Diagnostic labels applied to model case histories of chronic airflow obstruction. Responses to a questionnaire in 11 North American and Western European Countries

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Diagnostic labels applied to model case histories of chronic airflow obstruction. Responses to a questionnaire in 11 North American and Western European Countries. N.B. Pride, P. Vermeire, L. Allegra.
ABSTRACT: In Canada, USA and 9 Western European Countries, 121 respiratory physicians responded to an English language questionnaire asking them to state how they would investigate, treat and label four model patients, chosen to represent well-recognized patterns of clinical features of chronic airflow obstruction. Selection of further investigations appeared to be determined more by the probable diagnostic label than by the need to define selected characteristics in the whole range of such patients. Differences in recommended treatment between countries were less than others have reported for the treatment of asthma. Analysis of the diagnostic labels showed: the classic terms asthma, chronic bronchitis, emphysema still predominated in clinical practice and were considered to be better defined entities than any of the many terms introduced to describe chronic airflow obstruction in the last 30 yrs; the term chronic bronchitis was a source of confusion unless qualified to indicate presence or absence of obstruction; the use of combination terms such as chronic asthmatic bronchitis and chronic obstructive bronchitis showed large differences between countries; there were few differences related to national language. The implications of these findings are discussed.
Eur Respir J., 1989, 2, 702–709

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The English language diagnostic labels of chronic bronchitis, emphysema and asthma were established in clinical medicine long before modern concepts of airflow obstruction were developed, but the original definitions of these terms were imprecise. The introduction of spirometry into routine clinical practice in the 1950s led to the recognition of the central role of impaired airway function-particularly limitation of maximum expiratory flow- in determining the severity of symptoms and the prog-nosis in this group of diseases and highlighted the need for more precise definitions. The Ciba symposium [1] was set up to attempt to integrate the presence of airflow obstruction and the extent of its reversibility into the definitions of asthma, chronic bronchitis and emphysema. The definitions proposed by the Ciba Symposium in 1959 for these classical terms have continued with relatively few modifications until the present day. The report of the symposium also proposed two new umbrella terms, chronic non-specific lung disease (CNSLD) for the whole spectrum of these diseases (obstructed or not), and generalized obstructive lung disease (GOLD) for asthma and what subsequently was termed chronic obstructive pulmonary disease. The main country to adopt

the CNSLD (lumping) approach was The Netherlands [2], whose workers felt this term correctly reflected their reluctance to divide this group of patients at the start into those with and those without asthma, because of common pathogenetic factors and overlapping of symptoms and clinical features. Most other countries continued initially to divide patients into those with and without asthma and the term GOLD was not adopted. Instead in North America the term chronic obstructive pulmonary disease (COPD) was introduced [3]; asthma was not included in this term, but precise criteria, dividing patients into those with COPD and those with asthma, were not set out originally or subsequently [4].

The terminology and definitions established at this period were provisional and expected to evolve, but though there have been many publications on these topics in the following 25 years, few modifications have been established. A variety of synonyms for COPD, conveying nuances of pathology or physiology have been suggested; categorization of chronic bronchitis as 'simple' or 'obstructive' was introduced in the UK [5]. The term 'chronic asthmatic bronchitis' has also come increasingly into use in a number of other countries although it has

not been precisely defined. But it was the impression of a number of respiratory physicians working in Western Europe and North America that there remains considerable confusion in labelling patients and that new terms introduced in the late fifties and early sixties had been used in addition to, rather than instead, of older terms. Furthermore, we were uncertain how much practice differed among major Western European countries, even among academic physicians who were familiar with the English language literature, where influences of different schools of local or international thought might be dominant. At a preliminary discussion in Stresa in September 1985, during the Fifth Convention of the European Society of Pneumology (SEP), convened by one of the present authors (LA), it was decided to develop a simple questionnaire in order to assess current usage of diagnostic labels and to investigate how the selected labels influence the pattern of investigation and management undertaken.

