

## Proposed Terms for Endobronchial Lesions in Patients Suspected of Having a Bronchial Neoplasm

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Endoscopists describe lung cancer lesions using varying terminology. This study aimed to assess the probability of neoplastic disease in terms of endoscopic findings expressed in an original classification system. The endoscopic lesions were classified as infiltrations (superficial lesions without a clear border with normal mucosa) or masses (exophytic lesions easily distinguished from the bronchial wall). Each lesion was categorized according to 3 grades reflecting probability of malignancy. A grade I infiltration was a lesion presenting 1 of the following characteristics: loss of luster, increased thickness, or redness, with a smooth surface. A grade II infiltration presented 2 of the aforementioned characteristics, with a rough surface. A grade III infiltration presented 3 of those characteristics. A grade I mass was an exophytic lesion with a smooth surface, uniformly colored. A grade II mass presented a smooth surface of a distinct color, and a grade III mass had a rough surface and irregular coloring. We assessed 377 patients with suspicion of neoplasm. Twenty-three percent of the infiltrations were grade I carcinomas, 74% were grade II, and 95% were grade III. Twenty-three percent of masses were grade I, 77% were grade II, and 97% were grade III. The probability of malignancy increased significantly with grade ( $P < .001$ ) for both types of lesion. In summary, there is a positive correlation between the terms used and the probability of carcinoma. Most grade III lesions were carcinomas, but apparently innocuous grade I lesions could be carcinomas in a significant number of cases.

**Key words:** Lung cancer. Endoscopic images. Infiltration. Tumor.

Propuesta de terminología de las lesiones endobronquiales en pacientes con sospecha de neoplasia bronquial

La descripción de lesiones endoscópicas en el cáncer de pulmón varía según el endoscopista. Este trabajo pretende evaluar la probabilidad de neoplasia en relación con los hallazgos endoscópicos según una clasificación original. Las lesiones endoscópicas se clasifican en: infiltración (lesión en superficie sin límite preciso con la mucosa normal) y masa (lesión exofítica, fácil de diferenciar de la pared). Cada lesión tiene 3 grados con relación a la probabilidad de malignidad. En la infiltración grado I, la lesión presenta una de las siguientes características: pérdida de brillo, aumento de grosor o enrojecimiento, de superficie regular; en la infiltración grado II coinciden 2 de los cambios anteriores, con superficie irregular; en la infiltración grado III están presentes 3 de las características anteriores; la masa grado I es una lesión exofítica de superficie lisa y coloración uniforme; la masa grado II presenta una superficie regular de coloración distinta, y en la masa III la superficie y coloración son irregulares.

Se evaluó a 377 pacientes con sospecha de neoplasia. Fueron carcinomas un 23% de las infiltraciones grado I, un 74% de las infiltraciones grado II y un 95% de las infiltraciones grado III. Por lo que respecta a las masas, fueron neoplasias el 23% de las de grado I, el 77% de las de grado II y el 97% de las de grado III. En ambos tipos de lesiones la probabilidad de malignidad aumenta de acuerdo con el grado ( $p < 0,001$ ).

En conclusión, existe una correlación positiva entre la terminología descrita y la probabilidad de carcinoma. En la mayoría de los casos las lesiones grado III son carcinomas, pero a su vez las lesiones grado I, aparentemente inofensivas, pueden ser carcinomas en un número significativo de los casos.

**Palabras clave:** Cáncer de pulmón. Imágenes endoscópicas. Infiltración. Masa

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Lung cancer is responsible for the highest mortality rates due to cancer worldwide.<sup>1</sup> It is the most common tumor in men, accounting for 13.3% of all neoplasms,<sup>2</sup> and the third most common in women, after breast and colon cancer.<sup>3</sup> Lung cancer is among the respiratory diseases with the worst outcome and its social, economic, and health-related impact is considerable.<sup>4,5</sup>

**Figure 1. Descriptions of degrees of infiltration:** A) medium-sized, lobular, reddish ridge; B) enlarged ridge: biopsy positive for squamous cell carcinoma; C) intermediate bronchus with red-colored mucosal thickening; D) left upper lobe apicoposterior bronchus: thickening and irregular coloring; E) mainstem bronchus: thickened wall with an irregular surface and a high degree of vascularization; and F) thickening, hypervascularization, and abnormal longitudinal relief structures.

