

# Airway sensory hyperreactivity linked to capsaicin sensitivity

## Definitions and epidemiology

Akademisk avhandling

som för avläggande av medicine doktorsexamen vid Sahlgrenska Akademin, Göteborgs universitet kommer att offentlig försvaras i Hörsal Arvid Carlsson, Academicum, Medicinaregatan 3, Göteborg, torsdagen den 18 september kl 13.00

av  
legitimerade läkaren  
Åke Johansson

Fakultetsopponent:  
Professor Claes-Göran Löfdahl  
Lunds universitet

Avhandlingen baseras på följande delarbeten:

- I Johansson A, Lowhagen O, Millqvist E, Bende M  
Capsaicin inhalation test for identification of sensory hyperreactivity.  
Respir Med. 2002 Sep;96(9):731-5.
- II Johansson A, Bramerson A, Millqvist E, Nordin S, Bende M  
Prevalence and risk factors for self-reported odour intolerance: the Skovde population-based study.  
Int Arch Occup Environ Health. 2005 Aug;78(7):559-64.
- III Johansson A, Millqvist E, Nordin S, Bende M  
Relationship between self-reported odour intolerance and sensitivity to inhaled capsaicin: proposed definition of airway sensory hyperreactivity and estimation of its prevalence.  
Chest. 2006 Jun;129(6):1623-8.
- IV Johansson Å, Millqvist E, Bende M  
Relationship between airway sensory hyperreactivity and asthma.  
In manuscript 2008.



The Sahlgrenska Academy  
AT GÖTEBORG UNIVERSITY

# Airway sensory hyperreactivity linked to capsaicin sensitivity

## Definitions and epidemiology

Åke Johansson M.D, Institute of Medicine at Sahlgrenska Academy,  
University of Gothenburg, Department of Internal Medicine.

### Abstract

#### Aims:

- To study the relationship between odour intolerance and capsaicin sensitivity and to develop a definition of airway sensory hyperreactivity (SHR).
- To study epidemiology of odour intolerance; particularly regarding airway symptoms, and to relate odour intolerance to possible risk factors.
- To investigate the relationships between SHR and other respiratory diseases.
- To study psychiatric morbidity at SHR.

**Material and methods:** Totally 2847 adult subjects were included in these studies; 55% of them were women and 897 were patients. Studies I and IV were performed among patients referred to the Allergy Centre at the Central Hospital of Skövde, Sweden. Study IV also included a group of asthma patients from three Care Centres. Study II was a cross-sectional, population-based epidemiological study of adult inhabitants in Skövde, and in study III randomly selected individuals from this population-based study were used. In all four studies, we used questionnaires to evaluate the symptoms arising from odour exposure, the consequences of these symptoms for the participants' social lives, and smoking habits. Olfactory function was evaluated in study II. Patients referred to the Allergy Centre were diagnosed with medical history, allergy investigations, and nose and pulmonary function tests when appropriate. In study IV methacholine tests were performed in patients with SHR in order to exclude asthma. Capsaicin inhalation tests were used in study I, III and IV.

**Results:** The limiting value for the capsaicin inhalation test was defined as 35 coughs after provocation with a concentration of either 0.4 or 2.0  $\mu$ M capsaicin. The prevalence of SHR, defined as odour intolerance with affective and behavioural consequences and a positive capsaicin test, was estimated at 6% (95% CI: 4.2-8.4) in a general Swedish population. Odour intolerance with affective and behavioural consequences was reported by 19% (95% CI: 15-22), while one-third reported general odour intolerance. There was no evidence for an increased prevalence of SHR among asthma patients, an increased prevalence of asthma among SHR patients, any relationship between SHR and smoking, any relationship between SHR and depression or anxiety, nor any association between odour intolerance and changed sense of smell.

**Conclusions:** The diagnosis "Airway sensory hyperreactivity" (SHR) is proposed for patients with airway symptoms and affective reactions to and behavioural consequences of odour intolerance, who also have a positive capsaicin inhalation test.

**Keywords:** Capsaicin; chemical sensitivity; epidemiology; odour intolerance; sensory hyperreactivity;