Methods

The questionnaire was designed in English by an international working party (see previous page). The main part consisted of a brief presentation of four cases (identified as A, B, C and D), and chosen to represent stereotyped different presentations of chronic non-specific lung diseases (Tables 1–4). First, only data on history, clinical examinations, chest radiographs, spirometry before and after inhalation of a standard dose of beta-agonist were provided. The respondents were asked how often for each such case they would use a number of tests for diagnostic work-up and apply a number of methods for demonstrating reversibility of airflow limitation. In the following pages the case histories were completed with data on skin allergy testing, measurements of residual volume (RV), single breath diffusing capacity (D_{LCO}), elastic recoil of lung (Pel,l), arterial blood oxygen and carbon dioxide pressures (Pao_2, $Paco_2$) and the change in forced expiratory volume in one second (FEV_1) after 16 mg oral methylprednisolone was given daily for 3

weeks. With this additional information respondents were asked to state the terminology they would use to define the disease in each case when communicating information to colleagues, both in English and in their own language. The respondents were then asked how often they would use a selected range of drugs for maintenance treatment in each patient.

In the last part of the questionnaire (which was unrelated to these case histories), respondents were requested to state how often they used 23 possible diagnostic terms in referring in English to their own patients and also to state whether they thought such diagnoses were referring to clearly defined clinical entities.

Copies of the questionnaire were sent out to a National Coordinator in each of 11 countries in Europe and North America: Belgium, Canada, Finland, France, Italy, Netherlands, Spain, Sweden, West Germany, UK and USA. Each coordinator was asked to send a copy of the questionnaire to approximately 10 hospital-based chest physicians in his country, one half working in an academic, the other half in a non-academic hospital; he was also asked to collect these questionnaires and, if needed, to comment about particular features specific to his country.

A total of 121 questionnaires were recovered, with the highest number from the USA [19] and the lowest from Italy [7]. 95% of the respondents were specialist physicians in chest medicine and 69% were doing research related to chronic airflow obstruction. The median year of starting specialist practice for this group was 1970; 77% of them had started their practice after 1966.

The analysis was performed by computer through, a specialized institute. Terms used for diagnosis in each of the case histories were recorded for each country and pooled. For questions on frequency of use of terms, diagnostic tests and treatment, 4 grades were used: never (0); sometimes (1); often (2); always (3). The results were represented graphically by a cumulative score in a stamp format, so that the whiter the stamp the higher the frequency of use. In addition an empirical mean score was calculated to compare modalities or countries:

Table 1. – Model patient A

Initial information:	Further investigations:			
This 50 yr old man has been smoking 25 cigarettes a day for 30 yrs. He has had morning cough clearing mucous sputum throughout the year for the last 10 yrs. He needs one or two courses of antibiotics for acute episodes of mucopurulent bronchitis a year. He does not complain of dyspnoea on exertion and clinical findings are unremarkable. Chest X-ray is normal. FEV_1 is 98% of predicted before and 99% following inhalation of 2 puffs of a beta$_2$-agonist.	Pao_2 72 mmHg	D_{LCO} 80% pred	Allergic skin tests: negative	
	$Paco_2$ 38 mmHg	RV 125% pred	FEV_1 (% pred) after 3 weeks of corticosteroids = 101%	
		Pel, l normal		
	Labels applied:	Chronic bronchitis	- unqualified	56
			- early, mild, 'smokers' ⎫	
			- simple, non-obstructive ⎬	58
			- mucus hypersecretion ⎭	
		Miscellaneous		7
				121

$$score = \frac{(N1 \times 1) + (N2 \times 2) + (N3 \times 3)}{NT}$$

where N1, N2, N3 indicate the number answering sometimes, often and always respectively and NT equals (N0+N1+N2+N3) where N0 indicates the number answering never. Hence the range of mean scores was 0.0–3.0.

Results

Results are presented as group responses. Some remarks are made where particular national trends were strong but we have not attempted to assess the statistical validity of these differences, not least because of the arbitrary selection and the small number of the respondents.

Diagnostic labels (English language).

Patient A (table 1): About 50% of the respondents chose chronic bronchitis unqualified, and about the same number chronic bronchitis qualified so as to indicate it was not accompanied by significant obstruction (*e.g.* early, mild, smoker's cough, simple, non-obstructive, mucus hypersecretion). This was spread throughout the countries involved.