Because prognosis is poor, the only factor able to affect outcome is early diagnosis. Endoscopic exploration and biopsy are therefore essential whenever a lesion might be neoplastic.<sup>6</sup>

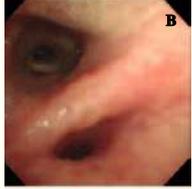
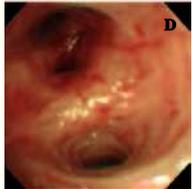
One problem a bronchoscopist faces is that of describing endobronchial lesions. The difficulty is aggravated by the great variety of presentations a bronchial tumor can have. It may appear merely as an area of mucosa that is dull, lacking luster or, at the other extreme, as a large irregular exophytic mass inside the bronchial lumen.<sup>7</sup> Descriptions of what can be viewed under the cold light of the endoscope are subjective, reflecting the variability any scientific observation is subject to. The same lesions may be described with different words, the light may create artifacts and often does, and finally the internationally stipulated conditions under which exploration should take place are not always followed.

To be able to assess a lesion viewed endoscopically, the normal conditions of the bronchi viewed through the fiberoptic bronchoscope must be known.<sup>8</sup> The mucosa should be uniformly pink and glistening; the surface should be smooth, with the exception of the corrugated relief formed by cartilage in the trachea and main bronchi and by the longitudinal fibers, which should be parallel and continuous. Submucosal vessels can be distinguished in the form of fine, widely spaced reddish lines. The ridges that separate branching bronchi should be thin and the crests should be paler than the surrounding mucosa.

With these considerations as a starting point, we proposed to describe endoscopic findings, mainly in the context of lung cancer diagnosis. The purpose is to systematize terminology to reduce variability and facilitate communication.

Two large categories of endoscopic lesions can be identified: infiltrations and masses. Infiltrations are lesions on the surface of the bronchial wall. They may have greater or lesser extension (they are quantified with simple measurements) and the borders separating them from normal mucosa are difficult to distinguish. Masses are exophytic lesions protruding into the bronchial lumen. Their borders are precise and easy to differentiate from the wall. Infiltrations and masses can each be classified in 3 grades that reflect the likelihood of malignancy<sup>6-8</sup>:

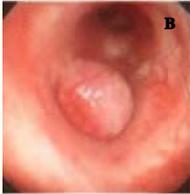
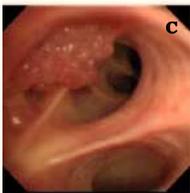
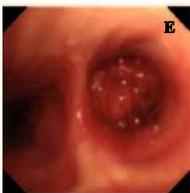
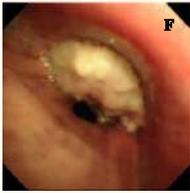
– Infiltration, grade I: minimal changes scarcely suggestive of malignancy; a mucosal surface might lack luster, the tissue might have thickened, or there might be localized redness. The surface is always smooth (Figures 1A and 1B).

Infiltrations	Characteristics	Images
Grade I	One of the Following Changes on a Uniform Surface:  Loss of Shine  Thickening  Localized Redness	 
Grade II	Two of the Following Changes:  Redness  Irregular Surface  Abnormal Longitudinal Reliefs	 
Grade III	All 3 Changes:  Thickening  Redness  Irregular Surface	 

– Infiltration, grade II: presence of 2 of the following changes in the same zone of tracheal or bronchial mucosa: thickening, redness, rough surface, or abnormal longitudinal relief patterns (Figures 1C and 1D).

– Infiltration, grade III: presence of 3 or more of the previously listed findings (Figures 1E and 1F).

– Mass, grade I: exophytic lesion in the bronchial lumen; the surface is smooth and uniformly pink, similar to normal mucosa (Figures 2A and 2B).

Masses	Characteristics	Images
Grade I	Exophytic Lesion Smooth Surface Uniformly Pink Coloring	 
Grade II	Exophytic Lesion Regular Surface (Smooth or Granular) Coloring Different From Normal Mucosal	 
Grade III	Formation of a Granulomatous or Papillary Surface Irregular Surface Coloring Different From Normal Mucosa	 

**Figure 2.** Description of the different grades of mass: A) exophytic lesion with a smooth surface and uniformly pink color, indicating cartilaginous protrusion; B) exophytic lesion with a smooth surface and uniformly pink color: polyp; C) exophytic lesion, pale color, uniformly granular with a strawberry-like appearance; D) exophytic lesion with a smooth, regular surface, with a more reddish coloring than that of normal mucosa: biopsy indicating a bronchial carcinoid tumor; E) obstruction of the mainstem bronchus by an irregular, papillary, red-colored formation: biopsy positive for carcinoma; and f) exophytic lesion with a whitish surface, characteristic of necrotized malignant tumor.

The objective application of such terminology would allow more careful use of language than is usually found in bronchoscopy reports in different hospitals. Better diagnosis and follow-up of bronchial tumors would then be feasible.<sup>9-14</sup> We evaluated the relation between these terms and the histologic grade diagnosed in our hospital in 377 patients suspected of having lung cancer. Histologic examinations confirmed a tumor in 12 of the 53 cases (23%) in which a grade 1 infiltration was observed during endoscopy; in 70 of the 94 cases (74%) with a grade II infiltration; and in 120 of the 126 (95%) with a grade III infiltration. Similarly, cancer was confirmed in 3 of the 13 patients (23%) with an endoscopic grade I mass; in 20 of the 26 (77%) with a grade II mass, and in 63 of the 65 (97%) with a grade III mass.

