INTERNATIONAL JOURNAL OF APPLIED BIOLOGY AND PHARMACEUTICAL TECHNOLOGY

www.ijabpt.com ISSN : 0976-4550

Volume-6, Issue-2, April-June-2015 Coden IJABFP-CAS-USA
Received: 18th Feb-2015 *Revised: 3rd Mar-2015* *Accepted: 05th Mar-2015*

Research article

SPECTRUM OF LESIONS IN THE LUNG – A 2 YEAR STUDY DONE ON LOBECTOMY SPECIMENS

Sumalatha Kasturi[1], Santhosh Babu Rendla[2], Renuka I.V.[3], Sumanlatha G. Roda[4] Sampoorna Gaddam[5]

[1]Assistant Professor, Department of Pathology, Chalmeda AnandRao Institute of Medical Sciences, Karimnagar, Telangana State, India.
[2]Associate Professor, Department of Radiology, Chalmeda AnandRao Institute of Medical Sciences, Karimnagar, Telangana State, India
[3]Professor, Department of Pathology, Guntur Medical College, Andhra Pradesh, India.
[4]Assistant Professor, Department of Pathology, Andhra Medical College, Vishakhapatnam, Andhra Pradesh, India
[5]Assistant Professor, Department of Pathology, NRI Medical College, Vijayawada, Andhra Pradesh, India.
Corresponding author: Email: sumalathakasturi97@gmail.com

ABSTRACT

Aims : The aims are to study the spectrum of non-neoplastic and neoplastic lesions of lung and to study the incidence of lung cancers with reference to age, gender, lifestyle and occupation.

Materials and Methods: The study is done over a period of 2 years (May 2009 to April 2011) in the Department of Pathology, GGH,Guntur. Total of 52 lobectomy specimens were studied. Formalin fixed, paraffin embedded H & E stained tissue sections were studied. Special stains (Gomorri's methenamine silver stain and Periodic acid schiff) were done whenever necessary. Immunohistochemistry was done in diagnostically difficult cases.

Results: Neoplasms constituted 38.4% of total lesions.Majority of lung tumors occurred in the fifth and sixth decade. M:F sex ratio is 4:1. On chest x-ray/CT scan chest, majority of lung tumors presented as mass lesion. Right side of the lung is more commonly affected than the left.Cigarette smoking is the major etiological factor in the causation of lung carcinoma. Among the primary tumors, adenocarcinoma constituted largest group followed by squamous cell carcinoma.

Conclusion: from the present study it is concluded that adenocarcinoma is now the most common lung carcinoma in all race and sex groups.There is a strong association between lung cancer and smoking.Chest radiograph and CT scan aid in the diagnosis and anatomical localisation of lung tumor.

Key words: Lung, Smoking, Neoplastic, Non neoplastic

INTRODUCTION

Lungs are one of the vital organs in the body and participate in delivering oxygen to and removing the excessive carbon dioxide from the body and enable the smooth functioning of various organs.Lung cancer was a rare disease until the early 1900s but it is now the most common cancer world wide. Lung cancer is by far the leading fatal cancer in both men and women, compared to prostate, colon and rectum (James A,2002). It began a sharp rise around 1930 in men and in the 1960s in women. Since the early 1950s the disease has become the most common cause of cancer death, rising steadily until 1991 when the mortality rate in men began to decline. In women, the mortality rate has continued to increase. Interestingly, over the years, the incidence by histologic type has significantly changed from squamous cell carcinoma to adenocarcinoma in all race-sex groups (Alberg AJ 2003). With more than 1.1 million deaths annually worldwide, lung cancer is the most frequent and one of the most deadly cancer types. In men 85-90% of cases can be attributed to tobacco smoking (Rosai 2010). Some western countries in which the smoking habit took off about 100 yrs ago, tobacco control programme has led to a significant decline in mortality. The prognosis of lung cancer is still poor, with a 5 yr survival rate of approximately 10% in most countries (Arthur S Patchefsky et al, 2006). Thus primary prevention by not starting or by stopping smoking remains the most promising approach.