Patient B (table 2): 61% of respondents were content to label this patient simply as 'asthma', sometimes qualified as chronic, intrinsic or extrinsic; the remainder chose a wide variety of labels to indicate that there was associated cough or that obstruction was not completely reversible. To indicate the association of cough, the most popular term was (chronic) asthmatic bronchitis [21/121], particularly in the USA (11/19 respondents). This term was used only once by UK physicians, who instead usually recorded diagnoses of both asthma and chronic bronchitis. Composite terms such as 'COPD with revers-

ible component' or 'asthma with irreversible component' were used by a minority of respondents to indicate incomplete reversibility. 'Chronic asthma' may also have been used to indicate this feature.

Patient C (table 3): As expected, this was the most straightforward, although the same problem as with Patient A occurred: should obstruction as well as emphysema be indicated? 67/121 labelled simply as 'emphysema' (occasionally panacinar) and 35 as 'COPD with emphysema'. The traditional 'chronic bronchitis and emphysema' was offered by 4, COPD (unqualified) by 6, while 9 others used other terms such as 'COPD (pink puffer)'. Two respondents used the label 'asthmatic bronchitis'. 110 of 121 respondents included emphysema in their diagnostic label.

Patient D (table 4): This patient attracted the most diverse labels, attempting to describe the combination of airflow obstruction, productive cough and hypoxaemia. 'Chronic obstructive bronchitis' was the most popular label (30/121) while variations on 'COPD, bronchitic type' were chosen by 17/121. Classifying replies by their reference to the 3 cardinal features, labels could describe one feature only (chronic bronchitis, COPD and variants, hypoxaemia) or two of these features (cough and obstruction, obstruction and hypoxaemia). Three replies included all 3 features but also emphysema, while 11 used chronic bronchitis and emphysema, 4 (all from The Netherlands) 'chronic asthmatic bronchitis' and 3 others emphasized emphysema. Unexpectedly, 9 respondents simply described Case D as 'chronic bronchitis' and at least 6 respondents gave the same qualified labels to both cases A and D.

Influence of diagnostic labels on further investigation (Fig. 1)

In general, choice of further tests appeared to be determined by preliminary assessment of the likely diagnosis rather than by the need to define certain characteristics in

Table 2. – Model patient B

Initial information:		Further investigations:		
This 55 yr old man had mild childhood asthma, waning completely at puberty. He has been a moderate cigarette smoker for 20 yrs until the age of 42. At that age he started complaining of dyspnoea and wheezing; for acute exacerbations of these symptoms he has needed several emergency hospital admissions. Between these episodes his exercise tolerance has become increasingly restricted. His present main complaint is severe coughing spells throughout day and night, mostly in the early morning, which allow him to clear with difficulty white to yellowish tenacious sputum. On clinical examination there is diffuse wheezing, mainly on expiration. Chest X-ray shows increased periphilar vascular markings. FEV_1 is 65% of predicted before and 75% following inhalation of 2 puffs of $beta_2$-agonist.		Pao_2 68 mmHg $Paco_2$ 40 mmHg	DLco 85% Pred RV 140% pred Pel, *l* normal	Weak positive to house dust FEV_1 (% pred) after 3 weeks of corticosteroids = 92%
		Labels applied:	Asthma (chronic, intrinsic, extrinsic)	74
			Asthmatic bronchitis (chronic)	21
			Asthma and chronic bronchitis	10
			Chronic obstructive bronchitis	4
			COPD with reversible component	7
			Asthma with permanent obstruction	1
			COPD	2
			Others	2
				121

