this capability bestows even further value to induced sputum testing [6].

As to the safety of sputum induction, this technique was found to be free of risk in patients with asthma of varying severity [7, 8] and in patients with chronic obstructive pulmonary disease (COPD) [9]. The sputum induction procedure produces a minimal fall in forced expiratory volume in one second (FEV₁) which can be inhibited by pretreatment with salbutamol [10].

With regard to the decrease of arterial oxygen saturation (SaO₂) during the induction of sputum, the results are still controversial: some reports show a slight fall in SaO₂ which was not clinically significant [9], while others show more significant effects [10]. In light of these inconsistencies, we suggest that the effect of induced sputum on the arterial oxygen saturation in patients with ILD must be monitored during sputum induction. This does not distract from the fact that induced sputum continues to be a much less invasive technique when compared with bronchoalveolar lavage.

In conclusion, we do not propose that induced sputum should replace bronchoalveolar lavage, transbronchial biopsy or other similar techniques but that it serve as another complementary or supplementary test that can be added to those recommended by the American Thoracic Society and European Respiratory Society executive committee for the first evaluation of patients with sarcoidosis, that it serve as another marker of activity to those already proposed as being potential diagnostic aids or indices of activation [11]. Our data show that analysis of CD4/CD8 cell subsets by induced sputum can be as helpful as BAL analysis in diagnosing sarcoidosis, and that it has prognostic value in patients with idiopathic pulmonary fibrosis, for whom there are clinical contraindications for undergoing bronchoscopy or when, for any other reasons, tissue samples are not available.

E Fireman*, Y. Lerman*

*Institute of Pulmonary and Allergic Diseases, Tel Aviv Sourasky Medical Center, †The Occupational Health and Rehabilitation Institute, Ra'anana, The Sackler Faculty of Medicine, Tel-Aviv University, Tel-Aviv, Israel. Fax: 97236974601.

References

1. Fireman E, Lerman Y. Possible future of induced sputum in interstitial lung disease. *Eur Respir J* 2000; 15: 240–242.
2. Fireman E, Topilsky I, Greif J, *et al.* Evaluation of interstitial lung by induced sputum compared to bronchoalveolar lavage. *Respir Med* 1999; 33: 827–834.
3. D'Ippolito R, Foresi A, Chetta A, *et al.* Induced sputum in patients with newly diagnosed sarcoidosis. *Chest* 1999; 115: 1611–1615.
4. Rosen Y, Vulentin JC, Perschuck LP, Silverstein E. Sarcoidosis: from the pathologist's vantage point. *Pathol Annu* 1979; 14: 405–439.
5. Winterbauer RH, Lammert J, Selland M, *et al.* Bronchoalveolar lavage cell population in the diagnosis of sarcoidosis. *Chest* 1993; 104: 352–361.
6. Fireman E, Vardinon N, Burke M, *et al.* The prognostic and diagnostic value of T-lymphocytes subtypes analysis in idiopathic pulmonary fibrosis. *Eur Respir J* 1998; 11: 706–711.
7. Wong HH, Fahy JV. Safety of one method of sputum induction in asthmatic subjects. *Am J Respir Crit Care Med* 1997; 156: 299–303.
8. Tarodo de la Fuente P, Romagnoli M, Godard P, Bousquet J, Chanez P. Safety of inducing sputum in patients with asthma of varying severity. *Am J Respir Crit Care Med* 1998; 157: 1127–1130.

9. Bhowmik A, Seemungal T, Sapsford RJ, Devalia JL, Wedzica JA. Comparison of spontaneous and induced sputum for the investigation of airway inflammation in chronic obstructive pulmonary disease. *Thorax* 1998; 53: 953–956.
10. Castagno A, Chetta A, Foresi A, D'Ippolito R, Malorgio R, Olivieri D. Effect of sputum induction on spirometric measurements and arterial oxygen saturation in asthmatic patients, smokers, and healthy subjects. *Chest* 1999; 116: 941–945.
11. Statement on Sarcoidosis – The Joint Statement of the ATS ERS and VASOG adopted by the ATS and ERS executive committee, February 1999. *Am J Respir Crit Care Med* 1999; 160: 736–755.

