



Occupational asthma caused by the predatory beneficial mites *Amblyseius californicus* and *Amblyseius cucumeris*

SG Skousgaard, T Thisling, C Bindselev-Jensen, et al.

Occup Environ Med 2010 67: 287
doi: 10.1136/oem.2009.049403

Updated information and services can be found at:
<http://oem.bmj.com/content/67/4/287.2.full.html>

	<i>These include:</i>
References	This article cites 2 articles http://oem.bmj.com/content/67/4/287.2.full.html#ref-list-1
Email alerting service	Receive free email alerts when new articles cite this article. Sign up in the box at the top right corner of the online article.

Notes

To order reprints of this article go to:
<http://oem.bmj.com/cgi/reprintform>

To subscribe to *Occupational and Environmental Medicine* go to:
<http://oem.bmj.com/subscriptions>

5. **Dement JM**, Hensley L, Kieding S, *et al*. Proportionate mortality among union members employed at three Texas refineries. *Am J Ind Med* 1998;**33**: 327–40.
6. **Tsai SP**, Ahmed FS, Wendt JK, *et al*. A 56-year mortality follow-up of Texas petroleum refinery and chemical employees, 1948–2003. *J Occup Environ Med* 2007;**49**:557–67.
7. **Tsai SP**, Chen VW, Fox EE, *et al*. Cancer incidence among refinery and petrochemical employees in Louisiana, 1983–1999. *Ann Epidemiol* 2004;**14**:722–30.

Response to Swaen *et al*

The differences in methods between our meta-analysis and that of Swaen *et al* (*see page 286*) did not 'vastly alter' our most important finding or change our overall conclusion (*Occup Environ Med* 2008;**65**:371–8). Our major conclusion was that evidence of an association between benzene and non-Hodgkin's lymphoma (NHL) could be found when analyses were focused on results from highly exposed workers and were appropriately adjusted for the healthy worker effect. In their analysis of high exposure benzene studies, Swaen *et al* implemented a series of differences in the data used from the studies compared to our own. But despite the fact that every single one of their major changes resulted in a lowering of the summary relative risk, Swaen *et al* also found a statistically significant elevated relative risk (RR) in the high exposure studies (RR=1.33; 95% CI 1.02 to 1.74), just as we did. Even after they adjusted for heterogeneity, the relative risk remained statistically significant if correctly estimated. The one-sided *p* value after this adjustment can be estimated from their CI to be 0.03. Since our *a priori* hypothesis was that benzene increases, not decreases, the risk of NHL, a one-tailed *p* value is clearly most appropriate here.

The Swaen *et al* use of the all-cancer standardised mortality ratio (SMR) to adjust for the healthy worker effect assumes that benzene or any of the other agents that the benzene-exposed workers are exposed to will not cause any other cancer type. However, benzene is a well known cause of leukaemia and risks of this cancer were elevated in many of the studies used in our meta-analyses. Relative risks of other cancers such as lung cancer and mesothelioma were also elevated in some of the studies, probably due to co-exposures like asbestos that can commonly occur with benzene. Because of these increases in other cancers, the use of the all-cancer SMR probably biased the Swaen *et al* summary relative risks towards the null. Without this bias, the Swaen *et al* summary relative risks would have been higher than they reported and even more similar to our results than they already are. In any case, as we noted above, using different data and different methods, Swaen *et al* have produced additional evidence that benzene increases the overall risk of NHL in the available studies to date in a manner which is unlikely to be due to chance.

Craig Steinmaus,^{1,2} Allan H Smith,¹ Martyn T Smith¹

¹School of Public Health, University of California, Berkeley, California, USA; ²Office of Environmental Health Hazard Assessment, California Environmental Protection Agency, Oakland, California, USA

Correspondence to Craig Steinmaus, School of Public Health, University of California, University Hall, Berkeley, CA 94720-7360, USA; craigs@berkeley.edu

Competing interests None.

Provenance and peer review Commissioned; not externally peer reviewed.

Accepted 6 January 2010

Occup Environ Med 2010;**67**:287.
doi:10.1136/oem.2009.051102

Occupational asthma caused by the predatory beneficial mites *Amblyseius californicus* and *Amblyseius cucumeris*

The increasing awareness of problems with chemical pesticides used in greenhouses has led to a widespread use of biological control measures such as beneficial arthropods and microbiological pesticides. However, exposure to microbiological pesticides may confer a risk of immunoglobulin E-mediated sensitization.¹ In a study by Baelum *et al* including 456 greenhouse workers, skin rash, nose and eye symptoms were seen in persons developing sensitization towards beneficial predatory mites during the 3-year study period and Groenewoud *et al* found a prevalence of 23% of sensitization to *Amblyseius cucumeris* in a cross-sectional study of 472 Dutch greenhouse workers.^{2,3} The predatory beneficial mites *A cucumeris* and *Amblyseius californicus* is known to cause sensitization and allergic symptoms from the skin, nose and eyes, but so far no case of occupational asthma caused by these predatory mites has been reported.

