Carcinoma
of Lung

INDEX

COURTESY OF CITIZENS AID SOCIETY

I. PEOPLE

1. THE DEANS

Your inquiring reporter found that the delegates to the Annual Meeting of the Association of American Medical Colleges were impressed with the size of the University of Minnesota, the intensive use of our facilities, the program and accomplishments of the Students' Health Service, Dr. Litzenberg's technique for handling the internship year, our interest in the early diagnosis of tuberculosis, weekly Staff Meetings, intense interest in community affairs, the Out-patient Admission Department, the Nurses' Hall, staff aggressiveness and courtesy, the large number of blondes (especially of the fair sex), our Community Fund, the Medical Library, and the very special weather which was on tap for their meeting. We appreciated having them with us and profitted by their stay. It is unfortunate that we do not have such organizations meet with us oftener. The Staff extends appreciation to those in charge who allowed us to participate in their meeting.

2. SHARE

The 16th Annual Community Fund Crusade, November 5 to 15, 1933, asks for your interest and support. The officers point to the need of the community beyond emergency, bread and butter relief, the responsibility of federal, state and local governments under the present economic situation, and the increase in services of Community Fund agencies with lower budgets. We, who know the objectives of the organizations asking for our assistance, do not have to be told the need for everyone to back them up to the limit. The new theme "share" in contrast to "give" is based on the fact that this year it will be necessary for us to share of our substance rather than to give of our excess. The Hospital will be divided into groups, (1) professional staff, (2) graduate nurses, (3) under-graduate nurses, (4) internes and fellows, (5) clerical help, (6) technicians, (7) service employees, (8) health service. Everyone will be given an opportunity to do something. Small contributions are just as welcome as large. It is suggested that certain groups combine and make a joint contribution. No one will be forced to subscribe but everyone should welcome the opportunity. The solicitor in charge of your group will try to contact you, but if this is not possible be sure to see him. The Hospital quota has been raised this year so a greater effort is needed to meet our obligations.

3. EDWIN J. SIMONS, M.D.

Whose unpublished monograph on "Primary Carcinoma of the Lung" is quoted today, practices in Swanville, Minnesota (population 400). He graduated from the University of Minnesota in 1924 and went to the country to practice. Encountering in his practice a case of primary carcinoma of the lung, he became interested in the subject and looked up the literature. The result is a dissertation which has been published in brief in one of the local journals (Minnesota Medicine). He won the prize of the Minnesota Society of Internists for his efforts. He has found time among other things to institute with Dr. Hilleboe, now of our staff, a tuberculosis survey of his community. A great many young men who go out into practice apparently find it difficult to "keep up" and do the things which they have been taught. Dr. Simons apparently does not experience this difficulty. It is unfortunate that his modesty prevents him from telling you of some of the things he has been able to accomplish in practice in the small community. We, who know him, appreciate what he has done and present him to the staff today as a shining example of what can be done to better medical and social conditions in a small community.

II. CASE REPORT

CARCINOMA OF LUNG

Case is of white male, 40 years old, admitted to Minnesota General Hospital 4-14-33, expired 5-12-33 (28 days).

Indefinite Onset

1- -33 Observed loss of weight and poor appetite.

Cough, bloody sputum, findings of pleurisy

1-20-33 - Symptoms continue. Cough and mucopurulent sputum, occasionally bloodtinged. Feels poorly and has some difficulty in breathing. Consulted a physician. Diagnosis of pleurisy.

Pain

4-3-33 - Sudden sharp, knife-like pain in left lower chest. Difficulty in breathing because of pain. Losing weight continuously (15 lbs.). Sputum thick, tenacious and on many occasions blood-tinged. Very nervous.

Numerous past pulmonary infections: pulmonary collapse

4-14-33 - Admitted. Past history: Measles, influenza, pleurisy, pneumonia, chronic upper respiratory infection (particularly right side) and otitis media. Physical examination: Temperature 98. Pulse 96. Respirations 22. Chronic upper respiratory infection and chronic otitis media (right). Chest - definite decreased excursion on left side; triangular area of flatness on percussion, posteriorly, extending from 6th dorsal vertebra to diaphragm and laterally as far as axillary line, breath sounds diminished in this area and fremitus weak. Laboratory: Urine - negative. Blood - Hb. 65%, rbc's 3,750,000, Pmn's 79%, L 20%, E 1%. Sputum - negative for tubercle bacilli. Wassermann - negative. Mantoux - negative.

Pulmonary collapse

X-ray of chest - There is localized density lying behind heart on left side, diaphragm is pulled up high on this side, with numerous pleural adhesions. Heart pulled over toward left. No definite evidence of tuberculosis in either lung.

Progress

Pleural punctures: 35 cc. bloody fluid obtained on 3 different taps in different locations. Fluid contains 1800 cells, no tubercle bacilli.

4-19-33 - Bronchoscopy attempted, unsuccessful because bronchoscope is not long enough to reach secondary bronchi.

Neurological signs begin

4-21-33 - Difficulty in voiding.

Numbness

4-22-33 - Still has difficulty in voiding. Numbness from knees down.