The association between smoking and lung cancer is not solely based on epidemiological studies. Lung tumours of smokers frequently contain a typical though not specific, molecular fingerprint in the form of G:C > T:A. mutations in the TP53 gene which are probably caused by benzo(a)pyrine, one of the many carcinogens in tobacco smoke. Not only the neoplastic lesions, non neoplastic lesions like obstructive and restrictive pulmonary diseases and occupational lung diseases cause significant morbidity and account for the largest number of workdays lost in the general population. Respiratory tract infections are more frequent than infections of any other organ.The vast majority are upper respiratory infections caused by viruses but bacterial, fungal and parasitic infections still account for an enormous amount of morbidity (Corrin B 1990).

MATERIALS AND METHODS

The prospective study was done over a period of 2 years (May 2009 to April 2011) in the Department of Pathology, GGH, Guntur. Total of 52 cases were studied, who presented with a mass lesion on CT scan and X-ray to the cardio thoracic department.complete clinical details including age, sex, smoking history, family history, duration of complaints and radiological data were collected. The case material included lobectomies. Specimens were fixed in 10% buffered formalin. Tissues were processed by routine paraffin processing. Sections from paraffin blocks were taken and Haematoxylin & Eosin staining was performed. Special stains (Gomorri's methenamine silver stain and Periodic acid schiff) were done whenever necessary. Immunohistochemistry was done in diagnostically difficult cases. Histological typing, grading and tumor extension were studied on tissue sections. The incidence of lung cancers with reference to age, gender, lifestyle and occupation were studied. Immunohistochemistry was done using the protocol given by the manufacturer. Heat induced antigen retrieval method was followed in our institute. Multistep procedure (sandwich method) is followed using biotinylated universal secondary antibody and a third layer of streptavidin, horse radish peroxidase complex and finally DAB chromogen was used to develop colour at the site of antibody binding.

RESULTS

A prospective histopathologic study of 52 cases of lung lobectomy specimens was done at Guntur Medical College, Guntur from May 2009 to May 2011.

Table –1: ge incidence of various lung lesions.

Age group	Neoplasms	Broncho-pneumonia	T.B, fungal and parasitic infections	Obstructive lung disease
<10	0	4	3	1
11-20	3	2	2	0
21-30	1	1	3	2
31-40	1	0	4	2
41-50	4	1	0	3
51-60	7	1	0	2
61-70	4	0	0	0
total	20	9	12	10

Table-1 and figure -1 shows neoplastic lesions are common in the 6 th decade and bronchopneumonias are common in the younger age group.

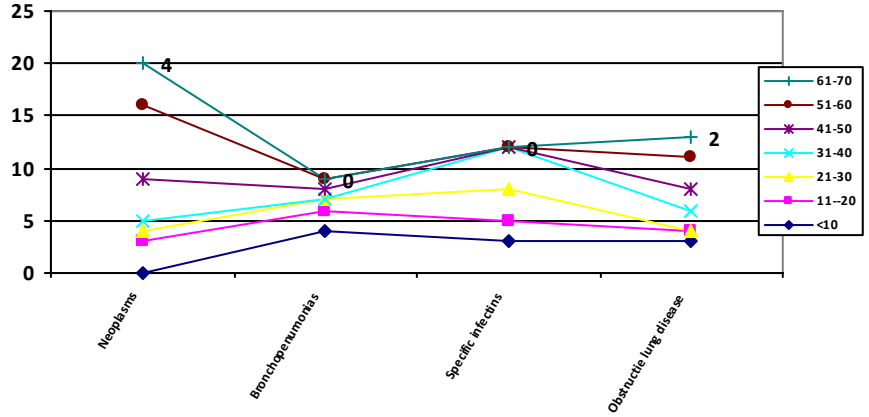


Table-2 Gender distribution of various lung and pleural lesions

S.no	Lesion	M	F
1	Benign & malignant neoplasms	17	3
4	Obstructive diseases	6	4
5	infections	16	6
	Total	39	13

Table 2 and figure 2 explains the gender distribution in the present study 75% males and 25% females. The ratio being 3:1 approximately. It is obvious from the table that male preponderance is seen in all types of lesions whether it is neoplastic (17:3) or non-neoplastic (22:10).

