Incidence of asthma in female Swedish hairdressers.

Albin, Maria; Rylander, Lars; Mikoczy, Zoli; Lillienberg, L; Dahlman Höglund, A; Brisman, J; Torén, K; Meding, B; Diab, Kerstin; Nielsen, Jörn

Published in:
Occupational and Environmental Medicine

2002

Link to publication

Citation for published version (APA):

General rights
Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

• Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
• You may not further distribute the material or use it for any profit-making activity or commercial gain
• You may freely distribute the URL identifying the publication in the public portal

Take down policy
If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.
Incidence of asthma in female Swedish hairdressers

M Albin, L Rylander, Z Mikoczy, L Lillienberg, A Dahlman Höglund, J Brisman, K Torén, B Meding, K Kronholm Diab and J Nielsen

Occup. Environ. Med. 2002;59;119-123
doi:10.1136/oem.59.2.119

Updated information and services can be found at:
http://oem.bmjjournals.com/cgi/content/full/59/2/119

These include:

References
This article cites 26 articles, 10 of which can be accessed free at:
http://oem.bmjjournals.com/cgi/content/full/59/2/119#BIBL

5 online articles that cite this article can be accessed at:
http://oem.bmjjournals.com/cgi/content/full/59/2/119#otherarticles

Rapid responses
You can respond to this article at:
http://oem.bmjjournals.com/cgi/eletter-submit/59/2/119

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 article

Topic collections
Articles on similar topics can be found in the following collections

• Occupational Health (1027 articles)
• Asthma (1056 articles)

Notes

To order reprints of this article go to:
http://www.bmjjournals.com/cgi/reprintform

To subscribe to Occupational and Environmental Medicine go to:
http://www.bmjjournals.com/subscriptions/
Incidence of asthma in female Swedish hairdressers

M Albin, L Rylander, Z Mikoczky, L Lilienberg, A Dahlman Höglund, J Brisman, K Torén, B Meding, K Kronholm Diab, J Nielsen

Objective: To investigate the risk of asthma in hairdressers.

Methods: The incidence of asthma was retrospectively estimated in a Swedish nationwide study including all female hairdressers certified from vocational schools from 1970 to 1995, and a stratified sample of women from the general population were referents. A postal questionnaire included questions on respiratory tract symptoms, atopy, smoking, working periods as a hairdresser, and number of specific hair treatments performed/week. Reported exposures were validated by occupational hygienists. Rate ratios of incidence (IRR) of asthma were estimated by Poisson regression, adjusted for calendar year of observation, hay fever, smoking, and region of domicile.

Results: The crude incidences of asthma/1000 person-years were: 3.9 during active years as a hairdresser, 2.8 among the hairdressers when not working in the profession, and 3.1 among the referents. The corresponding IRR for being an active hairdresser compared with the referents was 1.3 (95% confidence interval [95% CI] 1.0 to 1.6). Moderate effects on risk of asthma were found both from hairdressing work (IRR=1.6 [1.1 to 2.2] among never-smokers) and from smoking (IRR=1.6 [1.2 to 2.2] among referents). However, the combined effect from hairdressing work and smoking (IRR=1.5 [1.0 to 2.1]) was less than expected (p=0.02). No effect modification by respiratory atopy was found. The hairdressers most often performing hair bleaching treatments (IRR=1.5 [0.7 to 3.0]) or using hair spray (IRR=1.4 [0.8 to 2.4]) had, compared with the most infrequent users, a slightly, but not significantly higher incidence of asthma. Exposure to persulphates in hair bleach was estimated to be 0.04–0.15 mg/m³ during mixing of the powder. Reported average number of bleaching treatments agreed well with those performed according to a diary.

Conclusions: Active hairdressing work was associated with a moderately increased incidence of asthma among lifelong non-smokers. The results are moderately supportive, but not conclusive, of associations between asthma and exposure to hair bleach or hair spray.

H airdressers are exposed to several reactive agents with potentially irritant and sensitising effects on the airways. Several case studies on airway symptoms in hairdressers, mostly asthma, have been published, but only a few epidemiological studies. These indicate an increased risk for development of asthma among hairdressers. However, these studies (except Leino et al) are based on few exposed cases or hospital based materials. The European Community Respiratory Health Survey (Kogevasinas et al), and M Kogevasinas; personal communication) found no excess in the prevalence of asthma symptoms or medication among hairdressers. Thus, reliable risk estimates are few and inconsistent. Also the interaction with personal risk factors such as atopy and smoking is unknown.

