in a quiet, single room for the 24-h test period; studies were done at 1:00 PM and 1:00 AM, both in supine position with a close-fitting face mask and nasal packing to ensure mouth breathing. Subjects inhaled nebulized saline solution (control) and citric acid, delivered by an ultrasonic nebulizer. The citric acid was dissolved in the saline solution, providing incremental concentrations from 0.3 to 360 mg/mL. The subject's cough was recorded with a lapel microphone attached to the clothing, and connected to a tape recorder. The cough threshold was defined as the concentration at which the subject coughed at least five times, provided he or she also coughed at subsequent higher concentrations.3

The threshold concentration of citric acid was higher in patients than in control subjects during the day (25.1 [± 1.3] mg/mL vs 6.3 [± 1.3] mg/mL; p < 0.01) and during the night (63.1 [± 1.3] mg/mL vs 15.8 [± 1.3) mg/mL; p < 0.01). Furthermore, cough threshold in the night was significantly higher than that during the day in both patients and control subjects, and mean fold increase in cough threshold in the night did not differ significantly between both groups (2.5 [0.3] vs 2.5 [0.2]; p > 0.50) (Fig 1). Cough was always associated with an arousal.

We conclude that the cough reflex is depressed during sleep and is always associated with arousal. Attenuation of the cough reflex during sleep may predispose to nocturnal aspiration and sputum retention in the elderly, irrespective of a previous episode of aspiration pneumonia.

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REFERENCES

The Mortality of Untreated Pulmonary Embolism in Patients With Intermediate Probability Lung Scans

To the Editor:

Available estimates of the mortality of untreated pulmonary embolism (PE) are largely based on historical studies which were small and methodologically flawed.1 The purpose of this letter is to report previously unpublished data that suggests the need for a more contemporary estimate.

In a prospective study conducted at Christchurch Hospital, 504 consecutive medical inpatients underwent a lung scan between July 1996 and April 1997 to assist in the diagnosis of suspected acute PE.2 One hundred thirty-five of the lung scans (27%) were reported as showing intermediate probability of PE. In other studies, it has been observed that at least 30% of patients with lung scans showing a similar appearance will be shown to have PE by other methods.3,4

Forty-one (30%) of the intermediate probability group patients were selected for study because they did not have investigations of the lower limbs to help to exclude thromboembolic disease (TED), nor other tests relevant to the diagnosis of TED. They also did not receive anticoagulant or other specific treatment for PE, other than a day or two of IV heparin, while awaiting the results of tests.

Follow-up was undertaken 2 years later, on the assumption that all cases of suspected recurrence of TED would be referred back to the public hospitals serving the region, either as inpatients or outpatients. Inspection of the relevant hospital records showed that all of these patients remained in the region, and 70% had further hospital contacts for other reasons. None of these 41 patients has subsequently died of PE or been readmitted to the hospital for suspected recurrence.

Twenty-eight of the group of 41 had a positive D-dimer test (SimpliRED; AGEN Biomedical; Brisbane, Australia), the result of which was not known to the attending physicians. We have subsequently established that a positive D-dimer test in the cohort of the 504 inpatients was associated with a risk ratio for objectively diagnosed PE of 18.61 (95% CI 4.54, 76.3). It seems reasonable to assume that many of the patients with intermediate probability lung scans and a positive D-dimer test had suffered a PE.

Analysis of outcome in this group of 28 high-risk, untreated patients, showed that eight died subsequently, but none of these deaths was attributed to PE, although none had an autopsy.

We conclude that the mortality of untreated PE among patients was intermediate probability lung scans (and probably of PE in general) is currently likely to be substantially less than the widely quoted 20 to 30%.5

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REFERENCES

Elevation of Peak Expiratory Flow by “Spitting” Maneuver

To the Editor:

I read with interest the paper by Strayhorn and colleagues on elevation of peak expiratory flow by a “spitting” maneuver (April