Smoking and asthma

To the Editor:

We read with interest the paper of SIROUX *et al.* [1] who analysed the relationship between smoking and asthma severity amongst 347 asthma patients in the Epidemiological study on the Genetics and Environment of Asthma, bronchial hyperresponsiveness and atopy (EGEA) study. They found that smoking increases asthma severity and asthma patients were twice as likely to quit smoking as controls.

We have comparable data on smoking habits and asthma severity for a group of 1,570 asthma patients in Salford, North West England [2]. Details of patients seen by General Practitioners (n=653) for their asthma were obtained from the Salford Asthma Register [3]. Details of patients attending the hospital chest clinic for their asthma (n=700) and those who were admitted to the hospital as an emergency (n=217) were obtained from the Hope Hospital Chest Clinic database. We also have data on the smoking habits of a control group based on a postal survey of local residents. We received 1,102 replies (out of 2,000 questionnaires sent). We found the prevalence of current smoking amongst the groups to be as follows: General population 27.5%; "Mild Asthma" (General Practice Clinic) 19.6%; "Moderate Asthma" (Hospital Clinic) 23%; "Severe Asthma" (Hospital Admission) 32%. Our data is therefore in strong agreement with the data of SIROUX *et al.* [1], asthmatic patients in Salford who smoke tend to have more severe disease and thus are more likely to be seen in clinic or be admitted for their asthma.

In the EGEA study, patients with asthma were twice as likely as controls to describe themselves as exsmokers. This relationship was very different in Salford where asthma patients were less likely to have ever smoked than controls but we found only a weak tendency for asthma patients to quit smoking: Controls 25% exsmokers, "Mild asthma" 26.5%, "Moderate Asthma" 30%, "Severe asthma" 24%. Salford patients with severe asthma were least successful at quitting the habit. We submit that despite their illness, patients with asthma find it difficult to stop smoking and hence more education and awareness is needed to prevent young people from taking up this dangerous habit.

A. Raghuram, B.R. O'Driscoll

Dept of Respiratory Medicine, Hope Hospital, Salford, M6 8HD, UK. Fax: 44 1617874328.

References

1. Siroux V, Pin I, Oryszczyn MP, Le Moual N, Kauffmann F. Relationship of active smoking to asthma and asthma severity in the EGEA study. *Eur Respir J* 2000; 15: 470–477.

2. Raghuram A, Houghton CM, Ansted SJ, O'Driscoll BR. Smoking habits of asthma patients in Salford (Northwest England). *Eur Respir J* 1999; 14: Suppl. 30, 139s.
3. Ansted SJ, McDowall D, O'Driscoll BR. The Salford Asthma Register: a mechanism for auditing a district asthma population and supporting GP asthma care. *Thorax* 1998; 53: Suppl. 4, A75.

From the author:

Despite a different way of assessing asthma severity, RAGHURAM *et al.* [1] confirm our results [2] that active smoking relates to asthma severity. They concluded from their study conducted in Salford that asthma patients were less likely than controls to have ever smoked, but according to available data the prevalence of ever-smokers was not statistically different between asthmatics and controls (50 versus 53% respectively, $p=0.23$).

Although the relationship of asthma to exsmoking was weaker, asthmatic smokers in Salford, as in the Epidemiological Study on the Genetics and Environment of Asthma, bronchial hyperresponsiveness and atopy (EGEA) study, quitted smoking significantly more often than controls (OR (95% CI)=1.3 (1.1–1.7), $p=0.008$). The recruitment of asthmatics was probably based on a more restrictive definition of asthma in the EGEA study, which could explain the difference in OR between studies.

The conclusion that patients with severe asthma were least successful at quitting smoking is in accordance with the EGEA data in which we showed that the severity score was higher in current-smokers. These data and others strengthen the needs of more awareness and advice to prevent asthmatics from taking up smoking.

V. Siroux*, I. Pin[#], M.P. Oryszczyn*, N. Le Moual*, F. Kauffmann*

*Institut National de la Santé et de la Recherche Médicale U472, Villejuif, France. [#]Hôpital Albert Michalon, Grenoble, France.

References

1. Raghuram A, O'Driscoll BR. Smoking and asthma. *Eur Respir J* (to be completed).
2. Siroux V, Pin I, Oryszczyn MP, Le Moual N, Kauffmann F. Relationships of active smoking to asthma and asthma severity in the EGEA study. *Eur Respir J* 2000; 15: 470–477.