Figure 2:

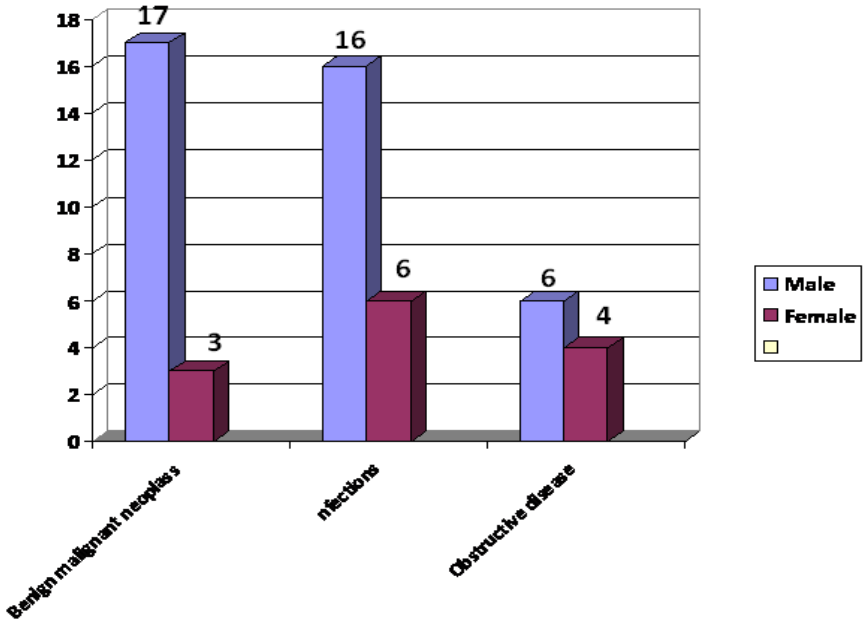


Table:3: CT scan findings in patients with carcinoma in the current study.

Mass lesion	14	70%
Pleural effusion	2	10%
Pleural effusion with mass lesion	3	15%
Pleural effusion with collapse	1	5 %

Table 3 shows that mass lesion in the lung is the most common diagnosis on chest X- ray and CT scan chest.

Figure1: Gross picture of squamous cell carcinoma

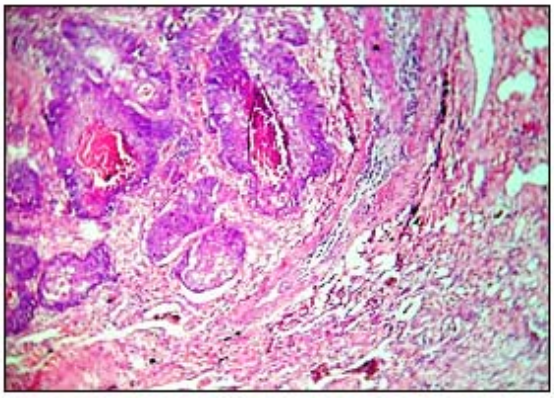


Figure 2: Squamous cell carcinoma x100,H&E

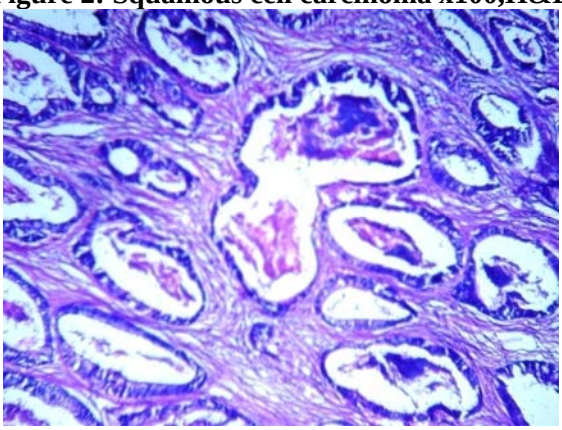


Figure 3: Adenocarcinoma- x100, H&E

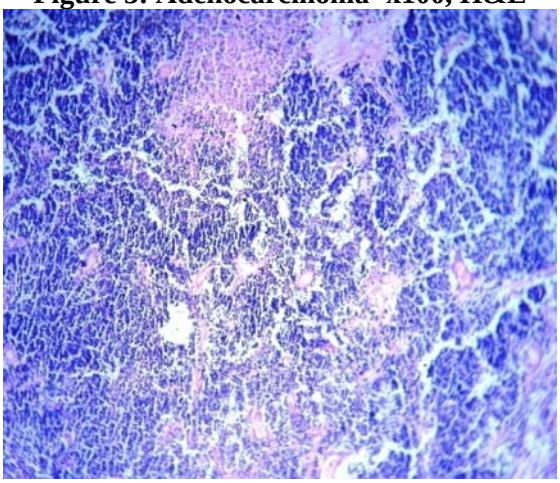


Figure 4: Small cell carcinomax100-H&E.

