

# **Asthma in West Sweden – a translational study from epidemiology to proteomics**

Akademisk avhandling

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av

Linda Ekerljung

Fakultetsopponent:

Professor Isabella Annesi-Maesano,  
INSERM

Department of Epidemiology of Allergic and Respiratory Diseases  
Paris, France

Avhandlingen baseras på följande delarbeten:

- I. Lötvall J, **Ekerljung L**, Rönmark E.P, Wennergren G, Linden A, Rönmark E, Torén K and Lundbäck B. **West Sweden Asthma Study: prevalence trends over the last 18 years argues no recent increase in asthma.** *Respir Res.* 2009 Oct 12;10:94.
- II. **Ekerljung L**, Bossios A, Lötvall J, Olin AC, Rönmark E, Wennergren G, Torén K and Lundbäck B. **Multi-symptom asthma as an indication of disease severity in epidemiology.** *Eur Respir J.* 2011 Oct;38(4):825-32.
- III. **Ekerljung L**, Bjerg A, Lötvall J, Bossios A, Wennergren G and Lundbäck B. **Increased use of asthma medications strengthens multi-symptom asthma as a marker of severe disease – report from the West Sweden Asthma Study.** *In manuscript.*
- IV. **Ekerljung L**, O’Neil S.E, Sihlbom C, Bossios A, Lötvall J, Hansson S and Lundbäck B. **Quantitative proteomics on nasal lavage fluid from asthma phenotypes.** *In manuscript.*

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# Asthma in West Sweden - a translational study from epidemiology to proteomics

**Linda Ekerljung**

Department of Internal Medicine and Clinical Nutrition, Institute of Medicine,  
Sahlgrenska Academy at the University of Gothenburg

## **Abstract**

Asthma has been increasing in prevalence and morbidity, however it is unclear if the increase continues. Asthma has long been regarded as a single disease entity, but is now recognised as a heterogenic disease with different phenotypes. The overall aim was to investigate asthma and selected phenotypes in the population with regard to prevalence, medication use and differences in mechanism.

In an epidemiologic study of 18 870 responders to a postal questionnaire, living in Gothenburg and Västra Götaland, the prevalence of physician-diagnosed asthma was 8.3%. Compared with a study conducted 18 years ago on the island of Hisingen, the prevalence of most respiratory symptoms had decreased, while there was a small increase in asthma prevalence and a significant increase in allergic rhinitis. As an epidemiological proxy to severe asthma, multi-symptom asthma (MSA) was defined from responses to the questionnaire. The prevalence of MSA was 2% in the population and 24% among asthmatics. The definition was verified in a subgroup of subjects invited to our research clinic. MSA was associated with signs of more severe disease, such as lower lung function, more airway inflammation, hyper-responsiveness and more severe health outcomes. Of subjects with MSA, 92% used asthma medication, compared with 61% of other asthmatic subjects. Inhaled corticosteroids were used by 70% of subjects with MSA, who also reported more frequent use of asthma medication. Selected participants from three phenotypes of asthma, and healthy controls were included in a proteomics study where several differences in protein expression patterns could be detected in nasal lavage fluid. In total 193 proteins was identified with a fold change of at least 1.3 as compared to healthy, these proteins represent different biological functions and pathways between phenotypes.

We conclude that the previous increase in asthma prevalence has ceased and that respiratory symptoms are decreasing. MSA is common among asthmatics and is related to signs of more severe disease, hence MSA can be used an epidemiological marker of disease severity. Medication use is high in MSA, however under-treatment occurs. Further, quantitative proteomics on nasal lavage fluid can be used to identify differences in protein expression between asthma phenotypes, and possibly to detect differences in mechanism.

**Keywords:** asthma, epidemiology, respiratory symptoms, medication, proteomics

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