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Review

# Sensitivity-related illness: The escalating pandemic of allergy, food intolerance and chemical sensitivity☆,☆☆

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ABSTRACT

The prevalence of allergic-related diseases, food intolerance, and chemical sensitivities in both the pediatric and adult population has increased dramatically over the last two decades, with escalating rates of associated morbidity. Conditions of acquired allergy, food intolerance and chemical hypersensitivity are frequently the direct sequelae of a toxicant induced loss of tolerance (TILT) in response to a significant initiating toxic exposure. Following the primary toxicant insult, the individuals become sensitive to low levels of diverse and unrelated triggers in their environment such as commonly encountered chemical, inhalant or food antigens. Among sensitized individuals, exposure to assorted inciting stimuli may precipitate diverse clinical and/or immune sequelae as may be evidenced by clinical symptoms as well as varied lymphocyte, antibody, or cytokine responses in some cases. Recently recognized as a mechanism of disease development, TILT and resultant sensitivity-related illness (SRI) may involve various organ systems and evoke wide-ranging physical or neuropsychological manifestations. With escalating rates of toxicant exposure and bioaccumulation in the population-at-large, an increasing proportion of contemporary illness is the direct result of TILT and ensuing SRI. Avoidance of triggers will preclude symptoms, and desensitization immunotherapy or immune suppression may ameliorate symptomatology in some cases. Resolution of SRI generally occurs on a gradual basis following the elimination of bioaccumulated toxicity and avoidance of further initiating adverse environmental exposures. As has usually been the case throughout medical history whenever new evidence regarding disease mechanisms emerges, resistance to the translation of knowledge abounds.



**Contents**



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## 1. Introduction

The incidence and prevalence of allergic-related diseases including asthma, (Lau et al., 2002) atopic dermatitis, (Kiyohara et al., 2008) hay fever, (Sih and Mion, 2010) food allergy, (Cochrane et al., 2009) atopic conjunctivitis, (Isolauri et al., 2009) and eosinophilic esophagitis (Nantes Castillejo et al., 2009) has escalated considerably in the last two decades. There has been increasing recognition, however, that not all sensitivities, including many types of food intolerance and chemical hypersensitivity reactions, are related to the classically understood concept of 'allergic' phenomenon involving immunoglobulin(Ig)-E antibody-mediated allergic responses (Gelincik et al., 2008; Miller and Ashford, 2000; Sicherer and Sampson, 2009). Food intolerance, for example, can precipitate a variety of outcomes, including headache, that are unrelated to atopic disease (Millichap and Yee, 2003). Despite discussion in the scientific literature of various hypotheses and theories, many consider the source etiology for escalating allergy, intolerance and sensitivities to be an enigma.

In this paper, a brief overview of the public health problem of sensitivities is initially presented to highlight the issue of allergy, food intolerance and environmental sensitivity. This is followed by the specific objective of this work: to present a review of the available research literature examining the etiology and pathogenesis of sensitivities and sensitivity reactions and to then examine interventions that can be used within clinical settings to address sensitivity problems. Finally, four brief case studies illustrating the pathway to sensitivity-related illness and strategies to advance recovery will be discussed.

## 2. Methodology

This review was prepared by assessing available medical and scientific literature from MEDLINE/PubMed, as well as by reviewing numerous books, toxicology and allergy journals, conference proceedings, government publications, and environmental health periodicals. References cited in identified publications were also examined for additional relevant writings. Searching techniques included key word searches with terms related to allergy, chemical sensitivity, food intolerance and environmental illness. A primary observation, however, was that limited scientific literature is available on the etiology of these disorders, on the pathogenetic mechanisms involved, as well as the general management of sensitivity-related illness and the associated clinical manifestations.

Available publications were reviewed and incorporation of data was confined to information deemed to be of clinical significance. The author's professional observations and experience as an environmental health physician were also incorporated into the discussion of management strategies. The format of a traditional integrated review was chosen as such reviews play a pivotal role in scientific research and professional practice in emerging medical issues with limited primary study and uncharted clinical territory (Dijkers, 2009). Brief case histories were included to illustrate the clinical importance of this issue and to highlight the potential benefit achievable with directed clinical interventions.

## 3. Description of terms

With overlap and ambiguity in commonly encountered vernacular, clarification of language is in order. Intolerance is a broad term describing any type of adverse reaction occurring in response to a specific trigger. Allergy commonly refers to conditions or reactions associated with an IgE antibody-mediated immunologic response following antigenic exposure. Antigen or incitant simply refers to material that, when introduced into the human body, is capable of initiating an immune response. Hypersensitivity or sensitivity are broad terms referring to situations where adverse reactions (including IgE responses) occur in association with exposure to low concentrations of antigenic stimuli such as foods, inhalants, or chemicals that are well-tolerated by the majority of people (Cullen, 1987).

Sensitivity-related illness (SRI), therefore, refers to adverse clinical states elicited by exposure to low-dose diverse environmental triggers, including inhalants (such as pollens), chemicals (such as synthetic perfumes), foodstuffs (such as gluten), biological compounds (such as molds), or electrical stimuli (Rea et al., 1991) (such as electromagnetic radiation). Between individuals with SRI, there may be marked variation in the nature of the clinical or immune response and sensitivity reactions may be apparent from early in life, or may present as acquired problems where no pre-existing difficulty was apparently evident.

## 4. Prevalence of sensitivity-related illness

Sensitivity to various compounds in our environment and our foods has become a ubiquitous phenomenon. The burden of disease related to atopic allergic illness is widespread and rising steadily, particularly in some jurisdictions. Estimates suggest that allergies affect as many as 40 to 50 million American people (University of Maryland Medical Centre, 2010). In Scotland, allergic disorders now affect about one in three of the population at some time in their lives, (Anandan et al., 2009) with over 4% of all primary care consultations in that country relating to allergy (Anandan et al., 2009). In 2005–2006, serum IgE antibodies to peanuts were detectable in an unprecedented 9% of American children, (Branum and Lukacs, 2009) with food allergy remaining a leading cause of life-threatening anaphylactic episodes (Papageorgiou, 2002). With at least 6–8% of the American pediatric population diagnosed with food intolerance, (Gupta et al., 2008) millions of families and educational institutions struggle to keep children safe by precluding exposure to inciting foods.

Not all such intolerance, however, is related to atopic illness. About 20% of the American population changes their diet in response to