Nocturnal ventilation in neuromuscular diseases

To the Editor:

The paper "Mechanisms underlying effects of nocturnal ventilation on daytime blood gases in neuromuscular diseases", by ANNANE *et al.* [1], published in the European Respiratory Journal, attempts to explain the still unclear mechanism whereby noninvasive nocturnal mechanical ventilation (NNMV) improves diurnal hypercapnia in neuromuscular patients with chronic respiratory failure.

They documented for the first time an increase in ventilatory CO₂ response after prolonged NNMV induced normocapnia. The authors conclude that the improvement of daytime hypoventilation with NNMV, may represent an adaptation of the central chemoreceptors to the reduction of profound hypercapnia during sleep or reflect changes in the quality of sleep.

The first mechanism, however, cannot explain CO₂ normalization after NNMV in central alveolar hypoventilation where respiratory drive may not be restored [2]. On the other side a normal mean CO₂ tension in arterial blood (P_{a,CO_2}) was obtained at the first year when the mean CO₂ ventilatory response had increased 84% but only from 1.33–2.45 L·min⁻¹·kPa⁻¹, a range which may be observed in many hypercapnic patients. However, considering individual data shown (fig. 1 of the original article) at 1 yr, though P_{a,CO_2} was decreased in every patient [1], ventilatory drive was virtually unchanged in several for whom another explanation must be sought. At any rate, it may be difficult to decide if an increased drive is the cause or the result of NNMV induced normocapnia, since concomitant HCO₃ decrease enhances central drive [3].

Accepting that normal minute ventilation ($\dot{V}_E$)/ P_{a,CO_2} is not <6 L·min⁻¹·kPa⁻¹ only three patients fell into that category, that is a substantial number of patients who normalized their P_{a,CO_2} remained however with depressed $\dot{V}_E$ / P_{a,CO_2} response. In two patients [1], P_{a,CO_2} increased at the third year ($P_{a,CO_2} > 6.6$ kPa, fig. 1b of the original article). It would be interesting to know their $\dot{V}_E$ / P_{a,CO_2} slope evolution. Also at least two patients increased their $\dot{V}_E$ slope >1 yr after beginning NNMV, it seems difficult to believe that resetting may take so long. In our experience, in patients without airway obstruction when nocturnal ventilation is adequate P_{a,CO_2} is normalized in a few days despite the fact that P_{a,CO_2} /mouth occlusion pressure ($P_{0.1}$) may remain indefinitely abnormal.

Figure 2 in the paper by ANNANE *et al.* [1] is difficult to understand. Considering the data shown the authors conclude that the reduction of diurnal P_{a,CO_2} correlated with the increase of slope. Is each point in this figure representative of the best result during the study irrespective of time? Were the maximum values in the x and y axis, time related? So if 9/14 patients had a reduction in P_{a,CO_2} <1 kPa and 7/14 patients had a maximal reduction in the slope <1 L·min⁻¹·kPa⁻¹. If all patients had responded, no correlation could be found. Data correlation on the other side, does not necessarily imply cause-effect relationship.

In accordance with these considerations, the relationship between the ventilatory response to carbon dioxide and development of chronic hypercapnia remains unclear to us. We believe that the washout of the carbon dioxide stores [4] during nocturnal ventilation could explain the normalization of diurnal hypercapnia [5, 6].

E.L. De Vito, A.J. Roncoroni

Laboratorio Pulmonar, Instituto de Investigaciones Medicas "Alfredo Lanari" Universidad de Buenos Aires, Buenos Aires, Argentina. Address: Combatientes de Malvinas 3150, PC1427, Buenos Aires, Argentina. Fax: 54 145148708.

References

1. Annane D, Quera-Salva MA, Lofaso F, *et al.* Mechanisms underlying effects of nocturnal ventilation on daytime blood gases in neuromuscular diseases. *Eur Respir J* 1999; 13: 157–162.
2. Roncoroni AJ, Montiel G, Semeniuk G. Bilateral carotid body paraganglioma and central alveolar hypoventilation. *Respiration* 1993; 60: 243–246.