

The article and the editorial give a similar presentation of the hypothetical mechanism by which airway inflammation translates into an increase in EBT through increased vascularity and bronchial blood flow. This general model seems adequate to explain most of the data, but indications of other determinants of EBT also need to be considered. We would like to specifically focus on air trapping. In a recent study we tried to answer the question as to whether treating asthma patients with inhalatory anti-inflammatory formulations reaching farther into the lung periphery had added value.<sup>3</sup> We used forced vital capacity (FVC) as a measure of small airways improvement; it is a highly reproducible indicator that is available in routine practice, and it has also been proven to reflect air trapping, as evidenced by its change during methacholine testing.<sup>4</sup> Asthmatic subjects whose FVC improved most after treatment tailored for the small airways demonstrated the most significant decrease in EBT. The significant odds ratio of a good response if baseline FVC was lower could indicate that small airways opened up, releasing trapped air.

The initial EBT measurements were made in conjunction with fractional exhaled nitric oxide (FeNO) assessment, the assumption being that both tests reflect similar aspects of airway inflammation. However, while FeNO exclusively captures eosinophilic inflammation,<sup>5</sup> EBT measurement provides meaningful information in other conditions of the large spectrum of obstructive diseases of the airways. EBT can be quite low in advanced chronic lung diseases where FeNO has no value, adding an important dimension to the applicability of the method. These seemingly similar non-invasive methods can be used conjointly to differentiate between the airway inflammation and destruction signals. Documenting EBT at a time of adequate disease control may serve as a reference point to assess the onset of inflammatory exacerbation in the short term, and of advancement of destruction in the long term.

An important issue is the reliability of EBT measurements. Factors such as food intake, air pollutants, aerosolised drugs, infections and comorbidities should be considered as possible confounders.<sup>6</sup> The technical aspects of EBT measurement are also important. Various systems using single or multiple breaths have been employed by research teams.<sup>6</sup> The advantages of portable hand-held devices, such as those used by García et al., are mainly their simplicity and the possibility of using them as individual management tools. Over the past several years there have been substantial modifications in their construction, which have reduced the time of measurement and improved their reproducibility.

We do hope that this additional information may provide better insight for the use of EBT measurements in research and bring it closer to routine clinical practice.

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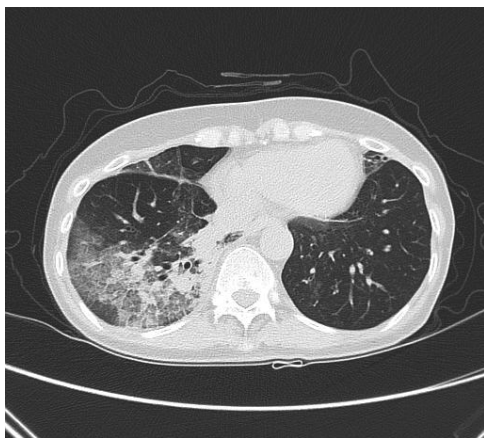
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#### Recurrent lipid pneumonia associated with oil pulling

A 56-year-old female visited our hospital with fever (38.8°C) and cough for 2 days. Chest computed tomography (CT) showed multi-segmental pneumonic consolidation in both lungs. White blood cell count was 12 430/mm<sup>3</sup> (neutrophil 86%), and high sensitivity serum C-reactive protein was 164.34 mg/l (normal 0–1.0 mg/l). Later, her sputum culture isolated *Klebsiella pneumoniae*, which is sensitive to all antibiotics except ampicillin.

This was the patient's fourth admission due to pneumonia in a 6-month period. During the first and the second admissions, 2 months apart, chest CT showed multifocal consolidation on both lungs and she improved on broad-spectrum antibiotics. Her third pneumonia developed one month after discharge from the second admission. Chest CT showed extensive infiltration in the right lower lobe with a mixed pattern of consolidation and ground-glass opacity (Figure). In retrospect, these findings could have indicated the cause of the recurrent pneumonia because they resembled the crazy-paving pattern of lipid pneumonia. However, she denied any specific history of ingesting lipids such as fish oil or squalene. She was negative for anti-human immunodeficiency virus antibody, and routine work-up for possible causes of immunosuppression was negative. She was taking only amlodipine for hypertension. Bronchoscopy, performed twice, showed nothing significant.



**Figure** Chest computed tomography taken during the patient's third admission shows mixed consolidation and ground-glass opacity in the right lower lobe, which resembles the crazy-paving pattern commonly observed in lipoid pneumonia.

During the fourth admission, we meticulously inquired about every possible cause of her recurrent pneumonia, and she revealed that she had been oil pulling 2 weeks prior to her first admission. She did not perform the procedure during the admission period, but on discharge, she returned to the practice even more rigorously to remove any possible toxic effects of medicines she had taken during her hospitalisation. It is highly likely that she aspirated oil during the mouth holding period, and her recurrent pneumonia must have developed from aspirated, microbe-rich oil. On our recommendation, she stopped performing oil pulling, and she has not developed pneumonia in the 2 years since her last discharge.

Oil pulling is a traditional folk remedy that originated in India. The practitioner rinses the mouth with approximately one tablespoon of oil (usually sesame or sunflower oils) for 15 to 20 min on an empty stomach, then spits it out. Inside the mouth, the oil turns

from clear and thick to a thin, white, milky consistency due to absorbed bacteria and toxins. While it is recommended not to swallow the oil, this is sometimes unavoidable. The practice is mentioned in the Ayurvedic text, which describes oil pulling as a remedy to both improve oral health and treat systemic diseases such as diabetes mellitus or asthma.<sup>1</sup> While scientific evidence is lacking to support any systemic benefits of oil pulling, some studies have suggested that it may reduce oral plaque, halitosis, and gingivitis.<sup>2-4</sup>

Oil pulling is advertised as a simple, economic and safe remedy, and many followers practise it around the world, including in South Korea. However, it would now appear that oil pulling can cause recurrent lipoid pneumonia.

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