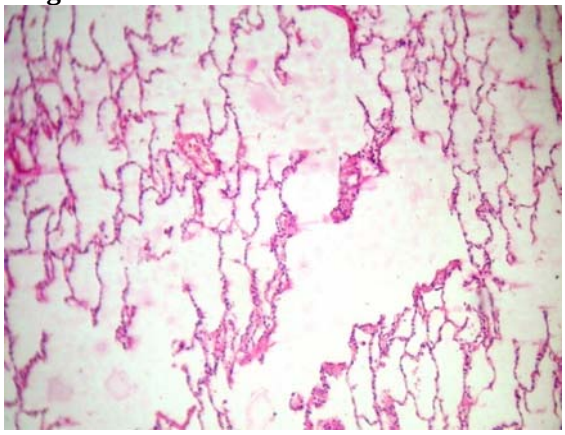


Figure 5: Emphysema-x100,H&E

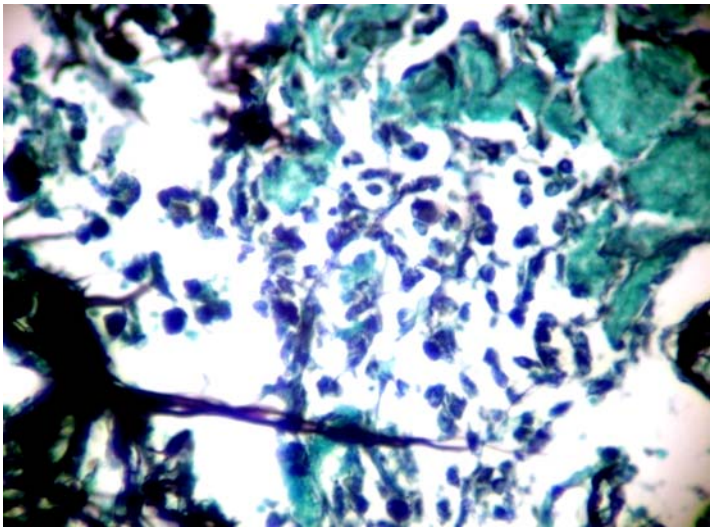


Figure 6: Pneumocystis jeroveci x1000, GMS stain

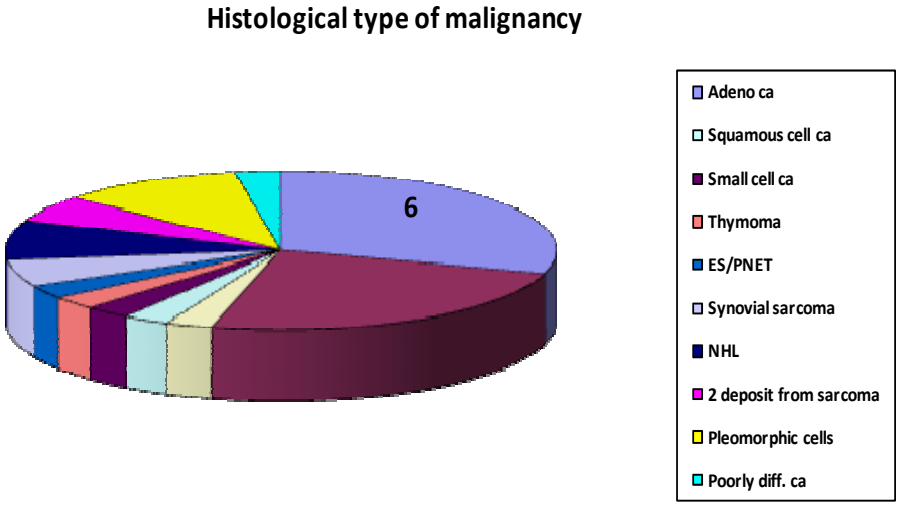
Table-4: Incidence of lesions in lobectomy specimens

