

Asthmagens and spirometry

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1 Purpose and scope

To describe the health surveillance procedures for employees working with asthmagens and to ensure that spirometry meets agreed standards when performed as part of health surveillance or any health assessment.

This document includes a standard for spirometry that is suitable for other health assessments for example pre employment assessment and health promotion activities that do not form part of formal health surveillance procedures.

2 Definitions

Asthmagen

A substance which causes asthma, the term does not imply any particular method of causation. The main agents and processes known to cause asthma are listed in "Preventing asthma at work". Substances with the risk phrase R42 "may cause sensitisation by inhalation" are asthmagens.

Health assessment

Any assessment of an individual's health that is intended to determine whether they are fit to perform a particular task or whether the individual's health has been (or may be) affected by performing a particular task.

Health surveillance

A form of health assessment, which is a statutory requirement under health and safety Regulations and is intended to detect adverse health effects at an early stage, thereby enabling further harm to be prevented. Additional benefits include the facility to check on the effectiveness of control measures, provide feedback on the accuracy of risk assessments, and identify individuals at increased risk.

The risk assessment will have identified the circumstances in which health surveillance is required and the following criteria will apply:

- 1) There is an identifiable disease or adverse health condition related to the work concerned.
- 2) Valid techniques are available to detect indications of the disease or condition.
- 3) There is a reasonable likelihood that the disease or condition may occur under the particular conditions of work.
- 4) Surveillance is likely to further the protection of the health of the employees to be covered.

3 Principles

Health surveillance for employees working with asthmagens will be in accordance with HSE guidance note MS25 and will be of the type described as "high level surveillance" whenever the criteria described in Section 2 are fulfilled.

All spirometry will be performed in accordance with appendix 2.

For health surveillance to be effective it is important that first line managers and employees contact occupational health as soon as any work related respiratory symptoms are noticed or suspected.

4 Responsibilities

- 1) First Line Manager
- 2) Employee
- 3) Occupational health nurse –
 - a) Registered general nurse with a post-registration specialist qualification in occupational health nursing recognised by the statutory nursing bodies of the UK.
 - b) Registered general nurse who has received specific training from and is under the supervision of an occupational health nurse or occupational physician.
- 4) Occupational physician –
 - a) Registered medical practitioner with higher qualification in occupational health (AFOM, MFOM, FFOM or specialist accreditation)

4.1 First line manager

Carry out risk assessments in accordance with The Control of Substances Hazardous to Health Regulations 1994 (COSHH) to identify employees who will require health surveillance.

Refer employees requiring health surveillance to occupational health before commencement of work with asthmagens.

Review risk assessments and control measures as soon as they become aware of suspected cases of respiratory sensitisation.

4.2 Employee

Attend for health surveillance as directed by first line managers or occupational health.

Report any respiratory symptoms to first line managers or occupational health.

Comply with any advice regarding working methods.

4.3 Occupational health nurse

Perform the health surveillance procedure detailed in appendix 1 for all employees working with astmagens and identified in the risk assessment as requiring health surveillance.

Carry out all other health assessments in accordance with the relevant OHSI.

Carry out all spirometry in accordance with appendix 2.

Obtain the opinion of the occupational physician where there is doubt regarding the fitness of any individual.

Advise employee and first line manager of the outcome of the assessment, any work restrictions and the date of next assessment

4.4 Occupational physician

Provide advice to managers performing risk assessments.

Train and instruct occupational health staff where necessary.

Investigate any suspected case of occupational asthma in accordance with guidance note MS 25.

Provide advice to occupational health nurse and management concerning the fitness of any individual and any necessary work restrictions.

5 Key performance indicators and audit criteria

Are employees requiring health surveillance correctly identified by first line managers and referred to occupational health prior to commencing work with astmagens?

Is spirometry performed in accordance with appendix 2?

Are employees referred to the occupational physician in accordance with referral criteria?

Are risk assessments and control measures reviewed when cases of respiratory sensitisation are detected?

6 References

The Control of Substances Hazardous to Health Regulations 1999. HMSO 1999; ISBN 0 11 082087 8. <http://www.hmso.gov.uk/si/si1999/19990437.htm>

Medical aspects of occupational asthma – Guidance Note MS25. HSE Books: 1998. ISBN 0-7176-1547-2.

Preventing asthma at work – how to control respiratory sensitisers. HSE publication L55. HSE Books 1994. ISBN 0-7176-0661-9

Asthmagen – critical assessments of the evidence for agents implicated in occupational asthma. HSE Books. ISBN 0-7176-1465-4

European Respiratory Society 1993. "Standardised lung function testing" The European Respiratory Journal Vol 6, Supp 16, 1993:1-100.

OHS Questionnaires RSHSinit.doc, RSHSquest.doc and SPIRREC2.doc

7 Revision History

Author	Issue	Date	Reason for Revision	Review by
David Shackleton	1	March 1999	First issue	March 2001
David Shackleton	2	January 2001	Revised references	January 2003

These occupational health instructions have been based on current best practice and official guidance. They are aimed at a level analogous to local rules or work instructions within a corporate hierarchy of policies on health, safety, environment and human resources.

Principles, which are applicable to a range of operating units, are followed by specific standards and criteria for use by occupational health professionals. Inevitably the material cannot be applicable in every workplace without some interpretation or amendment.

Current versions will be available to OHS clients at www.occhealth.co.uk and will be updated when necessary. Any comments will be gratefully received at policies@occhealth.co.uk

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Appendix 1 - Work with Asthmagens – Health Surveillance

1) Criteria for inclusion

All employees working with asthmagens where a risk assessment has shown that health surveillance is necessary.

2) Frequency of assessment

Initial – prior to work with asthmagens.

Periodic – 6 weeks, 12 weeks and annually thereafter.