These results demonstrate that a grade I infiltration is usually but not always benign, suggesting that biopsy should be performed in patients with evident risk factors. A grade II infiltration may also be benign but it is often neoplastic. The likelihood of a grade III infiltration being neoplastic is very high; nevertheless, non-neoplastic lesions, such as granulomas caused by foreign bodies, tuberculosis, or aspergillosis, may occasionally resemble a grade III infiltration.

A grade I mass is generally a benign granuloma, polyp, or cartilaginous protrusion but may occasionally be neoplastic; therefore these lesions should be biopsied in patients with risk factors. A grade II mass corresponds to the typical appearance of tumors that are benign or low-grade malignancy but may also be either a high-grade malignant tumor or a simple granuloma. Finally, a grade III mass is usually, but not always, a malignant tumor.

For both infiltrations and masses there was a statistically significant positive correlation between the endoscopic term and the probability of a histologic diagnosis of carcinoma ( $P < .001$ ). Even though most grade I lesions are benign and most grade III lesions are malignant, there are a significant number of exceptions in both categories to make histology advisable whenever it is possible. Histology is also, naturally, advisable in the case of grade II lesions, given that their macroscopic appearance is less specific.

The proposed terminology has the advantage of simplicity and ease of interpretation. The available data show that the described classifications bear a good relation to probability of malignancy. However, these results indicate that patients with risk factors for tumors should undergo biopsy even when bronchial wall alterations are minimal.

– Mass, grade II: exophytic lesion with a regular surface that may be either smooth or granular but is colored differently from the surrounding normal mucosa. The lesion may have the classic “strawberry” appearance (Figures 2C and 2D).

– Mass, grade III: formation of a granular or papillary surface, unevenly colored with pale areas mixed with highly vascularized ones. The visible surface may be necrotized and whitish (Figures 2E and 2F).

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## REFERENCES

1. Ferlay J, Bray F, Pisani P, Parkin DM. GLOBOCAN 2002: cancer incidence, Mortality and prevalence worldwide. IARC Cancer Base No 5, version 2.0. Lyon: IARC Press; 2004.
2. Boyle P, Ferlay J. Cancer incidence and mortality in Europe 2004. *Ann Oncol.* 2005;16:481-8.
3. Quinn MJ, D'Onofrio A, Moller B, Black R, Martínez-García C, Möller H, et al. Cancer mortality trends in EU and acceding countries. *Ann Oncol.* 2003;14:1148-52.
4. Morgan WKC, Andrews CE. Bronchogenic carcinoma. In: Baum BL, editor. Textbook of pulmonary diseases. Boston: Little, Brown, and Company; 1974.
5. Fraser RG, Pare JA. Diagnosis of diseases of the chest. Philadelphia: W.B. Saunders; 1978.
6. Puzo MC, Castella J, Nauffal D, Tarrés J, Sauret J, Rodríguez Arias JM. Carcinoma de pulmón III. Diagnóstico broncoscópico. *Med Clin (Barc).* 1978;71:86-8.
7. Ikeda S. Atlas of flexible bronchofiberscopy. Baltimore: University Park Press; 1974.
8. Castella J, Puzo C, editors. Broncología. Barcelona: Salvat Editores S.A.; 1982.
9. Tsuboi E, Ikeda S, Tajima M. Transbronchial biopsy smear for diagnosis of peripheral pulmonary carcinomas. *Cancer.* 1967;20:687-98.
10. Rapaud G, Dufat R, Gilbert J. Rendements comparés des prélèvements endoscopiques trachéo-bronchiques dans les cancers broncho-pulmonaires. Travail de la Commission d'Endoscopie et Techniques Instrumentales en Bronchopneumologie. *Rev Fr Mal Resp.* 1979;7:573-5.
11. Zavala DC. Diagnostic fiberoptic bronchoscopy: technique and results of biopsy in 600 patients. *Chest.* 1975;68:12-9.
12. Rodríguez C, de las Heras P, León C, Puzo C. Carcinomas bronquiales in situ e invasores precoces. Estudio de 11 casos. *Arch Bronconeumol.* 1987;23:15-9.
13. Kvale PA, Bode FR, Kini S. Diagnostic accuracy in lung cancer. Comparison of techniques used in association with flexible fiberoptic bronchoscopy. *Chest.* 1976;69:752-7.
14. Callol Sánchez L, Gómez de Terreros Sánchez FJ. Diagnóstico precoz del cáncer de pulmón. *Arch Bronconeumol.* 1999;35:395403.