Table 3. – Model patient C

Initial information:	Further investigations:			
This 65 yr old man has been a severe cigarette smoker for 50 yrs. He mainly complains of progressively severe dyspnoea on exertion. He has obvious breathing difficulty after minor effort leading to pursed lip breathing. His chest is hyperinflated and hyperresonant on chest percussion and faint breathing sounds on auscultation. Chest X-ray demonstrates lung hyperinflation and peripheral vascular markings are reduced. FEV_1 is 35% of predicted before and 38% after inhalation of 2 puffs of a $beta_2$-agonist.	Pao_2 68 mmHg $Paco_2$ 38 mmHg	$DLco$ 45% pred RV 180% pred Pel, l reduced	Allergic skin tests: negative FEV_1 (% pred) after 3 weeks of corticosteroids = 42%	
	Labels applied:	Emphysema (± obstructive)		67
		COPD with emphysema		35
		Chronic bronchitis with emphysema		4
		COPD (unqualified)		6
		Miscellaneous		9
				121

Table 4. – Model patient D

Initial information:	Further investigations:		Feature described			
			Chronic cough	Obstruction	Hypoxaemia	
This 65 yr old man had been a heavy cigarette smoker since the age of 15. He has had a productive morning cough for many years and has regularly suffered acute episodes of bronchitis until he stopped smoking 5 yrs ago. His main complaint is increasing dyspnoea on exertion. He is rather obese and mildly cyanotic. Breathing sounds are slightly reduced with expiratory wheezes. Chest X-ray shows increased peripheral vascular markings. FEV_1 is 40% of predicted before and 45% following 2 puffs of inhaled $beta_2$-agonist.	Pao_2 54 mmHg $Paco_2$ 46 mmHg	$DLco$ 78% pred RV 160% pred Pel, l normal	Allergic skin tests: negative FEV_1 (% pred) after 3 weeks of corticosteroids = 50%			
	Labels applied:					
	COPD			+		12
	COPD, bronchitic type		+	+		17
	COPD hypoxaemia (blue bloater)			+	+	20
	Chronic obstructive bronchitis		+	+		30
	Chronic bronchitis		+			9
	Chronic bronchitis and blue bloater		+		+	8
	Blue bloater				+	3
	Miscellaneous					22
						121

the whole range of patients. Other results (not shown in Fig. 1) indicated that lung elastic recoil measurements, single breath nitrogen wash-out and exercise testing, and CT scan with density measurements were very little used in clinical practice, while $alpha_1$-antitrypsin levels were only requested in poorly reversible airflow obstruction with suspected emphysema. For nearly all these tests there were few marked differences between countries.

Assessment of bronchodilator reversibility.

The most common procedure for assessing short-term reversibility was to use 2 puffs of an inhaled beta-agonist, but a larger dose given by nebulizer was used in some countries (UK and The Netherlands). Further testing with 2 puffs of an inhaled anticholinergic drug

was performed less and was most common in Belgium, France and The Netherlands. For long-term assessment of bronchial reversibility, there was a general use of beta-agonists, while trials of inhaled anticholinergics, inhaled steroids, oral theophylline and oral steroids were frequently used and showed little difference between countries.

Choice of treatment for the 4 patients (Fig. 2)

Some clear differences in treatment appeared between cases but there were less international differences than found earlier with asthma treatment [6]. As expected, in Case A little treatment was proposed, although some still proposed beta-agonists. In Case B the use of beta-agonists was quite general followed by theophylline and inhaled steroids. In patients C and D the use of

beta-agonists, oral theophylline and oral steroids was general but there was less use of inhaled steroids than in B. Inhaled anticholinergics were fairly often given in patients B, C and D. Inhaled and oral steroids appeared to be more popular in patients C and D in The Netherlands, Belgium, West Germany and Italy than in other countries. Oral mucolytic drugs were used in all cases and were most popular in Belgium, The Netherlands, West Germany and Italy.
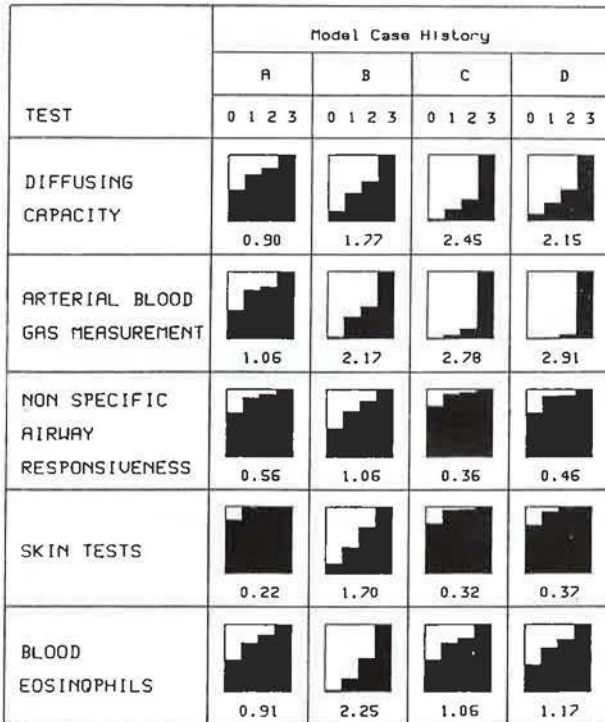

