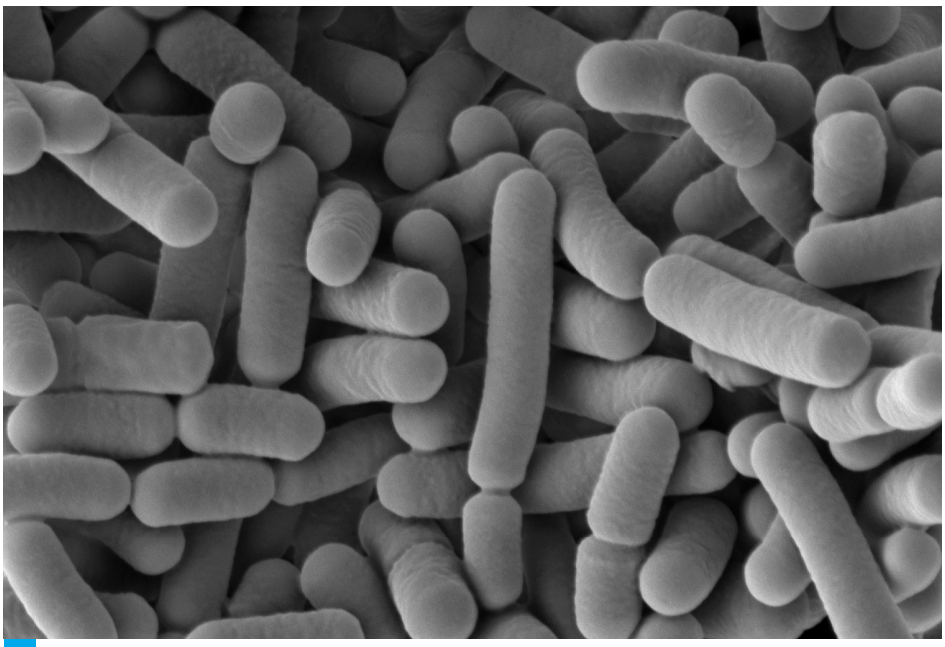

The occurrence of allergy in the past 25 years has increased dramatically and is now considered an epidemic by the World Health Organization. The global prevalence of food allergies is about 2-4% in adults and 5-7% in infants and children.

Protection
Focus On: Allergy

Allergy results in a wide range of physical manifestations due to an overreaction of the immune system to a specific antigen (called an allergen) that is normally harmless to the general population. Allergy symptoms are manifested through the gastrointestinal tract, respiratory airways, or through the skin.

Currently, the common treatment for established food allergy is the "eviction diet" – strict avoidance of the allergen. However, if an allergen is found in a wide variety of foods, (i.e. milk, egg or peanut allergens) complete avoidance of the food can be difficult, severely impairing the quality of life of those with allergies.

Allergic Response
Food allergies are a result of the body's immune system identifying a specific food component, usually a protein, as a threat to the body, thus inducing an

abnormal immune reaction. The hypersensitivity reaction involves three factors:

- Food allergen
- Antibodies (primarily immunoglobulin E – IgE)
- Immune cells, i.e. mast cells and basophils

In the allergic reaction to food, antibodies (usually IgE) are produced by the immune system, which then circulate through the blood where they either bind to basophils (white blood cells) or enter body tissues and bind to mast cells. Basophils and mast cells (usually found where the body interfaces with the environment) produce and store substances like histamine, a biologic amine. When IgE antibodies on the surface of basophils and mast cells interact with an allergen, histamine is released, causing the physical allergic reaction.

Risk for Allergy Development

The predisposition to allergy is inherited genetically though allergies may develop from environmental factors as well. Even if neither parent is allergic, the child is 15% at risk for developing allergy. This risk is doubled when one parent is allergic and quadrupled when both parents are allergic. Additionally, repeated exposure to an allergen during the first months of life, a critical period of sensitization to food allergens, increases the risk of food allergy development.

A primary prevention strategy for food allergy is to promote immunological oral tolerance to food proteins (particularly cow's milk proteins) in early infancy.

Oral tolerance is a normal immunological process in which the immune system learns to recognize antigens, such as food proteins, as harmless.

NRC Research Initiatives

Nestlé research focuses on allergy prevention and reducing the symptoms of allergy for people at different stages of life.

NRC is pursuing novel strategies to reduce the risk of onset and to mitigate the symptoms of food allergies through nutrition, rather than complete eviction.

- Reducing food allergenicity of raw food materials by biochemical processes.
- Designing interventions at the host level to promote oral tolerance to allergens (e.g. with hypoallergenic infant formulas and/or probiotics) and reducing existing allergic symptoms through specific food ingredients such as probiotics.

Slowing Down the Atopic March

If a child is at risk for allergy and the immune system is not educated properly in the first months of life, the risk and manifestation of allergy progresses through childhood.

Often times, children that develop food allergies at a young age progress to respiratory allergies and even possibly further, to asthma. This phenomenon is referred to as the "atopic march" which designates the progression of sensitization to new allergens and the manifestation of allergic symptoms at new sites.

NRC research focuses on primary prevention, aimed at reducing the risk of allergy onset. Using data from NRC research, Nestlé has developed hypo-allergenic infant formulas. Nestlé has also developed therapeutic infant formulas for babies that are allergic to cow's milk and continues to extend the range of infant food products to address allergy concerns.

Beyond Food Allergy

In addition to food allergy research, NRC is performing studies to evaluate the impact of nutrition on the allergic response to seasonal allergens, to help sensitized subjects manage their allergic symptoms.

References

1. Zuercher AW, Fritsche R, Mercenier A, Corthesy B. C*urrent Opinion in Biotechnology*, 2006, 17(2): 198-203.
2. Prioult G, Nagler-Anderson C. *Immunological Reviews,* 2005;206:204-218.
3. Rochat F, Verdu EF, Bercik P, Verma-Gandhu M, Huang XX, Blennerhassett P, Jackson W, Mao y, Wang L, Collins SM. *Gut,* 2006;55(2):182-190.
4. Prioult G, Pecquet S. *Allergy,* 2002;57 (Suppl 73) Posters: Food Allergy:101.
5. Mercenier A, Wiedermann U. *Clinical and Experimental Allergy*, 2007;37(4):473-475.
6. Mercenier A, Repa A, Grangette C, Daniel C, Hochreiter R, Hoffmann-Sommergruber K, Thalhamer J, Kraft D, Breitender H, Widermann U. *Vaccine*, 2003;22(1):87-95.
7. Fritsche R, Martin-Paschoud C, Schwarz C, Adel-Patient K, Bernard H, Ah-Leung S, Wal JM. *International Archives of Allergy and Immunology*, 2005;138(4):291-297.
8. Prioult G, Pecquet S, Fliss I. *International Dairy Journal,* 2205;15(5):439-448.
9. Fritsche R. *Toxicology Letters*, 2003;104-141:303-309.
10. Von der Weid T, Ibnou-Zakri N, Pfeifer A. Digestive and Liver Disease, 2202;34(Suppl 2):S255-S28.