Flat chest may be an acquired deformity of the thoracic cage in patients with pleuroparenchymal fibroelastosis http://ow.ly/tyqfq

Taishi Harada¹, Yuji Yoshida¹, Yasuhiko Kitasato², Nobuko Tsututa¹, Kentarou Wakamatsu¹, Takako Hirota¹, Makoto Tanaka¹, Naoki Tashiro³, Hiroshi Ishii¹, Motokimi Shiraishi¹, Masaki Fujita¹, Nobuhiko Nagata⁴ and Kentaro Watanabe⁵

¹Dept of Respiratory Medicine, Fukuoka University School of Medicine, Fukuoka, Japan. ²Dept of Respiratory Medicine, Kurume Dai-ichi Hospital, Kurume, Japan. ³Dept of Respiratory Medicine, Hamanomachi Hospital, Fukuoka, Japan. ⁴Dept of Respiratory Medicine, National Hospital Organization, Omuta National Hospital, Omuta, Japan. ⁵Dept of Respiratory Medicine, Fukuoka University Chikushi Hospital, Fukuoka, Japan.

Correspondence: K. Watanabe, Dept of Respiratory Medicine, Fukuoka University School of Medicine, Fukuoka 810-0180, Japan. E-mail: watanabe@fukuoka-u.ac.jp

Received: Sept 16 2013 | Accepted after revision: Oct 14 2013

Support statement: This work was partly supported by a grant to the Diffuse Lung Diseases Research Group (Dept of Respiratory Medicine, Jichi Medical University, Tochigi, Japan) from the Ministry of Health, Labour and Welfare (Tokyo, Japan).

Conflict of interest: None declared.

Provenance: Submitted article, peer reviewed.

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Specific inhalation challenge tests for occupational asthma in Europe: a survey

To the Editor:

Asthma is described as “occupational” if it has been induced by an agent encountered in the workplace. The avoidance of further exposure to the causative agent often results in resolution of the asthma, especially if it can be achieved soon after the onset of symptoms [1]. Consequently, occupational asthma is one of the very few types of asthma that are potentially curable.

The implications of this include the importance of early recognition of occupational asthma and of accurate identification of the causative agent. A variety of methods are available to make a diagnosis [2], among which specific inhalation challenge (SIC) testing is generally considered to be the reference standard [3–5]. In this context, SIC testing is the controlled exposure of a patient, under laboratory conditions, to an agent
encountered in their workplace. The technique is complex, specialised and practised only in a limited number of centres. If performed carefully it is an effective, efficient and low-risk strategy for making (or in some cases refuting) a diagnosis of occupational asthma and for identifying a specific causal exposure.

In 2011, we established a Task Force on occupational SIC testing, comprising 15 specialist physicians from 10 European countries; funding was granted by the European Respiratory Society (ERS). Our principle aim was to issue guidance on the indications, methodology and interpretation of SIC tests for those who already provide the service and for those who wish to do so in the future. The work programme included a survey of European centres where SIC testing is currently offered; here we present a summary of the responses to this survey.

Members of the Task Force devised a 40-item questionnaire designed to enquire about the experience and practice of occupational SIC over the previous 3 years. This was sent, by e-mail, to every European member of the Occupational and Environmental Group (6.2) of the ERS. We received and collated responses from 24 separate centres that conduct occupational SIC tests in 12 countries.

**Figure 1** maps the separate European centres where SIC is practised. The international distribution across the continent is uneven: while some countries (notably Finland, Belgium, Italy, Germany and the UK) have several centres, many have none. There is greater variation still in the rates of SIC, depicted by the size of the circles in figure 1, which bear no clear relationship with population numbers.
In the 3 years prior to the survey, the centres had collectively performed 1612 SIC tests, half of them with low molecular weight agents. Table 1 summarises their facilities, practise and experiences over this period after categorisation into two groups of “high” and “low” activity based on the median number of tests (n=12) undertaken annually. In 38% of centres, SIC is routinely used in the diagnosis of occupational asthma; the remainder employ it when alternative diagnostic tests have failed to provide an adequate diagnosis. All but three centres have an enclosed and ventilated chamber dedicated to occupational SIC testing. In all centres, the tests are overseen by a physician; in two-thirds a nurse performs the test, advised by a technician, occupational hygienist or chemist in 54% of centres. These proportions did not differ markedly by the level of activity.

Half of the centres routinely admitted patients to hospital for the duration of the SIC, the remainder carried out the test on an outpatient basis; almost all centres preferred to perform the test after asking patients to stop all treatments for asthma. Simulating work tasks is the most common method of delivering exposure; in almost all centres this was carried out with exposure to an inactive control agent on a separate day to provide a basis for comparison of responses to active exposures. It was rare for more than one active agent to be tested on any one day, although different doses of the same active agent were used in about half of the centres. For almost all centres, the exceptions being two centres in Germany where airway conductance was measured, serial measurements of forced expiratory volume in 1 s were the primary outcome. In addition, assessment of bronchial reactivity was commonly used and, in many centres, the newer techniques of exhaled nitric oxide fraction measurement and sputum cytology were routinely included.

We asked each centre to report the number of excessive asthmatic reactions requiring treatment with oral corticosteroids provoked by SIC over the previous 3 years. Half of the centres reported none; in the remainder (with one exception where an incidence of 18% was reported), the incidence was between 2% and 8%. These proportions were not related to the level of activity in the centre.