Among possible aetiological agents in hairdressers’ asthma, the main focus has been on the persulphates used in bleaching powder, but their quantitative contribution to asthma is not known.

We have performed a nationwide study including all Swedish hairdressers certified from 1970 to 1995. They were investigated by a postal questionnaire on exposure and symptoms. The aims of the study were to investigate the incidence of asthma during work as a hairdresser, especially relative to exposure to bleaching powder and hair spray, and effect modification by atopy and smoking.

SUBJECTS AND METHODS

Hairdressers

In Sweden, since 1970 there has been a 3 year training for hairdressers. Usually the training starts at the age of 15 or 16. The third year was spent practising in hairdressing salons until 1993 when practice was organised at the school.

Main messages

- A moderately increased asthma risk was found among female non-smoking hairdressers.
- The risk was slightly, but not significantly, higher for the hairdressers that were most often performing hair bleaching treatments or using hair spray.
- A moderately increased risk of asthma was found from smoking.
- Surprisingly, the risk of developing asthma among hairdressers who smoked was not higher than among women who either worked as a hairdresser or smoked.
- Atopy did not modify the risk from hairdressing work.

From the records of all 29 vocational schools for hairdressers in Sweden, a cohort of female hairdressers born in 1946 or later and who graduated from 1970 to 1995 was established. Altogether 7204 women were identified.

A questionnaire was posted in December 1996. After two reminders 4849 (67%) returned the questionnaires. Reliable data for one or more variables were missing in 892 of the returned questionnaires. Most of these had missing data for several important variables. Thus 3957 hairdressers remain as participants in the final calculations. Descriptive data for participants and non-participants are given in table 1.

Abbreviations: IRR, incidence rate ratio
Referents
As referents 7355 women randomly selected from the general Swedish population in 1996, stratified for age and restricted to the year of birth between 1946 and 1978 were identified. After two reminders 5569 (76%) returned the questionnaire. Among the returned questionnaires reliable data for one or more variables were missing in 664, thus 4905 participated in the final calculations (table 1).

Questionnaire
Asthma
All women were asked if they had or had had asthma and about the year of onset of the disease. A follow up question asked if the diagnosis was confirmed by a physician.

Common risk factors
Information about smoking, hay fever with onset before the age of 18, and childhood eczema was also asked for in the questionnaire. Moreover, the place of residence in 1996 was known for all participants. The distributions of these variables are presented in table 1.

Exposure
The hairdressers were asked to state the calendar years of all employments as a hairdresser from the time they graduated. They also stated if they for some reason were not working as a hairdresser for periods of more than a year. For each employment, the number of times specific performed categories of treatments with bleaching powder and hair spray were performed was asked.

Non-responders
To study the incidence of asthma among non-responders, 589 out of the 2355 hairdressers and 224 out of the 1786 referents (about one fourth and one eighth, respectively) that had not returned the questionnaire were randomly selected. They were contacted in 1998 by a letter in which they were informed that a nurse would later interview them by phone about symptoms and exposure. Altogether, 393 hairdressers (67%) and 134 referents (60%; table 1) were interviewed by telephone. The most common reasons for not performing an interview were: not being listed with a phone number (95 hairdressers (16%) and 47 referents (21%)) and refusal to participate (65 hairdressers (11%) and 23 referents (10%)).

In the telephone interview, based on a questionnaire, hairdressers were asked about periods of employment as hairdressers. Everybody answered questions about asthma and when the symptoms appeared. Also, they were asked about smoking and childhood eczema. The wording of the questions was the same as in the postal questionnaire.

