

# Accuracy and Clinical Utility of Cytological Typing of Lung Tumors

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To evaluate the diagnostic reliability of bronchial washings and brushings in typing lung carcinomas by means of histological comparative study and to assess its usefulness in clinical management. It was a comparative study, collected on clinicopathological basis. The study was conducted at Pathology and Chest Surgical Departments of King Edward Medical College Mayo Hospital, Lahore from March 1998 to July 1999. One hundred consecutive malignant cases were included in this study and clinical parameters e.g. age, sex, smoking habits, gross/bronchoscopic findings and histopathological features were studied. Cytopathology is a good tool for the diagnosis of pulmonary carcinoma. It is an easiest, accurate and cheaper method for the diagnosis of this tumor. The overall accuracy of this method was 100% It was concluded that two groups scheme (Binary System) is highly useful on cytological specimen because it exhibits high diagnostic accuracy and its two subgroups of small and non-small cell carcinoma coincide to the currently utilized treatment protocols.

**Key words.** Lung carcinoma; cytology; Histopathology; small cell carcinoma; binary system; bronchoscopy.

Lung carcinoma is the most common visceral malignancy in men and is the most frequent fatal threat in industrialized nation. It alone accounts for approximately one third of all cancer deaths in men and more than 7% of all deaths in both sexes<sup>1</sup>. Cytopathology is the study of pathological changes in the cell and it has undoubtedly emerged as one of the most useful diagnostic modalities in pathology<sup>2</sup>. Cytopathological examination of sputum, bronchial brushing and bronchial washings has proved to be a major diagnostic tool in clinical medicine<sup>3</sup>.

The use of fine needle aspiration has been increased in recent years and with experienced cytopathologist, it has proved to be accurate and helpful in rendering a specific diagnosis<sup>4</sup>.

It is well known that lung cancer has a heterogeneous phenotype and may present with more than one direction of differentiation<sup>5</sup>. The following three cytologic classification schemes are currently in use

1. The categorical system of the WHO, In this system four categories are given: adenocarcinoma (AC), (50%) of all the primary lung Carcinomas), Squamous cell carcinoma (SCC) (30%) large cell (LC) undifferentiated carcinoma (<5%) and small cell (SC) undifferentiated carcinoma (15%)<sup>6</sup>,
2. The binary system of small cell and non small cell carcinoma<sup>5</sup>
3. Single group system of malignant cells<sup>7</sup>

This study was carried out to evaluate the diagnostic reliability of bronchial washings and brushings in typing lung carcinomas by means of histological comparative study and to assess its usefulness in clinical management.

## Subjects and materials

The present study was carried out on 100 consecutive patients of lungs cancer observed in the files of Pathology and Chest Surgical Departments of King Edward Medical

College Mayo Hospital, Lahore from March 1998 to July 1999.

They included 83 males and 17 females divided in to 8 groups according to the age table (1). The smoking habits were studied as degree and duration of smoking. Patients were divided in to three groups according to the degree and durations (Table II).

Table I Distribution Of patients according to Age and Sex

Age in Years	Male	Female	Total	%age
20-29	02	0	02	02
30-39	01	0	01	01
40-49	08	01	09	09
50-59	30	08	38	38
60-69	18	06	24	24
70-79	16	02	18	18
80-89	06	0	06	06
90-99	02	0	02	02
Total	83	17	100	

Table II. Smoking Habits

Degree of smoking & No. of cigarettes	No. of smokers	%age	Duration of smoking (In years)	No of smokers	%age
Light (1-10)	13	15.7	0-10	6	7.2
Moderate (10-15)	19	23	11-20	23	27.7
Heavy (15+)	51	61.5	21-30	38	45.8

Bronchial fluids were obtained preoperatively by means of bronchial washings under direct vision. Slides were made and fixed with 50% ethanol and stained with Papanicolaou method<sup>8</sup>. Tumor classification was accomplished as SC from non-SC and further categorizing these into squamous cell carcinoma (SCC), adenocarcinoma (AC), LC and not otherwise specified (CANOS)<sup>5,8</sup>.

