relationship between bronchial hyperresponsiveness (BHR) and physical activity. Several hypotheses are invoked to explain this association, including a suggestion that physical activity reduces bronchial inflammation by altering airway physiology.

Their major hypothesis is that obesity reduces physical activity and that it is this reduction in physical activity which causes, in some mysterious way, the increase in BHR observed. Their proposed mechanism—that this lack of exercise is associated with a decrease in deep inspiration—is truly breathtaking.

We suggest a much more obvious explanation, which is supported by the published evidence. In our recent survey reported in *Thorax*[2] we demonstrated a highly significant association of body mass index with chronic cough. Other associations observed in this study infer that the cough of obesity is reflux in nature. If obesity leads to reflux-related respiratory symptoms, can this form of upper airway reflux cause BHR?

Unfortunately, Shaaban *et al*[1] do not provide us with any information concerning the incidence of classic reflux symptoms in their population. In a study of patients with dyspepsia and endoscopically proven gastro-oesophageal reflux by Bagnato *et al*,[3] over one-third had significant BHR. These subjects had no personal/family history or symptoms suggestive of asthma.

However, about two-fifths of patients in the study by Shaaban *et al* had asthma-like symptoms, defined as wheeze and sedentary breathlessness. We suggest that these patients could still have reflux-related symptoms as one-third of patients with chronic reflux cough, as demonstrated by pH monitoring, complain of exertional wheeze and dyspnoea.[4]

With the rising levels of obesity in the population, the accurate recognition of the aetiology of the associated BHR is vital to avoid the spurious diagnosis of "late onset" asthma. Perhaps reflux asthma would be a better—but, as yet, unproven—term.

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Bronchial responsiveness and airway inflammation in trained subjects

We read with interest the paper by Shaaban and coworkers[1] on the protective effect of physical activity against bronchial hyperreactivity (BHR) in the general population. The authors suggest that a beneficial effect of deep inspirations during exercise could account for the lower prevalence of BHR in physically active subjects compared with sedentary subjects, while the accompanying editorial[2] favours an "anti-inflammatory" effect of exercise as the most plausible explanation.

We have studied lung function and airway cell biology in non-asthmatic amateur athletes[3 4] and found that both modulation of airway responsiveness and downregulation of airway inflammation occur with training. At rest, the response to single-dose methacholine inhalation in the absence of deep breaths was significantly lower in amateur runners than in age-matched sedentary controls.[3] Shortly after a marathon race the response to methacholine was further blunted, suggesting a causal relationship between endurance exercise and low bronchial responsiveness,[3] possibly mediated by ventilation at increased lung volumes.

We have previously reported large numbers of neutrophils in induced sputum of runners.[4] However, this finding was not associated with evidence of neutrophil activation after intense exercise, since expression of adhesion molecules by airway neutrophils decreased and the elastase concentration in sputum supernatants was unchanged after a marathon race compared with baseline.[4] Similarly, inflammatory cell infiltration in the airways was not associated with activation of the NFκB pathway in endurance-trained mice,[5] while airway inflammation was found to decrease strikingly in ovalbumin-sensitised trained mice compared with sedentary mice.[6] Exercise therefore appears as a model of tightly regulated airway inflammation, possibly secondary to exercise-induced mild bronchial epithelial damage.[5] Along the same line, physically active smokers appear to be protected against lung function decline and the risk of developing chronic obstructive pulmonary disease compared with sedentary smokers,[7] supporting a role for regular exercise in blunting airway inflammation.

We acknowledge that athletes, even at the amateur level, do not represent the general population. On the other hand, a publication bias may have favoured preferential reporting of exercise-associated BHR in athletes, especially those training under extreme environmental conditions (such as "ski asthma") or exposed to irritants (such as swimmers). It is time to reconsider the beneficial effects of regular exercise as a strategy to preserve respiratory health. Studies like that by Shaaban and coworkers will certainly help us to move in this direction.

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Propionibacterium acnes in granulomas of a patient with necrotising sarcoid granulomatosis

Necrotising sarcoid granulomatosis (NSG) was first described by Liebow[1] in 1973. It is defined by three pathological features: the presence of a conglomerate mass of sarcoid-like granulomas; varying degrees of necrosis within the confluent granulomas; and vasculitis with granulomas and giant cells involving the walls of muscular arteries and veins. The relationship between NSG and classic sarcoidosis is controversial. In NSG hilar lymphadenopathy is not seen as frequently as in sarcoidosis, extrapulmonary involvement is rare and serum levels of angiotensin-converting enzyme (ACE) are not necessarily raised.[2]

The cause of sarcoidosis is unknown, but it has been hypothesised that it results from exposure of a genetically susceptible individual to specific environmental agents. Abe *et al*[3] isolated *Propionibacterium acnes* (*P acnes*) in culture from sarcoidosis biopsy specimens, and recently the *P acnes* genome has been detected in sarcoid lymph nodes by