	Diagnosis	No of specimens	% of total
Neoplastic – 20 (38.4%)	Squamous cell carcinoma	6	11.5%
	Adenocarcinoma	8	15.3%
	Synchronous tumor	1	1.92%
	Small cell carcinoma	1	1.92%
	Thymoma	1	1.92%
	PNET	1	1.92%
	Secondary deposit from sarcoma	2	3.84%
Non neoplastic – 32 (61.5%)	Bronchopneumonia	9	17.3%
	Lung abscess	1	1.92%
	Pulmonary tuberculosis	7	13.46%
	Bronchiectasis	9	17.3%
	Emphysema	1	1.92%
	Bronchogenic cyst	1	1.92%
	Pneumocystis jiroveci	1	1.92%
	Hydatid cyst	1	1.92%
	Fungal balls	2	3.84%

Table –5: Histological type of malignancy in lung specimens

Histological type	No. of cases	% of total
Adenocarcinoma	8	40
Squamous cell carcinoma	6	30
Small cell carcinoma	1	5
Thymoma	1	5
ES/PNET	1	5
Synovial sarcoma	1	5
Sec. deposit from sarcoma	2	10

This table 5 and figure 3 explains the histopathological diagnosis in lung specimens From the table it is clear that adenocarcinoma is more common that is closely followed by squamous cell carcinoma in our study.



DISCUSSION

The present study is undertaken to study the spectrum of lesions of lung and to correlate the clinical, radiological and histopathological features of various lung lesions.

Paraffin embedded and H & E stained tissue sections are studied and discussed in the light of other research findings in the literature.

Neoplastic lesions in lung specimens:

Out of these 52 lung specimens, 20 cases (38.4%) are diagnosed as neoplastic and remaining 32 cases (61.5%) as non-neoplastic lesions. Although the lungs are frequently the site of metastases from cancers in extrathoracic organs, primary lung cancer is also a common disease. Bronchial epithelium is the site of origin for 95% of primary lung tumors (carcinomas); the remaining 5% are a miscellaneous group that includes bronchial carcinoids, mesenchymal malignancies (e.g., fibrosarcomas, synovial sarcoma), lymphomas, and a few benign lesions (Aliya N Husain 2010).

The present study is undertaken to study incidence of different types of lung tumors in and around Guntur.

Eric B Haura et al (2010) reported that the majority of the cases occured in the fifth, sixth and seventh decades with the peak incidence in sixth decade. The age distribution of various malignant lesions in the present study reflected a similar picture (Table–1 and figure-1).

Eric B Haura, Susan A et al (2010) recorded a ratio of 5.2:1 and Malhotra et al (1985) reported the ratio of male to female ratio as 7.7:1 with a male preponderance. In the present study, sex ratio is 3:1 and is similar to study done by MC. Diffie et al. Most of the patients presented with cough and shortness of breath. Few patients presented with hemoptysis. Majority of the lung cancer cases (70%) on CT scan presented with mass lesion.

The right lung is more commonly affected than the left. In the right lung, the upper lobe is more commonly involved (68.96%) than middle lobe (24.13%) and lower lobe (17.24%).

Cigarette smoking is one of the causative factor in most cases of lung cancer. Lung tumors of smokers frequently contain a typical though not specific, molecular fingerprint in the form of G:C > T:A. Mutations in the TP53 gene which are probably caused by benzo(a)pyrine, one of the many carcinogens in tobacco smoke[4]. Not only the neoplastic lesions, non- neoplastic lesions like obstructive and restrictive pulmonary diseases and occupational lung diseases cause significant morbidity

Adenocarcinoma is the most frequent non small cell lung cancer, representing 35-40% of all lung cancers (Travis W.D 2004). In the present study also, adenocarcinoma is the commonest lung cancer, representing 40% of all lung cancers. Adenocarcinomas comprise approximately half of all lung carcinomas in females, however, in absolute numbers they are more common in males than in females. It develops more frequently than any other histologic type of lung cancer in individuals who have never smoked (Colby T.V 2004).

In this study, adenocarcinomas comprise about 33.33% of total malignancies in females.

