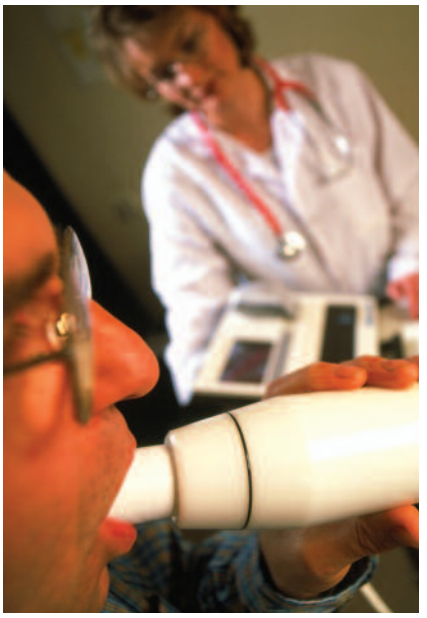

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Differentiating COPD and asthma

Is it worth the effort?

The treatments of COPD and asthma were previously centred on symptom relief using bronchodilators. Increased understanding of the two conditions has led to therapy becoming much more condition-specific, and the two conditions should be differentiated to enable best treatment.

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Asthma and chronic obstructive pulmonary disease (COPD) together account for the largest health burden of respiratory disease in the developed world, and are increasing in developing nations. Asthma is seen in all age groups, although it is especially prevalent in childhood and adolescence, and 40% of all Australians are thought to have asthma at some stage in their lives.[1] Symptomatic COPD is thought to occur in at least 300,000 Australians, but perhaps up to 1 million, with annual direct costs projected at $500–900 million.[2,3] COPD ranks third and asthma ninth as leading causes of total disease burden in Australia.[2]

Although the management of COPD and asthma has been similar, now that the differences between the two conditions are becoming clearer, their treatments are becoming more specific.

Pathophysiological differences

Asthma and COPD are both characterised by airway inflammation as a response to noxious stimuli. For uncertain reasons, however, the pattern of inflammation is significantly different between the two conditions, the initiators of inflammation differ, and the ultimate effects in the lung are different (Table 1).

The histopathological features of asthma are chronic but they do vary with time and are sometimes modifiable by eliminating the relevant noxious stimuli. They are usually highly responsive to a variety of medications. COPD runs a more progressive course, with more consistent symptoms and lung function changes over time. In both conditions, however, inflammation and bronchial smooth muscle contraction can be heightened

IN SUMMARY

- **COPD and asthma are common and often underdiagnosed and misdiagnosed in adults.**
- **The symptoms of COPD develop slowly and may be attributed to ageing or other causes.**
- **It is important to differentiate between COPD and asthma because the treatment approaches differ.**
- **Spirometry is an underused resource that supplements good history taking in distinguishing between the conditions.**
- **The various drugs used to relieve the symptoms of asthma and COPD are not equally effective in the two conditions.**

intermittently (for example, by respiratory infection, allergen or pollution exposures, or other less well defined triggers), leading to exacerbations.

Symptoms during exacerbations of asthma and COPD can be similar (that is, cough, dyspnoea, wheeze and sputum production), and this can blur the distinction between the two conditions. Between exacerbations, however, the symptom and lung function variability in asthma is much greater (Table 2). While exertion can result in breathlessness in both COPD and asthma, it tends to be more predictable in COPD, where it progressively increases with continuing exertion but is relieved almost as soon as the exertion stops, with full recovery within 2 to 5 minutes. In exercise-induced asthma, the dyspnoea is often at its worst 5 to 10 minutes after exertion stops, after which time recovery occurs. Productive cough is more often seen in COPD, and wheeze is more common in asthma.

Table 1. Pathophysiology of asthma and COPD

	Asthma	COPD
Typical stimuli	Allergens, infections	Smoke, infections
Inflammatory cascade components	CD4+ T-lymphocytes, eosinophils	CD8+ T-lymphocytes, macrophages, neutrophils
Effects on:		
– airway epithelium	Marked epithelial cell shedding	Squamous metaplasia and neutrophil infiltrate
– airway lumen	Narrowed (variably), mucus plugging	Narrowed (consistently), serous/mucus excess
– subepithelium	Inflamed with eosinophils, oedematous, thick basal lamina	Neutrophil infiltrate (few eosinophils)
– mucous glands and goblet cells	Hypersecretion, hyperplasia	Hyperplasia
– smooth muscle	Hyper-responsive, hypertrophy	Small airway remodelling
– lung parenchyma	Normal	Emphysematous

Table 2. Differences in clinical features between asthma and COPD

	Asthma	COPD
Symptoms:		
– dyspnoea	Variable, post-exercise	Consistent, limiting exercise
– wheeze	Prominent, variable	Less prominent
– cough	Dry	Productive (especially morning)
Past history	Childhood croup, bronchitis, asthma Atopic conditions No or minimal smoking	No childhood complaints Less likely atopic Usually smoker
Spirometry	Variable airflow limitation Complete or substantial β_2-agonist reversibility	Consistent airflow limitation No or minor β_2-agonist reversibility

Treatment differences

Advances in our understanding of the pathophysiological differences between the two conditions have driven much of the research into treatment. Even greater advances are likely in the next few years and treatment differences will probably become more distinct. The effectiveness of the various drugs used to treat symptoms are summarised in Table 3.

Bronchodilators

Until now, symptom relief in both conditions has revolved around bronchodilation and, therefore, β_2-agonists and anticholinergics. Observations made many years ago suggested that while β_2-agonists were more effective than anticholinergics in asthma, the differences in efficacy were either not as distinct in COPD or anticholinergics were superior to β_2-agonists.