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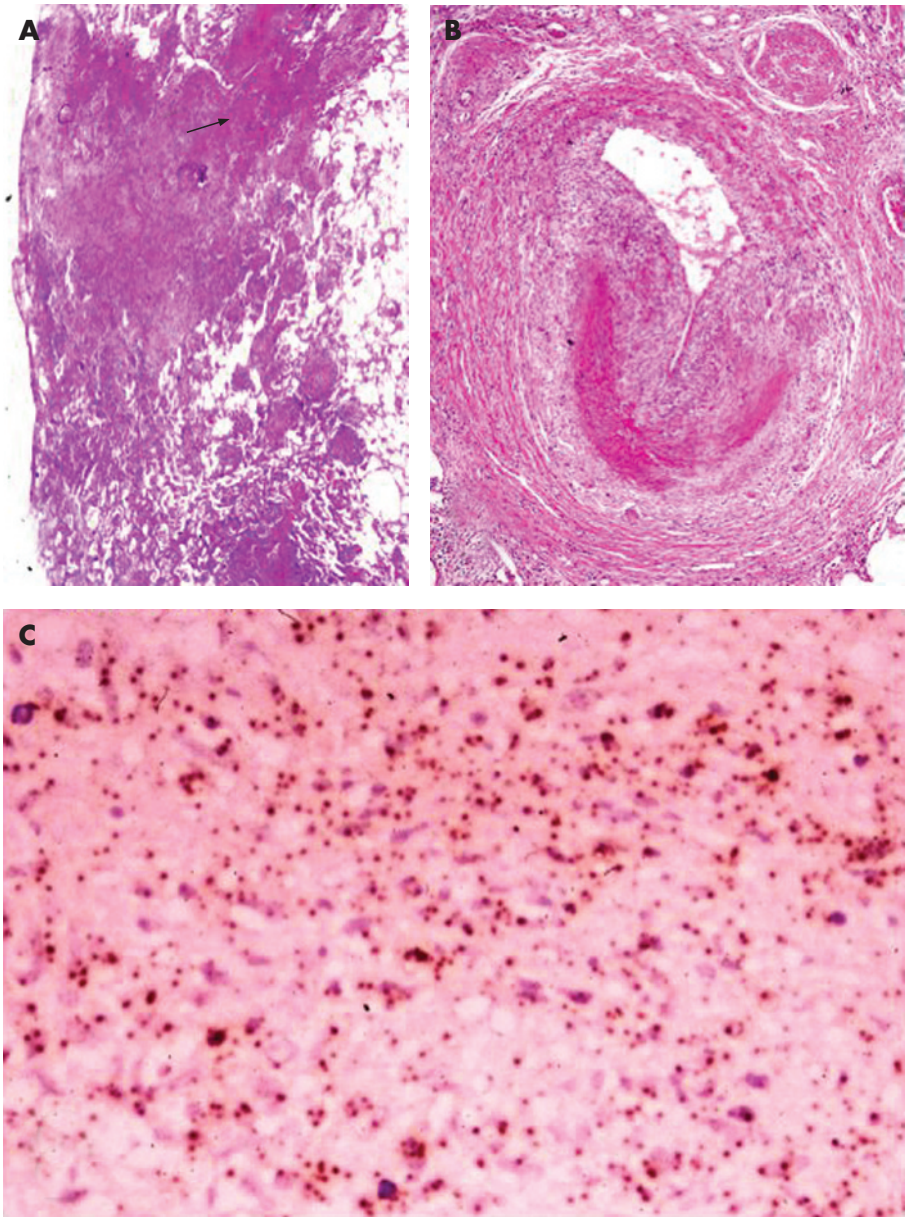

Figure 1 (A) Open lung biopsy specimen revealing necrotising granulomas (arrow) with giant cells aggregated in masses and distributed in a lymphangitic pattern. (B) Granulomatous vasculitis was also present: granulomas infiltrated the vascular walls and almost completely occluded the lumens of the vessels. (C) Genomic DNA of *Propionibacterium acnes* was detected in abundant amounts by in situ hybridisation in the lung tissue of a patient with necrotising sarcoid granulomatosis. Numerous dots indicate the existence of *P acnes* in the granulomas.

polymerase chain reaction[4] and in situ hybridisation.[5] The *P acnes* genome was less frequently and less abundantly detected in tuberculosis specimens.[4 5] Thus, an aetiological relationship between *P acnes* and sarcoidosis has been advocated. We report here the first case of a patient with NSG in whose lung specimens were found abundant *P acnes* genome.

A 65-year-old female non-smoker with no history of dust exposure or pet ownership was referred to our hospital with bloody sputum. The patient's superficial lymph nodes were not palpable. No abnormal findings were revealed by ophthalmological or otolaryngological examinations. Serum levels of C-reactive protein and lysozyme were raised to 2.62 mg/dl and 10.8 μg/ml, respectively. Antinuclear antibody, rheumatoid factor and antineutrophil cytoplasmic antibody were negative. The ACE level was within the normal range. A skin test with purified protein derivative was negative. Small mediastinal and hilar lymph nodes were detected on CT scanning. Multiple irregularly marginated consolidations with air bronchograms were distributed predominantly in peribronchovascular or subpleural lesions of both lungs on a high-resolution CT scan. Total cell count of bronchoalveolar lavage fluid was 9.7×10^5/ml with a cell population of 88% macrophages, 5% neutrophils, 5% lymphocytes and 2% eosinophils; the CD4+/CD8+ ratio was 11.1. Pathological findings of open lung biopsy specimens were consistent with NSG (fig 1A and B) and no pathogenic organisms (including mycobacteria and fungi) were detected in culture of the biopsy specimens. The patient was diagnosed with NSG. *P acnes* DNA was detected in abundant amounts in the granulomas by in situ hybridisation (fig 1C).[5]

This is the first report of NSG with *P acnes* DNA found in the granulomas of lung specimens. This may indicate an aetiological link between NSG and *P acnes*, and it also suggests that NSG is an atypical sarcoidosis with a common aetiology. The clinical and pathological differences between these diseases could be explained by variability in the host response to *P acnes* or the histological location of *P acnes*, although further study would be necessary to arrive at more definite conclusions.

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Symptoms limiting activity in cancer patients with breathlessness on exertion: ask about muscle fatigue

Rehabilitation is an integral part of cancer care and aims to maximise the functional

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