Fig. 1. – Further investigations suggested for the 4 model cases. Coding 0 to 3 indicated a scale of never (0) to always (3). The cumulative percentage of grades are indicated by the height of the 4 black columns, 0% being indicated by the bottom line of the square (*e.g.* model case D, grade O, arterial blood gas measurement) and 100% by the top line of the square. Hence the blacker the picture, the less frequently a given investigation would be ordered and the lower the mean score indicated under each square. Note that diffusing capacity was frequently requested in cases B, C and D, but most often in Case C with emphysema. Skin tests and blood eosinophils were assessed most frequently in case B with reversible obstruction.

Definitions of terms and their use by physicians

Responses to questions about 10 of the most familiar of the 23 labels presented in the questionnaire are shown in Fig. 3. The well established terms 'asthma', 'emphysema', and 'chronic bronchitis' were considered to be more clearly defined than any of the newer terms. There was a strong correlation between the terms individual physicians used to communicate about their patients to colleagues (*i.e.* score in Fig. 3) and their perception of how well defined the term was (Spearman Rank correlation coefficient 0.90, p<0.001).
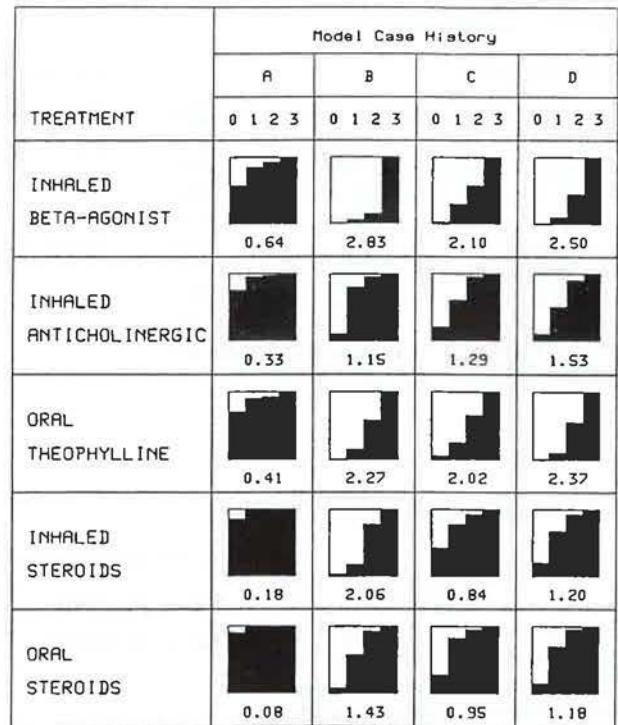

Fig. 2. – Choice of treatment with bronchodilators and corticosteroids for the 4 model cases. (Grading and mean scores, see Fig. 1.) Little treatment was proposed in case A and more intensive treatment in cases B, C and D.

Fig. 3. – Responses to questions about definition and usage of 10 terms. Terms arranged in order of how well defined the respondents considered the term to be. (Grading and mean scores, see Fig. 1.)

Fig. 4. – Comparisons of the use of 5 terms in 5 different countries. The terms were selected because they showed obvious differences between countries. (Grading and mean scores, see Fig. 1.)