**Results**

We evaluated the diagnostic reliability of bronchial aspiration cytology in typing lung carcinoma by means of Histopathology comparative study using biopsies and operated tissues. Bronchoscopic findings and smoking relation are given in table III and IV. The result indicated that the overall accuracy of cytology method is 100% in single group classification (positive for malignant cell, 82.7% in WHO categorical grouping (4 groups) and about 93% in Binary system. The male are affected more as compared to females and the incidence increased with age in both sexes till 6<sup>th</sup> decade. There is positive correlation between smoking and development of pulmonary carcinoma and heavy smokers have more chances of its development. Pulmonary carcinoma has definite relationship with duration and degree of smoking (Table V-VI)

Table III Bronchoscopic findings

Bronchoscopic Findings	%age of lesions
Endobronchial mass	61
Abnormal Mucosa	25
Compressed lumen	03
Purulent secretions with necrotic mucosa	03

Table IV Smoking among 100 cases of diagnosed pulmonary carcinoma

Type	Total	Smokers %age	Non-smokers
SCC	46	97.2	2.8
AC	33	57.7	42.3
SC	14	90.9	9.1
LC	07	100	-

Key: SCC=SMALL CELL CARCINOMA, AC= ADENOCARCINOMA  
SC=SMALL CELL CARCINOMA, LC=LARGE CELL CARCINOMA

Table V Tumors typing 100 cases of diagnosed pulmonary carcinoma

Type	Male	Female	Total
SCC	43	3	46(45.5%)
AC	20	13	33(32.4%)
SC	13	01	14(13.9%)
LC	07	0	07(7.6%)

Key: SCC=SMALL CELL CARCINOMA, AC= ADENOCARCINOMA  
SC=SMALL CELL CARCINOMA, LC=LARGE CELL CARCINOMA

Table VI Cytological typing accuracy in 100 cases of diagnosed pulmonary carcinoma

Procedure	SCC	AC	SC	LC
Histopathological diagnosis	46	33	14	07
Bronchial Brushings	42	27	12	04
Bronchial Washings	25	21	09	03
Washings & Brushings	42	31	12	04
Accuracy rate	91.66%	96.15%	90.9%	57.14%

Key: SCC=SMALL CELL CARCINOMA, AC= ADENOCARCINOMA  
SC=SMALL CELL CARCINOMA, LC=LARGE CELL CARCINOMA

**Discussion**

Pulmonary cytology has reached a high level of accuracy and examination of the sputum and/or bronchial brushings; it is now possible to make a diagnosis in 80-90% of patients with cancer. An increasingly popular cytologic specimen is that provided by fine needle aspiration. This technique is associated with minimal morbidity, and the diagnostic yield is very high but Percutaneous fine needle aspiration needs care to avoid the rare complication of tumor implantation (9-10).

The main problem for most inaccuracies is the dedifferentiation of malignant cells in high-grade pulmonary carcinoma especially in non-small cell carcinoma<sup>11</sup>.

Our findings are consistent with the observation of Barbazza et al 1992<sup>11</sup> that the accuracy is 100% for SC, 98.8% for SCC and 91.6% for AC. They observed 98% overall accuracy in pulmonary carcinoma while we obtained overall 100% accuracy. Our results are higher than the results of Malcolm et al 1994<sup>3</sup>, who noted the positive predictive value for the diagnosis of malignancy by FNA up to 98.5%.

According to this study several conclusions can be made concerning the utility of cytopathologic typing of pulmonary tumors: The categorical system exhibited 82.17%, monadal system showed the highest 100% and binary system revealed 92.9% accuracy. The score of accuracy for categorical system by cytopathology is very low while the score for other two systems is excellent. The monadal system is adequate for cytology specimens if treatment differences are not important; this may be the case in high stage lesions in which no treatment will be rendered.

The binary system is highly useful on cytology specimens because it exhibits high diagnostic accuracy and its two sub-groups of small cell carcinoma and non-small cell carcinoma coincide to the currently utilized treatment protocol.

In our study the age and sex correlation was seen which indicates the high incidence in men than women, however in females tumor incidences increases after menopause. The incidence of tumor rises with the increase of age in both sexes till 6<sup>th</sup> decade and then falls. The chances of development of pulmonary carcinoma increase with the degree and duration of smoking. Our results are consistent with the findings of other investigators like Cotran et al 1999<sup>1</sup>.

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