Validation of exposure
We examined the reliability in self reported exposure among the hairdressers by comparing answers of this study to those given 3 years later in another study where a subsample (n=1038) of the hairdressers participated. The same treatments were asked for in both questionnaires, but the answers

---

**Table 1**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Hairdressers</th>
<th>Referents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Participants</td>
<td>All n=4905</td>
</tr>
<tr>
<td>Region (%, south/middle-north)</td>
<td>49.8/50.2</td>
<td>44.2/55.8</td>
</tr>
<tr>
<td>Hay fever (% yes/no)</td>
<td>24.0/76.0</td>
<td>25.5/74.5</td>
</tr>
<tr>
<td>Smoking (% ever/never)</td>
<td>50.0/50.0</td>
<td>52.4/47.6</td>
</tr>
<tr>
<td>Childhood eczema (% yes/no)</td>
<td>16.0/84.0</td>
<td>13.7/86.3</td>
</tr>
</tbody>
</table>

**Table 2**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Hairdressers*</th>
<th>Referents†</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Person-</td>
<td>Incidence</td>
</tr>
<tr>
<td></td>
<td>year (1000)</td>
<td>(1000)</td>
</tr>
<tr>
<td>Calendar year:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1970–80</td>
<td>6</td>
<td>3 477</td>
</tr>
<tr>
<td>1981–90</td>
<td>36</td>
<td>11 548</td>
</tr>
<tr>
<td>1991–96</td>
<td>62</td>
<td>11 704</td>
</tr>
<tr>
<td>Total</td>
<td>104</td>
<td>26 729</td>
</tr>
<tr>
<td>Hay fever:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>41</td>
<td>20 791</td>
</tr>
<tr>
<td>Yes</td>
<td>63</td>
<td>5 939</td>
</tr>
<tr>
<td>Smoking:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>54</td>
<td>12 173</td>
</tr>
<tr>
<td>Ever</td>
<td>50</td>
<td>14 556</td>
</tr>
<tr>
<td>Region:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>South</td>
<td>48</td>
<td>13 983</td>
</tr>
<tr>
<td>Middle-north</td>
<td>56</td>
<td>12 747</td>
</tr>
</tbody>
</table>

*Followed up during active years after certification; †followed up since 18 years of age; ‡IRR from a model with all variables included.
were given in preformed categories in the first study, and in absolute numbers in the second.

Furthermore, a random sample of 19 salons, stratified by the number of hairdressers in the cohort still working there, was selected from one major city (Gothenburg) and the surrounding region to validate the exposure information. Two occupational hygienists visited the salons during the high and low season, asked the hairdressers to fill in the questionnaire again, and also asked them to complete a diary for 3 weeks stating the number of different treatments each day. Personal and stationary measurements of air concentrations of persulphate were made twice at one salon with 20 employees, using IOM samplers with cellulose acetate filters. The filters were analysed at the Regional Institute for Occupational Health in Tampere, Finland. The detection limit was 1.5 µg persulphate/filter.

Statistics
Effects of common risk factors on incidence of asthma
Rate ratios of incidence of asthma (IRR) with 95% confidence intervals (95% CIs) were estimated by a Poisson regression with EGRET software (Statistics and Epidemiology Research Corporation, Seattle). The referents, followed up from 18 years of age, were used to determine the effects of common risk factors on incidence of asthma. Age (six categories; <20, 20–24, 25–29, 30–34, 35–39, and ≥40 years) had no effect (not in table), whereas the incidence of asthma increased during the period of observation (three categories; 1970–80, 1981–90, and 1991–96). Both hay fever and childhood eczema had an effect, but the effect of childhood eczema almost disappeared (IRR=1.2 (95% CI 0.9 to 1.6)) when hay fever was simultaneously included in a multivariate model. A slightly increased incidence of asthma was found among women who were ever smokers and among women living in the middle and northern regions of the country. The final model thus included calendar year of observation, hay fever, smoking, and region (table 2). The estimated univariate effects were, apart from childhood eczema, similar to the estimates obtained from the multivariate model.

Estimation of incidence of asthma among hairdressers
Hairdressers without previous asthma were followed up from the year of certification, usually at the age of 18. Also, the incidence of asthma was calculated only during exposed time—that is, time not working as a hairdresser was excluded. The effect on incidence of asthma of bleaching (three categories; 0–1, 2–7, and ≥8 treatments/week) and using hair spray (three categories; 0–30, 31–50, and ≥51 treatments/week) was evaluated during exposed time.

RESULTS
Asthma incidence
The crude incidence of asthma among the hairdressers was 3.5/1000 person-years (not in table), whereas a higher incidence was found when only years in active hairdressing work was assessed (3.9/1000 person-years, table 2). There was a small difference between the incidence of asthma in the cohort of hairdressers when years not working as a hairdresser was assessed (2.8/1000 person-years, not in table) and that among the referents (3.1/1000 person-years, table 2).