Differences between countries

The use of composite terms showed marked differences between physicians of some countries (Fig. 4). 'Chronic obstructive lung disease' was most used by American and French physicians and hardly used by German physicians. The term "chronic airflow obstruction", which is rather difficult to translate into French, German or Dutch, was most used by English and American physicians. In contrast, the term "chronic asthmatic bronchitis' is easy to translate in all languages, but was frequently used only by American and Dutch physicians. These physicians used much less the term 'chronic obstructive bronchitis', which was very popular among German and French physicians. Overall there appeared to be few linguistic problems between the different countries.

Discussion

Many articles discuss problems of definitions and classification of the various airway diseases but there is a dearth of practical information on how strongly previous recommendations on nomenclature are adhered to and whether there are important discrepancies between individuals and between different countries. The present pilot study has obvious limitations. The model circumstances in which the questions were answered are likely to bias the responses to correct, textbook answers. The sample of physicians approached were mainly mid-career physicians working in respiratory medicine, often undertaking research in these diseases and familiar with the English language scientific literature. While their responses probably reflect the views of current teachers of respiratory medicine in the medical schools of the

various countries, clearly linguistic problems will be underestimated. More extensive studies among broader groups of physicians almost certainly will reveal an even larger confusion than shown by this study.

The model case reports presented were chosen as the simplest stereotypes, but brought out some general problems. Patient A was supposed to represent chronic bronchitis (as defined as chronic cough and expectoration, not as inflammation of the bronchial wall) without significant airflow obstruction. But despite the efforts of the Ciba Symposium [1] and a subsequent UK Medical Research Council Committee [5] to confine the meaning of chronic bronchitis in this way, many physicians felt it necessary to indicate positively the absence of airflow obstruction. Everyday observation of clinical habit (in the UK at least) indicates that such terms as 'severe' chronic bronchitis are still used (implying associated airflow obstruction or even cardio-respiratory failure) and examples of this usage were obtained in this survey.

Patient B was intended as an example of asthma with persistent cough and not quite fully reversible airflow obstruction after intensive corticosteroid treatment. In the responses, the presence of a cough was sometimes accepted as an asthmatic feature but frequently led to a combined diagnosis of asthma and bronchitis or 'chronic asthmatic bronchitis'. The absence of full reversibility most commonly was described as asthma without complete reversibility but, perhaps equally logically, occasionally as COPD with a large reversible component.

Patient C was intended as a patient with irreversible airflow obstruction with radiological and physiological signs of emphysema and did not produce much diversity of reply, in contrast to patient D who was intended as an example with severe airways obstruction, hypoxaemia, chronic expectoration and oedema. This patient produced the greatest number of terms to describe the various clinical features, especially aspects of the cardio-respiratory failure.

It was striking that the physicians regarded the classic terms (asthma, emphysema, chronic bronchitis) as more clearly defined than any of the terms introduced by the Ciba Symposium or subsequently. None of the respondents made any suggestions for new terminology. The main problems seemed to be a non-systematic use of current terms and uncertainty as to whether a short label such as asthma, provided a sufficient case description (i.e. does it allow the presence of cough, incomplete reversibility, etc?).

Conclusions

The following opinions are those of the compilers of this report and not the consensus view of all the responders or the National Co-ordinators.
(i) It has not been clear when the newer terms describing airflow obstruction should be combined with the older classic terms-chronic bronchitis, asthma, emphysema because there is uncertainty as to the precise features the brief classic terms 'entrain'. Confusion as to whether the presence or absence of airflow obstruction needs to be

stated explicitly, applied particularly to chronic bronchitis but also arose with asthma in complete remission and non-obstructive emphysema, which is being increasingly recognized in pathology studies [7] and presumably will be increasingly diagnosed in life with CT scans [8]. But terms such as COPD also did not provide sufficient information even in the most straightforward patient. Additional terms were most commonly used to indicate severity of disease (for instance cor pulmonale, pulmonary hypertension, hypoxia, hypercapnia, or emphysema) or to describe overlap features, particularly the reversibility of obstruction. Even without invoking the 'Dutch hypothesis' of a continuum of chronic airway disease, multiple diagnoses are inevitably common because the major risk factors of atopy and smoking each occur in about one-third of the population. Because treatment and prognosis of chronic airflow obstruction are influenced by the presence of asthmatic features [9], the term 'chronic asthmatic bronchitis' has been used but this was not regarded as well-defined (Fig. 3) and showed considerable between-country differences in usage (Fig. 4).