Long acting forms of these drugs are emerging as important symptom controllers. The long acting anticholinergic tiotropium (Spiriva), a once daily anti - muscarinic (M_3 blocker), appears to have little place in asthma but is emerging as a key treatment strategy in COPD. On the other hand, the long acting β_2-agonists (LABAs) have a somewhat stronger role in asthma, although they can also be beneficial in moderate to severe COPD.[4]

Corticosteroids

Glucocorticoids have had a long appreciated central role in asthma, both in

Table 3. Effectiveness of drugs in relieving symptoms of asthma and COPD

	Asthma	COPD
Short acting β_2-agonists (SABAs) Orciprenaline (Alupent); salbutamol (Airomir, Asmol, Epaq Inhaler, Ventolin); terbutaline (Bricanyl)	Effective	Mildly effective
Long acting β_2-agonists (LABAs) Eformoterol (Foradile, Oxis Turbuhaler); salmeterol (Serevent)	Effective	Effective in moderate to severe disease
Short acting anticholinergics Ipratropium bromide (Apoven, Atrovent, Ipratrin, Ipravent)	Effective but less so than SABAs	Mildly effective (probably more so than SABAs)
Long acting anticholinergics Tiotropium (Spiriva)	Not effective	Effective – becoming a key treatment
Corticosteroids, inhaled Beclomethasone (Qvar); budesonide (Pulmicort); fluticasone (Flixotide)	Effective for long term inflammation control, but a minority of patients are poorly responsive	Role in long term control unclear – most patients are unresponsive
Corticosteroids, systemic Prednisolone (Panafcortelone, Solone); prednisone (Panafcort, Sone)	Effective for exacerbations	Effective for exacerbations
Leukotriene receptor antagonists Montelukast (Singulair); zafirlukast (Accolate)	Less predictable but may be more effective than inhaled corticosteroids in patients poorly responsive to steroids	Not effective

treatment of exacerbations (systemic corticosteroids) and in inflammation control in the long term (inhaled corticosteroids). Emerging understanding of the pathophysiology of asthma suggests that a minority of people with asthma are poorly responsive to corticosteroids, perhaps because they have less eosinophilic and more neutrophilic inflammation. Leukotriene receptor antagonists may be more beneficial than corticosteroids for these patients.[1]

In COPD, systemic corticosteroids have been shown to speed recovery from exacerbations, but the role of long term inhaled corticosteroids remains unclear. Although a minority of patients with COPD have an eosinophilic bronchitis and are significantly helped by corticosteroids, most are poorly responsive. Some research suggests a small reduction in the frequency of exacerbations in people with severe COPD who regularly use inhaled corticosteroids. This can translate to better quality of life, but no modifying of the progressive decline in COPD has been seen.[4]

Distinguishing COPD and asthma

In many chronic diseases, objective diagnostic markers can double as indicators of severity, thereby helping monitor the course of disease and measure the outcome of therapy. Obvious examples are blood pressure measurement in hypertension and blood sugar or glycosylated haemoglobin in diabetes mellitus. In just the same way, spirometry is an essential tool in the management of COPD and asthma, as it reflects the calibre of intrapulmonary airways.

The forced expired volume in one second (FEV_1) and its relationship to the total forced vital capacity (FVC), or FEV_1/FVC ratio, are used to indicate both presence and severity of airflow limitation (an FEV_1/FVC of less than 0.70 indicates airflow limitation). The FEV_1 is a prognostic indicator in COPD – and even of all-cause mortality. The variability of FEV_1 and its response to inhaled bronchodilator help in the diagnosis of asthma and reflect the level of asthma control. Bronchodilator responsiveness can be complete in asthma, and by definition is either absent or at least incomplete in COPD (a FEV_1 post-bronchodilator of less than 80% of predicted value suggests nonresponsiveness to bronchodilator). Hence, it can be added to the clinical features that distinguish COPD from asthma (Table 2). The range of bronchodilator responsiveness in

COPD is very wide.[5] Short term bronchodilator responsiveness tests in COPD are not useful in predicting long term response to long acting bronchodilators.[6] Similarly, short term corticosteroid responsiveness tests in COPD do not predict a likely response to long term inhaled corticosteroid use.[4]

Conclusion

Does it all really matter? Perhaps when therapeutic interventions were limited, especially for COPD, the need for diagnostic accuracy was considered unimportant. However, with the emergence of pulmonary rehabilitation as a major benefit in COPD[4] and a better appreciation of the difference in steroid responsiveness between COPD and asthma – not to mention the development of tiotropium as an effective drug therapy for COPD – the importance of diagnostic clarity is now established.

There is substantial underdiagnosis and misdiagnosis of asthma and COPD in adults,[7-11] and we do need to be much more careful than we may have been in the past. Spirometry is an underused resource in COPD and asthma that supplements good history taking in making the important distinction. MT

A list of references is available on request to the editorial office.

Declaration of interest

Dr Frith has served on Advisory Boards of or has provided consulting advice to the following pharmaceutical companies: Altana Pharma, AstraZeneca, Bayer Healthcare, Boehringer Ingelheim and GlaxoSmithKline. He has no ongoing commercial interest in any pharmaceutical or medical equipment companies.

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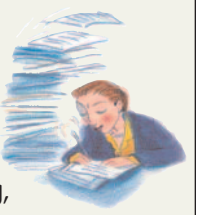

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