In contrast to adenocarcinoma, squamous cell carcinoma is found in the central part of the lung (Rosai 2010). In this study, squamous cell carcinoma cases are accounting for 30% of all lung cancers. This is similar to a study by Winston W tan (2011).

The incidence of primary synchronous lung tumors is around 1.2-5.1% of all non small cell lung cancers and 1.9-9% of those non small cell cancer patients undergoing curative lung resection (Hans Rostad 2008). Synchronous tumors include tumors of different histologic types or two tumors of the same histologic type in separate lobes with no evidence of extrathoracic disease.

One case of synchronous lung tumor is reported in our study in a 60 yr old male patient, Histologically, sections from upper lobe mass showed moderately differentiated squamous cell carcinoma and sections from middle lobe mass showed well differentiated adenocarcinoma with focal bronchioloalveolar patterns.

Histopathology of small cell carcinoma is characteristically showed tumor cells arranged in nesting pattern, trabecular pattern. Cells are two times larger than lymphocytes with granular, salt-pepper chromatin, high mitotic activity and characteristic nuclear moulding with vast areas of necrosis.

Small cell carcinoma should be staged as limited versus extensive disease rather than using the TNM system because of the tendency for widespread dissemination at presentation.Small cell lung cancers have invariably spread by the time they are first detected, even if the primary tumor appears small and localised. Thus surgical resection is not a viable treatment.

Primary pulmonary lymphoma is defined as a lymphoma affecting one or both lungs, without evidence of extra pulmonary involvement or bone marrow disease on diagnosis or during the subsequent 3 months. Primary pulmonary lymphoma represent 0.4% of all lymphomas and 15-30% of rare pulmonary tumors. (Girald N 2004).

Primary pulmonary synovial sarcomas are rare, constituting less than 0.5% of all pulmonary malignancies (Travis W.D.2004). Pulmonary Synovial Sarcoma usually presents in young to middle age adults and shows no gender predilection.

Non neoplastic lesions of lung:

Out of 52 radical lobectomy specimens 9 cases (17.3%) are diagnosed as bronchiectasis based on gross morphology and microscopic appearance. Smokers are prone to bronchiectasis because smoke impairs their respiratory defense mechanisms. Bronchogenic cysts are one variety of foregut cysts. They are usually situated in the mediastinum, close to the carina but may also be found within the central portions of the lungs. (Corrin B 1990).

A 5 yrs old female child presented with recurrent respiratory tract infections. We received a lobectomy specimen of lung. Grossly, cut section showed a cyst filled with gray white gelatinous material. Microscopically, the cyst is lined by pseudostratified columnar epithelium with cartilage and glands in the wall of the cyst. CT scan characteristically showed air-fluid levels suggesting a connection with the airways.

In the present study two cases of fungal diseases are recorded in lobectomy specimens,which showed positive result on special stain for fungus i.e Gomorri methenamine silver stain.

Pneumocystis Carinii was discovered early in this century in Brazil by Chagas and soon after by carini. It was first identified as a human disease in 1942, in Belgium.More recently it has generally been considered to be a protozoan largely founded on its ultra structure and renamed as Pneumocystis jiroveci.

One case of pneumocystic jeroveci pneumonia is recorded in our study. Patient is an immunocompromised (AIDS) male of 40 years old, present with fever, productive, cough, shortness of breath. Chest x-ray showed bilateral opacification.

One case of pulmonary hydatid cyst is reported in a 11 years old female patient.

In the present study, 16 cases showed picture of pneumonia grossly and microscopically. Out of these 16 cases of pneumonia, etiology of tuberculosis is found in 7 cases but in the remaining 9 cases no etiology is found

CONCLUSIONS

Adenocarcinoma is now the most common lung carcinoma in all race and sex groups.There is a strong association between lung cancer and smoking.Chest radiograph and CT scan aid in the diagnosis and anatomical localisation of lung tumor.Immunohistochemistry is very much helpful in diagnosing difficult cases.

ACKNOWLEDGEMENT

I thank Dr. Saila Bala,Professor Dr.Aparna, Associate Professor and Dr.RamanaKumari, Assistant Professor, Department of Pathology, Guntur Medical College for their valuable suggestions.

Conflict of interest: no conflict of interest
Source of funding: Nil.