(ii) There is a redundancy of new terms indicating chronic obstruction (Fig. 3). Although introduced to reflect minor differences in the pathogenesis of obstruction (but not its reversibility), in practice they appear to be used interchangeably.

(iii) We obtained no evidence that semantic problems lead to practical neglect of useful treatment-bronchodilators and inhaled or tablet corticosteroids were proposed similarly for all 3 model patients with airflow obstruction. However this might not be the case in clinical practice. It has been shown that the label of asthma or of bronchitis in childhood is important in determining the intensity of subsequent treatment [10, 11] and we suspect that may also be the case in adult patients especially if the clinical features are not classical or the patients are elderly.

Two other problems not addressed by this enquiry are potent sources of misunderstanding. First, despite the Anglo-American habit of initially deciding whether a patient fits into the category of asthma or COPD, there are no accepted guide lines on how reversibility could be graded on a continuously variable scale between complete reversibility and irreversibility so as to allow this initial categorisation. Secondly, though the definition of 'chronic bronchitis' as chronic expectoration has not been challenged since the Ciba Symposium, some feel that it would have been better to use a descriptive term such as chronic hypersecretion, bronchorrhoea, or bronchial catarrh rather than 'chronic bronchitis'. However it has recently been claimed that inflammation of the bronchial wall is indeed present in smokers with chronic expectoration [12].

We conclude that much of the present confusion in use of terminology is due to a redundancy of available terms (and uncertainly as to how much detail to provide), rather than to subtle differences in how individual physicians interpret the terms. For example 'COPD with considerable variability and reversibility' probably means exactly the same as 'asthma without complete reversibility'. Experts often suggest starting again with newer terms

that have a smaller accumulation of historical habit, but this investigation shows that the classic terms are still regarded as the best defined (even including asthma which has defied precise definition by more than one working group! [13]). It is disappointing that consistent labelling causes us all so much trouble, when we are concerned with only a small number of important features of these diseases. A more systematic and informative use of the available labels should be possible.

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Qualificatifs diagnostiques appliqués à des cas-type d'obstruction bronchique chronique: résponses à un questionnaire dans 11 pays d'Europe Occidentale et d'Amérique du Nord. N. B. Pride, P. Vermeire, L. Allegra.

RÉSUMÉ: Au Canada, aux Etats-Unis, ainsi que dans neuf pays d'Europe Occidentale, 121 pneumologues ont répondu à un questionnaire en langue anglaise leur demandant d'indiquer leur façon de mettre au point, de traiter et de qualifier 4 patients-type, sélectionnés pour représenter des formes bien admises d'obstruction bronchique chronique des voies respiratoires (bronchite chronique et emphysème). La sélection des investigations supplémentaires requises apparaît déterminée davantage par le qualificatif diagnostique probable que par la nécessité de définir certaines caractéristiques sélectionnées chez l'ensemble de ces patients. Des nuances dans les traitements recommandés dans les différents pays apparaissent moins marquées que celles rapportées par d'autres auteurs en ce qui concerne le traitement de l'asthme. L'analyse des qualificatifs diagnostiques a montré les éléments suivants: (1) les termes classiques - asthme, bronchite chronique, emphysème - prédominent toujours en pratique clinique et sont considérés comme des entités mieux définies qu'aucun des nombreux autres termes introduits pour définir l'obstruction chronique des voies aériennes au cours des 30 dernières années; (2) le terme "bronchite chronique" reste une source de confusion s'il n'est pas suivi d'autres qualificatifs indiquant la présence ou l'absence d'obstruction; (3) les termes combinés, tels que "bronchite chronique asthmatique" et "bronchite chronique obstructive", sont utilisés avec des fréquences diverses selon les pays: (4) peu de différences sont en rapport avec la langue nationale. Les implications de ces diverses observations sont discutées.
Eur Respir J., 1989, 2, 702–709.