A 34-year-old male gardener, a non-smoker, was referred to our Department of Occupational and Environmental Health. The previous 10 years, he had been working in a tomato and green pepper nursery. During October to December each year, he was removing plants and cleaning up in all the greenhouses, including the sweet bell pepper greenhouses, and from January to September, he worked in the tomato nursery. *A californicus* was used as a biological control measure in the tomato nursery in 2003 and 2004 and *A cucumeris* in 2003 to 2007 in the neighboring sweet bell pepper greenhouses. During the past few years before referral, he had recurrent episodes of rash on the hands, wrists and face and symptoms of rhinitis and conjunctivitis with relief of symptoms on days off work. At the beginning of a new tomato season, he developed respiratory symptoms with wheezing and

coughing. He was reported sick by his general practitioner and treated with antihistamines and a short-acting β_2 -agonist, which relieved his symptoms completely. After his sick leave he returned to work but had to leave the tomato greenhouse after 1.5 h of work because of severe respiratory distress. He was seen by his general practitioner who found him severely asthmatic with a pronounced drop in lung function and with a flushing of the face and neck. The patient also complained of itchy and runny eyes. The patient was reported sick again and referred to our Department of Occupational and Environmental Medicine.

On admission he was free of symptoms and free of medication because his symptoms had resolved completely during his sick leave. At the allergy centre, the following tests were performed: (1) Skin prick test (birch, timothy, *Artemisia*, horse, dog, cat, *Alternaria*, *Cladosporium*, *Dermatophagoides farinae*, tomato plants (Sendrico and Aromata), latex and material from the tomato nursery (fresh tomato plants stem and leaf), withered tomato plant (plum tomato), red and green plum tomato and cocktail tomato); (2) histamine release test (HRT) for fresh tomato plant and flower, cultivation material, withered tomato plant, tomato stem and leaf, plum tomato, cocktail tomato and dust from tomato nursery. (3) immune-specific immunoglobulin E (birch, timothy, *Artemisia*, *Alternaria*, *Cladosporium*, *Dermatophagoides pteronyssinus* and *D farinae*, tomato, *Aspergillus niger* and *Cephalosporium acremonium*); (4) patch test (European Standard Series, tomato, tomato leaf and stem, tomatoleoresin, latex and vinyl gloves). All tests were negative. A slight positive skin prick test reaction to *D pteronyssinus* was seen, but this reaction was not reproducible when the test was repeated.

A challenge test was then performed where the patient was handling plant material from the tomato nursery in a plastic bowl. After 5 min of handling the plant material, the patient developed respiratory symptoms with a drop in forced expiratory volume in 1 s (FEV₁) equivalent to 72% of the expected (FEV₁=2.95). To test for sensitization to predatory beneficial mites, allergen preparation was made by extraction of the following species: *Tetranychus urticae*, *Hypoaspis miles*, *A cucumeris* and *A californicus* (for details on allergen preparation, see Baelum *et al*³). HRT (RefLab, Copenhagen, Denmark) revealed clear positive reaction (class V and VI) to *A cucumeris* and *A californicus*, respectively, and no reaction to *Turticae* or *H miles*. Skin prick testing revealed a positive reaction to *A cucumeris* but not to *A californicus*, *Turticae* or *H miles*. A nasal challenge with a mix of *A cucumeris*, *A californicus*, *Turticae* and *H miles* was performed resulting in a forceful clinical reaction including nasal blockage and respiratory distress. Lung auscultation revealed prolonged expiration,

and lung function test showed a marked drop in FEV₁ from 4.2 to 3.6 litres. The patient was treated with terbutaline inhaler, which restored lung function and resolved symptoms completely. HRT was repeated again with a marked positive reaction to *A cucumeris* and *A californicus* class V and VI respectively.

CONCLUSION AND POLICY IMPLICATIONS

This is the first report documenting occupational asthma caused by *A cucumeris* and *A californicus* and emphasizes the need for regulation, guidelines and preventive measures when handling these mites and mite-treated plants. Further studies are

needed to evaluate antigen exposure and identification of workers at risk.

SG Skousgaard,¹ T Thisling,¹ C Bindslev-Jensen,² J Baelum[†]

¹Department of Occupational and Environmental Medicine, Odense University Hospital, Odense, Denmark;

²Department of Allergology and Dermatology, Odense University Hospital, Odense, Denmark

Correspondence to Søren Glud Skousgaard, Department of Occupational and Environmental Medicine, Odense University Hospital, Sdr Boulevard 29, 5000 Odense C, Denmark; soeren.skousgaard@ouh.regionsyddanmark.dk

Competing interests None.

Provenance and peer review Not commissioned; not externally peer reviewed.

Accepted 11 October 2009

Occup Environ Med 2010;**67**:287–288.
doi:10.1136/oem.2009.049403

REFERENCES

1. **Doekes G**, Larsen P, Sigsgaard T, *et al*. IgE sensitization to bacterial and fungal biopesticides in a cohort of Danish greenhouse workers. The BIOGART study. *Am J Ind Med* 2004;**46**:404–7.
2. **Groenewoud GC**, de Graaf in t' Veld C, Wan Oorschot-van Nes AJ, *et al*. Prevalence of sensitization to the predatory mite *Amblyseius cucumeris* as a new occupational allergen in horticulture. *Allergy* 2002;**57**:614–19.
3. **Baelum J**, Enkegaard A, Doekes G, *et al*. *Health effects of predatory beneficial mites and wasps in greenhouses* Pesticides Research No. 110, 2007. Copenhagen (Denmark): The Danish Environmental Protection Agency, 2007.