



## The role of long acting bronchodilators and inhaled corticosteroids, alone and in combination, in COPD

### Introduction

The GOLD Guidelines<sup>1</sup> define chronic obstructive pulmonary disease (COPD) as airflow limitation that is usually progressive and associated with an abnormal inflammatory response of the lung to noxious particles or gases. Thus, COPD – like asthma – is a chronic inflammatory disease. Therefore, it might be anticipated that agents such as inhaled corticosteroids (ICS) would be of considerable benefit, just as they are in asthma. However, the cellular and chemical pattern of inflammation in COPD is different from asthma, and bronchial biopsy studies have shown little change after months of treatment with an ICS. The reason for the poor steroid response is unclear.

### The role of ICS and long-acting bronchodilators

The role of ICS in COPD relates to their well-documented ability to reduce the frequency of acute exacerbations – usually by about 25%.<sup>2</sup> This effect is seen predominantly in patients who have more severe disease<sup>2</sup> and has led the UK NICE Guidelines<sup>3</sup> to recommend that ICS therapy should be given to those COPD patients with an FEV<sub>1</sub> below 50% predicted and who have had at least two exacerbations in the past 12 months. ICS also slightly improve lung function and slow the rate of decline of Quality of Life measures. They have no significant effect on altering the rate of decline in FEV<sub>1</sub> with time.

Bronchodilators are the keystone to

symptomatic improvement in COPD. Short-acting agents are usually the initial form of therapy for symptomatic relief. If improvement is inadequate, the next step is to add a long-acting bronchodilator which usually gives better and more prolonged reduction in breathlessness and improvement in exercise ability. Long-acting bronchodilators have the additional benefits of reducing exacerbation frequency, improving health status, and increasing measures of lung function.<sup>4</sup> Both long-acting beta-agonists (LABAs) such as salmeterol and formoterol, and anticholinergics such as tiotropium, exhibit these benefits.

Long-acting bronchodilators cause bronchodilatation, but perhaps more importantly reduce lung hyperinflation, thus reducing the work of breathing. Both reduce breathlessness. There appear to be other actions on the inflammatory response but these are not well understood.

Combining long-acting bronchodilators and ICS adds significant improvements in clinical outcomes over and above the benefits when either group of drug is used on its own. There have been several studies with combinations of both salmeterol/fluticasone and formoterol/budesonide which show similar improvements.<sup>5,6</sup> Adding tiotropium to

one of these combinations may confer greater improvement in lung function, but more major studies comparing all three agents are awaited.

### Practical implications

Most guidelines<sup>1,3</sup> recommend a stepped approach to therapy which should be based on symptoms such as breathlessness and disability rather than on FEV<sub>1</sub> alone. Indices of breathlessness such as the MRC Dyspnoea scale (see Box 1) measures of every day living, and exacerbation frequency, should all influence the type of therapy chosen for an individual patient - see Figure 1.

Long-acting bronchodilators should normally be added at a fairly early stage once persistent symptoms have appeared. As with all therapies, a trial of about a month needs to be given and the patient reviewed to see if any symptomatic improvements have occurred. These should not be based on change in FEV<sub>1</sub> as this will not

#### Box 1. Medical Research Council (MRC) Dyspnoea Scale Grade

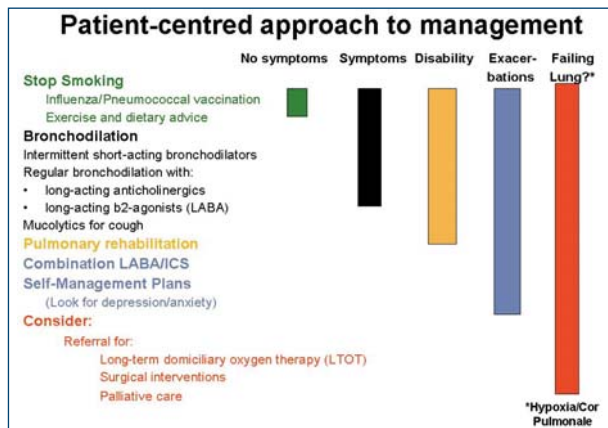
Grade	Degree of Breathlessness related to activities.
1	Not troubled by breathlessness except on strenuous exercise
2	Short of breath when hurrying or waking up a slight hill
3	Walks slower than contemporaries on level ground because of breathlessness or has to stop for breath when walking at own place.
4	Stops for breath after walking about 100m or after a few minutes on level ground.
5	Too breathless to leave the house or breathless when dressing or undressing

measure any reduction in hyperinflation. Rather, ask the patient if they feel less breathless, are able to walk further, or can do more activity than before. If the response is positive, continue the drug. If not, try a different long-acting bronchodilator – e.g. tiotropium instead of salmeterol. It is always important to check inhaler technique and adherence to therapy.

If the patient's FEV<sub>1</sub> is below 50% predicted and the patient is having exacerbations, guideline advice is to add an ICS in fairly high dosage – since all the trial evidence was conducted on higher doses and there is no evidence that low doses work. The usual approach is to use an ICS/LABA combination inhaler twice daily and this can be added to those already taking tiotropium.

### Short and long term benefits

Short term and longer term these agents improve symptoms and exercise ability. Other forms of therapy such as pulmonary rehabilitation should always be considered. The main longer term benefit is reduction of exacerbation frequency.



**Figure 1: Patient-Centred Approach to COPD Management**

(Patients are assessed according to the criteria along the top of the chart. Corresponding treatment options are shown on the left hand side)

Figure developed by Dr Kevin Gruffydd-Jones

The recent large TORCH study<sup>7</sup> set out to examine whether long-acting bronchodilators, ICS or the combined drug had any effect over three years on mortality reduction in patients with an FEV<sub>1</sub> less than 60% predicted. Although there was a trend for the combined drug to reduce deaths this did not quite reach statistical significance (P = 0.052). However, the trial did confirm the greater benefits of the combined drug in terms of exacerbation frequency, quality of life (QOL), and lung function. However, the changes in QOL (as measured on the St George's Respiratory Questionnaire, SGRQ), even though statistically significant, did not reach clinical significance (i.e. a change in 4 points on the SGRQ).

Cost benefits of COPD therapies have also been reported recently, mainly in the context of exacerbations. The Canadian HTA<sup>8</sup> found that ICS were more effective than LABAs alone at all COPD severity stages. Adding ICS was deemed cost effective in more severe patients.

### Exacerbations

COPD exacerbations cause worsening of symptoms and reduction in quality of

life, and may take up to three months to resolve. They also cause a huge burden on secondary care, accounting for 13% of all acute medical admissions. A combination ICS/LABA inhaler, with or without tiotropium. This will have the greatest effect on reducing exacerbations, by 25 to 38%, which is greater than any of the drugs on their own. Halpin<sup>9</sup> has calculated the numbers needed to treat (NNT) to avoid one exacerbation requiring medical intervention in one year for formoterol/budesonide as 2.4.

### Side Effects

The TORCH study<sup>7</sup> looked carefully for side effects and found no adverse effect on bone density or cataracts on ICS-based therapy. There was an unexplained increase in reported pneumonia in both arms containing ICS which will need further study. ■

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Author: Dr David Bellamy

Editor: Dr Paul Stephenson, GPIAG Editor-in-Chief: Dr Mark Levy

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Address for Correspondence: GPIAG, Smithy House, Waterbeck, Lockerbie, DG11 3EY, UK

Telephone: +44 (0)1461 600639 Facsimile: +44 (0)1361 331811 Email: info@gpiag.org Websites: http://www.gpiag.org, http://www.thecprj.org