Hairdressers who did not answer the questionnaire (non-participants) reported a slightly higher incidence of asthma according to the phone interview overall (4.9/1000 person-years based on 20 cases) and during active work as hairdressers (0.0/1000 person-years based on 16 cases) than the participants. Non-participating referents also reported a slightly higher incidence of asthma (4.9 per 1000 person-years based on 18 cases) than the participants.

The median time from certification to the onset of asthma was 6 years among the hairdressers. Change of work due to asthma was reported by 29 hairdressers (0.7%) and 34 referents (0.7%).

Effects of work as a hairdresser
A moderate cohort effect of being an active hairdresser compared with the referents (IRR=1.3 (1.0 to 1.6), not in table) was found. The effect was, however, modified by smoking (table 3). Thus, we found an effect of being a hairdresser on the incidence of asthma among the lifelong non-smokers, and an effect of smoking in the referents. A negative effect modification (p=0.02) was indicated by the absence of a further increase in risk during smoking and hairdressing.

Validation of exposure
In the subsample of hairdressers who answered the same questions twice, 46 had reported the highest category of treatments/week (≥8) in the first questionnaire, but for the same calendar year only 14 of them reported a similar number in the second questionnaire (κ value 0.24). The corresponding figures for use of hair spray were 112 and 17 in the highest category (κ value 0.17). Thus, the comparisons indicated a fair to poor agreement.

However, the average number of bleaches performed/week according to the diary agreed with the interval stated in the questionnaire among 13 out of 15 hairdressers. The use of hair spray was generally overestimated in the questionnaire compared with the diaries both during the high and low seasons (one category by nine hairdressers, two categories by three hairdressers; correct category three hairdressers). Personal sampling (three samples) during mixing of bleaching powder with peroxide and application of the mixture gave 15–49 µg persulphate/m³ for sampling periods of

---

**Table 3** Effects of cohort affiliation (active female hairdressers and referents, respectively) and smoking on incidence rate ratio (IRR) (95% CI) of asthma

<table>
<thead>
<tr>
<th>Cohort affiliation</th>
<th>Smoking Never</th>
<th>Smoking Ever</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incidence (1000)</td>
<td>IRR* (95% CI)</td>
<td>Incidence (1000)</td>
</tr>
<tr>
<td>Referrants</td>
<td>2.5</td>
<td>1.0 (–)</td>
</tr>
<tr>
<td>Hairdressers</td>
<td>4.4</td>
<td>1.6 (1.1 to 2.2)</td>
</tr>
</tbody>
</table>

*IRRs are adjusted for calendar year (1970–80, 1981–90, and 1991–96), hay fever (no/yes), and region (south/middle-north).

**Table 4** Effect of spraying and bleaching, respectively, on asthma incidence in a cohort of active female hairdressers. Asthma incidence rate ratios (IRRs) with 95% CIs are shown

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Person-years (1000)</th>
<th>Incidence (1000)</th>
<th>IRR* (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spraying (treatments/week):</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0–30</td>
<td>24</td>
<td>7 807</td>
<td>3.1</td>
</tr>
<tr>
<td>31–50</td>
<td>38</td>
<td>10 457</td>
<td>3.6</td>
</tr>
<tr>
<td>&gt;51</td>
<td>31</td>
<td>6 619</td>
<td>4.7</td>
</tr>
<tr>
<td>Bleaching (treatments/week):</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0–7</td>
<td>10</td>
<td>8 816</td>
<td>3.4</td>
</tr>
<tr>
<td>&gt;7–12</td>
<td>57</td>
<td>14 419</td>
<td>4.0</td>
</tr>
<tr>
<td>&gt;12</td>
<td>10</td>
<td>2 105</td>
<td>4.7</td>
</tr>
</tbody>
</table>

*IRRs in the models are adjusted for calendar year (1970–80, 1981–90, and 1991–96), hay fever (no/yes), smoker (never/ever), and region (south/middle-north).
The salient finding in our study was an increased incidence of asthma among the hairdressers, corresponding to one extra case/1000 person-years. The effect was modified by smoking, and evident only among lifelong non-smokers. A stronger effect, corresponding to two extra cases/1000, was suggested among non-smokers (hairdressers 85%, referents 87%), than among non-smokers (hairdressers 2.4%) than among the referents (3.9%), showing that a selection against more severe respiratory atopy had taken place. Residual confounding between the cohorts is probably present if a selection by severity of disease has been operating within the hay fever group also, as we could not adjust for this.