REFERENCES

Addis B.J. (1990). Lymphoproliferative disease. In: Corrin.B. Systemic Pathology. 3rd edition, Edinburgh London Melbourne and Newyork: Churchill Livingstone; 317-29.

Alberg AJ, Samet JM. (2003). Epidemiology of lung cancer.Chest 123:218.

Aliya N Husain, The lung In: Vinay Kumar, Abul K Abbas, Nelson Fausto, Jon C.Aster. Robbins and Cotran (2010). Pathologic basis of disease. 8th edition: Elsevier. Philadelphia; 692-734.

Arthur S Patchefsky, Hormoz Ehya, Hong Wu. (2006). Localized diseases of the bronchi and lung. In: Steven G Silverberg. Silverberg's Principles and practice of surgical pathology and cytopathology. 4th edition. china: Elsevier; 935-94.

Banks P.M, Harris N.L, Warnke R.A, Gaulard P.H. Lymphomas. In: William D Travis, Elisabeth Brambilla, H.Konrad Muller- Harmelink, Curtis C Harrier. (2004). Pathology and genetics of tumours of the lung, pleura, thymus and heart. Lyon: IARC Press; 137-140.

Charles Kuhn I, Williams W West, John E Craighead, Allen R Gibbs, Lungs, In: Ivan Damjanov, James Linder. (1996). Anderson's Pathology. 10th edition. St. Louis: Mosby; 147-73.

Colby T.V, Noguchi M, Henschke C, Vazquez.MF, Geisinger KA, et al. Adenocarcinoma. In: William D Travis, Elisabeth Brambilla, H.Konrad Muller- Harmelink, Curtis C Harrier. (2004). Pathology and genetics of tumours of the lung, pleura, thymus and heart. Lyon: IARC Press; 35-50.

Corrin.B. (1990). Acute bacterial infections and lung abscess, chronic bacterial infections, fungal diseases, parasitic diseases, atelectasis and pulmonary collapse. Effects of pressure changes. In: Corrin.B. systemic Pathology. 3rd edition. Edenburg London Melbourne and Newyork: Churchill Livingstone; 86-101, 103-123, 125-144, 147-158, 161-165.

Girald. N, Babareschi.M, Cordier J.F, Murer.B. What is a rare tumor and how should it be dealt with clinically European respiratory monograph. Lyon, France.

Hans Rostad, Trond – Eirik Strand, Anne Naalsund, Jarle Norstein. (2008). Resected synchronous primary malignant lung tumors: A population based study. Ann thorac Surg 85: 204-209.

James A, Thomas A, MurrayT. (2002).Cancer statistics, Cancer J Clin; 512-22.

Nicholson A.G, Harris N.L. Primary pulmonary diffuse large B-cell lymphoma. In: William D Travis, Elisabeth Brambilla, H.Konrad Muller- Harmelink, Curtis C Harrier. (2004). Pathology and genetics of tumours of the lung, pleura, thymus and heart. Lyon: IARC Press;.91.

Rosai, Ackerman. (2004). Lung and pleura. In: Michael Houston: Rosai and Ackerman's Surgical Pathology, 9th edition. St Louis: Mosby; 387-424.

Sanjay Mukhopathyay, Anthony A Gal. (2010). Granulomatous lung disease – An approach to the differential diagnosis. Arch Pathol lab med 134: 667-690.

Travis.W.D, Churg.A, Aubry M.C, Ordonez N.G, et al. Mesenchymal tumours. In: William D Travis, Elisabeth Brambilla, Konrad Muller-Harmelink. H, Curtis C Harrier. (2004). Pathology and genetics of tumours of the lung, pleura, thymus and heart. Lyon, IARC Press; 141-144.

Travis W, Nicholson.S, Hirsch FR, Pugatch B, (2004). Small cell carcinoma. In: William D Travis, Elisabeth Brambilla, H.Konrad Muller- Harmelink, Curtis C Harrier. Pathology and genetics of tumours of the lung, pleura, thymus and heart. Lyon: IARC Press; 31-34.

ISSN : 0976-4550

INTERNATIONAL JOURNAL OF APPLIED BIOLOGY AND PHARMACEUTICAL TECHNOLOGY

Email : ijabpt@gmail.com

Website: www.ijabpt.com