We doubt that we have captured the full picture, but in any case, a large number of occupational SIC tests are performed in Europe. However, the distribution of centres that offer tests and the numbers undertaken in each centre are uneven and reflect neither the populations they serve nor the likely regional incidence of

| TABLE 1 Responses to questionnaire items for all centres and after categorisation by median level of annual activity |
|---------------------------------------------|--------|--------|--------|
| **Centres** | **All** | **High activity** | **Low activity** |
| SIC used Systematically to confirm occupational asthma | 9 (38) | 6 (50) | 3 (25) |
| Only if other tests are inconclusive | 14 (58) | 6 (50) | 8 (67) |
| **Number of SIC annually** | | | |
| 12.2 (0.3–124) | 25.0 (12–124) | 8.0 (0.3–12.0) |
| Dedicated** facilities for SIC | 21 (88) | 11 (92) | 10 (83) |
| Physician oversees SIC | 24 (100) | 12 (100) | 12 (100) |
| Nurse performs SIC | 16 (67) | 8 (67) | 8 (67) |
| Hygienist, chemist or technician involved in SIC | 13 (54) | 7 (58) | 6 (50) |
| Informed consent from patient | 19 (79) | 10 (83) | 9 (75) |
| Patients routinely admitted to hospital | 13 (54) | 8 (67) | 5 (42) |
| Inhaled steroids stopped prior to SIC** | 22 (92) | 11 (92) | 11 (92) |
| Control exposure used | 23 (96) | 12 (100) | 11 (92) |
| Simulation of work tasks | 20 (83) | 10 (83) | 10 (83) |
| GenaSIC® or comparable device | 5 (21) | 3 (25) | 2 (17) |
| Different doses of active agent used on same day | 15 (63) | 7 (58) | 8 (67) |
| Different active agents used on same day | 4 (17) | 4 (33) | 0 (0) |
| FEV₁ as primary outcome | 21 (88) | 11 (92) | 10 (83) |
| NSBHR routinely used as an outcome parameter | 17 (71) | 9 (75) | 8 (67) |
| Sputum cytology used as an outcome parameter | 11 (46) | 8 (67) | 3 (25) |
| FeNO used as an outcome parameter | 16 (67) | 8 (67) | 8 (67) |
| SIC with low molecular weight agents in the past 3 years | 822 (51) | 693 (51) | 129 (50) |
| Percentage of SIC with excessive asthmatic response | 0 (0–18) | 2 (0–6) | 0 (0–18) |

Data are presented as n (%) or median [range], unless otherwise stated. SIC: specific inhalation challenge; FEV₁: forced expiratory volume in 1 s; NSBHR: nonspecific bronchial hyperreactivity; FeNO: exhaled nitric oxide fraction. **: enclosed and ventilated chamber reserved for SIC; **: inhaled steroids were stopped prior to SIC always or when possible; ®: GenaSIC [SCL Medtech, Montréal, QC, Canada] is a closed-circuit chamber that facilitates the production of aerosols at steady concentrations.
How is specific challenge testing used in diagnosis of occupational asthma in Europe? This survey provides a summary.

Hille Suojalehto1 and Paul Cullinan2 on behalf of the European Respiratory Society Task Force on Specific Inhalation Challenges with Occupational Agents3

1Occupational Medicine Team, Finnish Institute of Occupational Health, Helsinki, Finland. 2Dept of Occupational and Environmental Medicine, Imperial College, National Heart and Lung Institute, London, UK. 3A full list of the members of the European Respiratory Society Task Force on Specific Inhalation Challenges with Occupational Agents and their affiliations can be found in the Acknowledgements section.

Correspondence: H. Suojalehto, Finnish Institute of Occupational Health, Topeliuksenkatu 41 a A, 00250 Helsinki, Finland. E-mail: hille.suojalehto@ttl.fi

Received: Jan 17 2014 | Accepted: Jan 19 2014

Conflict of interest: None declared.

Provenance: Submitted article, peer reviewed

Acknowledgements: The Task Force members’ affiliations are as follows. P. Cullinan (co-chair): Dept of Occupational and Environmental Medicine, Imperial College, National Heart and Lung Institute, London, UK; H. Suojalehto (co-chair): Occupational Medicine Team, Finnish Institute of Occupational Health, Helsinki, Finland; T.B. Aasen: Dept of Occupational Medicine, Haukeland University Hospital, Bergen, Norway; X. Baur: Institute for Occupational Medicine, Charité University, Berlin, Germany; P.S. Burge: Dept of Respiratory Medicine, Heart of England NHS Foundation Trust, Birmingham, UK; F. de Blay: Division of Asthma and Allergy, Dept of Chest Diseases, University Hospital of Strasbourg, Fédération de Médecine Translationnelle, Strasbourg University, Strasbourg, France; D. Fishwick: Dept of Respiratory Medicine, Royal Hallamshire Hospital, Sheffield, UK; J. Hoyle: Dept of Respiratory Medicine, North Manchester General Hospital, Manchester, UK; P. Maestrelli: Dept of Cardiologic, Thoracic, and Vascular Sciences, University of Padova, Padova, Italy; X. Muñoz: Pulmonology Dept, Hospital Vall d’Hebron, Barcelona, CIBER de Enfermedades Respiratorias (CIBERES), Madrid, Spain; G. Moscati: Department of Public Health, Experimental and Forensic Medicine of the University of Pavia, Pavia, Italy; J. Sastre: Allergy Dept, Fundacion Jimenez Diaz-Capio, CIBER de Enfermedades Respiratorias (CIBERES), Madrid, Spain; T. Sigsgaard: Dept of Public Health, Section of Environment, Occupation and Health, Aarhus University, Aarhus, Denmark; K. Suuronen: Occupational Medicine Team, Finnish Institute of Occupational Health, Helsinki, Finland; O. Vandenplas: Dept of Chest Medicine, Mont-Godinne Hospital, Université Catholique de Louvain, Yvoir, Belgium; J. Walusiak-Skorupa: Dept of Occupational Diseases, Nofer Institute of Occupational Medicine, Lodz, Poland.

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