We had a fairly low response rate to our questionnaire, especially among the hairdressers. We considered the possibility of a selective participation by interviews with the non-participants. A slightly higher proportion of the non-participants than the participants were ever smokers or had dermal atopy. These two variables were determinants of higher risk of asthma among the participants, and we found accordingly a slightly higher incidence of asthma among non-participants than participants in both cohorts. As the participation rate was lower among the hairdressers, this is most likely to lead to a weak underestimation of the difference between the two cohorts.

Accurate information about asthma and the year of onset is important in this study. Self reports about asthma assessed by questionnaire have been shown to be reliable and have a good specificity, especially for age groups below 50 years. We limited our study to these age groups. The sensitivity is moderate, and selective for severity of the disease. This should give an underestimation of the incidence, especially for mild disease, but the high specificity makes it adequate for comparisons of rates. In the present study the proportions of subjects reporting asthma who had been diagnosed by a physician were high, and similar in hairdressers and referents, but higher among smokers (hairdressers 85%, referents 87%), than among non-smokers (hairdressers 73%, referents 73%; not in results).

In a former study of bakers’ asthma, which used a similar approach, Brisman and Järvholm found that when answering a questionnaire on the year of onset of asthma a second time, 47% gave the same year and another 32% ±1 year of the first answer. The incidence of asthma during unexposed time in the hairdressers’ cohort was similar to the one among the referents, indicating an acceptable comparability between the two cohorts and no substantial misclassification between exposed and unexposed years.

Time trends are well established for childhood asthma, but have been less studied for asthma of adult onset. However, an increasing trend also for adult asthma has been indicated in some studies. Also, regional differences have been found with, for instance a higher prevalence in northern than southern Sweden. We found a strong effect of calendar year of observation, and a moderate effect of region of living, but within our span of 18–49 years of age we found no effect of
age. The effect of calendar-year could also to some extent be
due to differential recall for different periods.

We found the expected strong effect on risk of asthma from
hay fever as a marker of respiratory atopy in both cohorts,16 18
but no modification of the cohort effect by respiratory atopy.
This is in agreement with overall findings for occupational
asthma by Kogevinas et al.19

The higher proportion of subjects with asthma diagnosed
by a physician among smokers than non-smokers in both
cohorts may indicate a selective underreporting among the
smokers, and thus that the effect on risk of asthma from
smoking is underestimated. However, such a differential
reporting in smokers and non-smokers should not introduce
interaction with exposure, as it was the same in the two
cohorts. Furthermore, quantitative smoking habits were not
considered in our main analyses, and could, if substantially
different between the two cohorts, have confounded our find-
ings. However, a strong bias is not likely, as median age at
the start of smoking was 16 years in both cohorts (not in results).
Also, the fraction of women among the hairdressers who
stopped smoking were 51%, at a median age of 25 years, and
the corresponding figures among the referents were 52% and
26 years. Moreover, the distributions of cigarettes smoked/day
were almost the same in both cohorts. Overall, a moderate
effect of smoking was found, similar to earlier reports.27 28

However, we found an interaction between smoking and
work as a hairdresser, for which we presently have no
explanation. It has been stated that in occupational settings,
current smokers have a higher risk of developing sensitisation
to high molecular weight agents, whereas non-smokers have a
higher risk for developing asthma due to low molecular
weight compounds.29 If so, our findings would fit into this. The
biological background for such a possible pattern is not
known. If hairdressers' asthma is induced by irritants and not
an IgE sensitising process, it is possible that the proportion of
people susceptible to developing asthma in the population is
limited, and thus once one risk factor is operating, addition of
another does not increase the risk.

ACKNOWLEDGEMENTS
The study was funded by the Swedish Council for Work Life Research,
the Swedish Foundation for Health Care Sciences and Allergy
Research, and by the Medical Faculty Lund University. Gunborg Lin-
dahl assisted with the collection of the cohort, and Karin Amilon, and
Ingrid Lindqvist, with the interviews with the non-participants.
Anders Holmén, assisted in editing the questionnaire for scanning.
Gudrun Persson, GunnelNilsson, Monica Hansì, Helena Brönnmark
and Ulrika Wallin handled the questionnaires. Anna Axmon and
Ann-Kathrine Alveblom supplied us with exposure information from
a subsample who also participated in another study.