Special – Whenever employee or manager suspects that work may be the cause of respiratory symptoms

3) Content of assessment

Initial – Initial questionnaire (see references), spirometry, review of results by occupational physician and examination as appropriate, inform employee of health risks and symptoms to report, issue advice card e.g. "breathe freely" IND(G)172L

Periodic – Periodic questionnaire, spirometry, discussion with occupational physician and examination as appropriate, remind employee of health risks and symptoms to report.

Special – as for periodic with referral to occupational physician in all cases.

Results and spirometry printout to be filed / recorded in the occupational health medical record using a history sheet or a form which facilitates comparison of subsequent measurements e.g. spirrec2.doc. Where COSHH applies an entry in the Health Record will be made.

4) Fitness Standard

Assessment	Standard
Questionnaire	No positive responses
Spirometry	FEV1 80% of predicted or more FVC 80% of predicted or more FEV1/FVC75% or more[Less than 10% variation of FEV1 between successive attendances

Individuals with asthma are not suited to work with asthmagens.

Personal or family history of atopy is a poor predictor of respiratory sensitisation and will not normally constitute a bar to working with asthmagens.

The presence of audible wheeze, cough and breathlessness on exercise is common, especially in smokers. These symptoms or signs should not automatically lead to referral if questionnaire and spirometry are normal.

5) Criteria for Referral

All new starters will be seen by the occupational physician within 4 weeks of assessment by the occupational health nurse.

Employees who cannot meet the fitness standard will be discussed with the occupational physician in the first instance but not removed from their duties.

Any employee reporting cough, wheeze or chest tightness, which has a clear relationship to workplace exposure, will be temporarily removed from further

exposure to asthmagens and referred directly to the occupational physician. The relationship may be immediate or delayed i.e. coming on over 12 hours.

Appendix 2 - Spirometry

Spirometers will meet the criteria set out by the European Respiratory Society and ERS normal values will be used.

Spirometers will be serviced in accordance with the manufacturers' instructions.

Spirometers will be calibrated at regular intervals, in accordance with the manufacturers' instructions. Equipment that relies on volume measurement (e.g. Vitalograph) will usually be calibrated daily and whenever there is a change in ambient temperature of more than 2 degrees Celsius.

A record of all maintenance and calibration will be kept.

Staff performing spirometry procedures will have been trained to do so and will be able to demonstrate competence.

The subject will be in a seated, upright position.

The subject must be properly instructed and encouraged to use maximum effort when performing the FEV manoeuvre for example:

- 1) "We want to measure how much air your lungs can hold and how quickly you can blow it out".
- 2) "You need to take a deep breath (not through the tube), as deep as you can, and blow it all out through this tube as hard and as fast as you can".
- 3) "You need to put your mouth around the tube, not against it – like this".
- 4) "Try to keep blowing until I tell you to stop, even when it feels like there is nothing left to blow".
- 5) Demonstrate the manoeuvre yourself.
- 6) "OK, your turn but don't worry if it's not right, you can always have another try".
- 7) Encourage the subject throughout the manoeuvre, waiting until no further volume change is occurring, usually five or six seconds but in extreme cases as long as 25 seconds.

A minimum of three tests will be performed to produce the characteristic smooth volume-time curve i.e. jerky, hesitant or incomplete manoeuvres will be disregarded.

Continue testing until the best test variation is less than 5% (about 200ml) or until five tests have been performed.

Interpret the findings for the subject.

Appendix 3 - ERS Normal Values¹

Summary equations for lung volumes and ventilatory flows for adults aged 18-70 years*.

MEN

Variable	Unit	Regression equation	RSD	1.64RSD
FVC	l	5.76H - 0.026A - 4.34	0.61	1.00
FEV ₁	l/s ⁻¹	4.30H - 0.029A - 2.49	0.51	0.84
FEV ₁ /FVC	%	- 0.18A+87.21	7.17	11.8
PEF	l/s ⁻¹	6.14H - 0.043A + 0.15	1.21	1.99

WOMEN

Variable	Unit	Regression equation	RSD	1.64RSD
FVC	l	4.43H - 0.026A - 2.89	0.43	0.71
FEV ₁	l/s ⁻¹	3.95H - 0.025A - 2.60	0.38	0.62
FEV ₁ /FVC	%	- 0.19A+89.10	6.51	10.7
PEF	l/s ⁻¹	5.50H - 0.030A + 1.11	0.90	1.48

The 5th and 95th centiles are calculated by subtracting or adding the figure in the last column from the predicted mean. H = standing height (m); A = age (yr); RSD = residual standard deviation. ***NB.** Between age 18 and 25 substitute age 25 in the equations.

Alternative method of classifying results as normal / abnormal

It is common practice to express results as a percentage of the predicted value, regarding 80% predicted as the lower limit of normal. This is only truly valid where the scatter is proportional to the level of lung function, as in children. In adults the residual standard deviation is a constant and not proportional (to age, height, gender etc. see tables above). If a short, elderly individual and a tall, young individual both have an FEV₁ that is one RSD below predicted then their lung function is comparable. To express the result as %predicted would falsely suggest that the older individual had poorer function.

Standardised residuals can be used to compare actual and predicted values by using a dimensionless index which indicates how far the observed value is removed from the predicted one, and therefore how likely it is that the observed value exists in a reference population. They can also be used to indicate which centile an observed value lies on or near.

$$\text{Standardised residual} = \frac{\text{observed} - \text{predicted}}{\text{RSD}}$$

Standardised residual	-2.326	-1.644	-0.842	0.0	0.842	1.644	2.326
Centile	1	5	20	50	80	95	99

Examples of standardised residuals and corresponding centiles

¹ Adapted from "Standardised lung function testing" The European Respiratory Journal Vol 6, Supp 16, 1993:1-100.