Authors’ affiliations
M Albin, L Rylander, Z Mikoczy, K Kronholm Diab, J Nielsen,
Department of Occupational and Environmental Medicine, Lund
University Hospital, SE-221 85 Lund, Sweden
L Lilienberg, A Dahlman Höglund, J Brisman, K Torén,
Institute of Internal Medicine, Section of Occupational Medicine, Sahlgrenska
University Hospital, SE-412 66 Göteborg, Sweden
K Torén, Department of Respiratory Medicine and Allergology,
Sahlgrenska University Hospital, SE-413 45 Göteborg, Sweden
B Meding
National Institute for Working Life, SE-112 79 Stockholm, Sweden

REFERENCES
1 Gamboa FM, de la Cuesta CG, Garcia BE, et al. Late asthmatic reaction
in a hairdresser, due to the inhalation of ammonium persulphate salts.
3 Schwartz HJ. Effect of chronic chromonyl sodium therapy in a beautician
4 Aubart JF, Amellie J. Une nouvelle cause d’allergie respiratoire chez les
5 Parra FM, Igea JM, Quirce S, et al. Occupational asthma in a
6 Schwabimair M, Vogelmeyer C, Fruhmann G. Occupational asthma in
hairdressers: results of inhalation tests with bleaching powder. Int Arch
Occup Environ Health 1997;70:419–23.
8 Blisney AD, Ollier S, Cundell D, et al. Occupational asthma in a
9 Kogevinas M, Anto JM, Soriano JB, et al. The risk of asthma attributable
to occupational exposures. A population-based study in Spain. Spanish
Group of the European Asthma Study. Am J Respir Crit Care Med
1996;154:137–43.
10 Leino T, Tammiilehto L, Paakulainen H, et al. Occurrence of asthma and
chronic bronchitis among female hairdressers. A questionnaire study. J
11 Bena A, D’Errico A, Mirabelli D. A system for the active surveillance
of occupational bronchial asthma: the results of 2 years of activity of the
12 Kogevinas M, Anto JM, Sunyer J, et al. Occupational asthma in Europe
and other industrialised areas: a population-based study. Lancet 1999;
13 Hylén M, Leino T, Sala E, et al. Nasal provocation test in the
diagnostics of hairdressers’ occupational rhinitis. Acta Otolaryngol Suppl
1997;529:133–6.
14 Allman DG. Practical statistics for medical research. London: Chapman
and Hall, 1992.
15 Mansing T, Moret W, RoIüfHeinsoh et al. Acute exposure to hair
bleach causes airway hyperresponsiveness in a rabbit model. Eur Respir J
16 Leino T, Tammiilehto L, Hylén M, et al. Occupational skin and
respiratory diseases among hairdressers. Scand J Work Environ Health
18 Gordon S, NewmanTaylor AJ, Animal, insect and shellfish allergy. In:
Bernstein L, Chan-Yeung M, Malo HL, et al. eds. Asthma in the
19 Brisms SJ, Järvelin MG. Occurrence of self reported asthma among
20 Torén K, Brismar J, Järvelin M. Asthma and asthma-like symptoms in
adults assessed by questionnaires. A literature review. Chest 1993;
104:600–8.
confirming asthma – is there a difference in lung function or degree of
asthma and persistent asthma in young adults has increased in Finland.
reported first attack of asthma in 15 industrialised countries. European
Community Respiratory Health Study (ECHRS). Eur Respir J 1999;
14:885–91.
24 Huovinen E, Kaprio J, Laatinen LA, et al. Incidence and prevalence of
asthma among adult Finnish men and women of the Finnish twin cohort
from 1975 to 1990, and their relation to hay fever and chronic
year trends in the prevalence of asthma and hay fever in adults: the
Midspan family study surveys of parents and offspring. BMJ 2000;
16(suppl 31):111.
27 Torén K, Hermansson BA. Incidence rate of adult onset asthma in
relation to age, sex, atopy, and smoking: a Swedish population based
28 Chen Y, Dales R, Krewski D, et al. Increased effects of smoking and
obesity on asthma among female Canadians: the National Population
29 Chan-Yeung M, Malo JL. Natural history of occupational asthma. In:

www.occenvmed.com