Paresis

4-23-33 - Unable to void. Abdomen distended. Paresis present in lower extremity with absence of reflexes.

Spinal lesion

X-ray of abdomen, thoracic spine - films of spine show definite erosion of pedicles of 6th and 7th thoracic vertebra, especially marked on left side. This suggests spinal cord tumor extending through this area. There is in addition some rarefaction of the body of the 10th thoracic vertebra and on left side of the 12th. Slight compression of all these bodies and hypertrophic changes anteriorly are present which may suggest that this is secondary to an arthritic process. Changes in 6th and 7th, however, are strongly suggestive of spinal cord tumor.

Level of lesion established

4-24-33 - Sensory level definitely localized at 6th dorsal segment.

Gradual decline

5-12-33 - Condition showed little further change. Gradually became weaker, lost more weight. Almost daily rises of temperature, ranging to 102 without definite localizing signs. Respirations much weaker. 2:30 P.M.- Expired.

Autopsy

External examination negative. Body is well-developed, fairly well-nourished, white male, measuring 168 cm. in length, weighing approximately 135 lbs. Rigor just beginning. Hypostasis slight. No edema, cyanosis or jaundice. Pupils are equal, each measuring 5 mm. in diameter. No special marks observed about body. Some deformity of fingers of right hand (said to be due to old frost bite).

Peritoneal Cavity contains slight excess of clear fluid. Appendix hangs free.

Right pleural adhesions

Pleural Cavity on right is free of adhesions and contains no excess fluid. On left side, there are light adhesions on posterior part of lower lobe. Base of lung adherent to diaphragm over area about 3 cm. in diameter. Pleura not particularly thickened over this lobe.

Tumor

Pericardial Sac smooth and glistening. Tumor mass projects into sac near base from hilus of lung. Has not eroded sac.

Heart weighs 375 grams. Musculature well-developed. No hypertrophy of dilation. Mural endocardium smooth. Valves are well formed and smooth. Root of Aorta shows no change (good lumen). Coronaries soft and patent.

Carcinoma of left lung

Right Lung weighs 375 grams, Left 700. On opening thorax, right lung collapsed immediately. Left upper lobe remained distended and collapsed very slowly. Right lung is well expanded and shows no pneumonia. There is one metastasis in upper lobe near mediastinal surface. This metastasis is about 1.5 cm. in diameter. In left lung, upper lobe is over-expanded, no pneumonia or metastasis. Lower lobe is collapsed, firm, rubbery and when other lobes are expanded by air pressure this lobe is about 1/2 its normal size. Cross section of lobe shows an extensive carcinoma arising in bronchi near hilus of lung. Hilar bronchial mucosa is uniformly involved. No one definite tumor present. Malignancy has grown out from original focus in a white, sheath around all branches of bronchi. This same white cylindrical sheath is present around the terminal bronchi. In addition, two nodules are present in lung parenchyma. Terminal branches of bronchi near base of lobe are extensively dilated into a sacular bronchiectasis. Near upper part of lobe, there is a liquefied irregular area which probably represents an abscess. Hilus of lung is extensively involved by malignancy. Enlarged lymph nodes have fused into a solid mass which partially constricts pulmonary artery and constricts main branches of upper bronchi to considerable degree. These lymph nodes extend over into opposite hilus.

Spleen weighs 250 grams, is soft. No metastases present.

Metastasis to liver

Liver weighs 2700 grams, contains numerous large metastases, some of which measure 5 cm. in diameter.

Gall-bladder and Gastro-Intestinal Tract - normal.

Metastasis

Pancreas is extensively infiltrated from retroperitoneal tumor which makes the substance of pancreas difficult to find. On cross section, pancreatic tissue can be well differentiated from white tumor and there is no question that tumor is infiltrating pancreas rather than that there is a primary tumor of pancreas.

Adrenals - normal.

Metastasis

Each Kidney weighs 175 grams. On both sides, there are very small metastases.

Ulcerative cystitis - effect of catheter?

Bladder has thin wall. Mucosa is red and hemorrhagic. There are 3 ulcerations which are round, measure about 3/4 cm. in diameter, are very deep and marked out on serosal surface of bladder as discolored areas. Ulceration extends down to peritoneum. This suggests very much that ulceration is due to necrosis from indwelling catheter in bladder during life. Prostatic urethra is red. Prostate is

soft and not enlarged.

Aorta shows minimal degree of atheromatous change.

Lymph Nodes are as described above. There is a large plaque of lymph nodes surrounding celiac axis artery and pancreas. These extend up into hilus of liver.

Organs of Head and Neck - not examined.

Two metastatic cord tumors

Cord: Adjacent to spinal column beneath pleura on right side, there is a small metastasis which is independent of spinal column itself. Bodies of vertebra are soft but no tumor tissue can be recognized grossly. When spinal cord is removed from its bed, there is a plaque -like mass of tumor encircling dura posteriorly opposite 8th and 9th dorsal vertebrae. At this point, laminae of vertebra are eroded. Apparently this tumor has arisen about lamina and has penetrated canal secondarily. It has not infiltrated dura to any extent and can be peeled out very easily. When dura is opened and cord exposed, there is an oval metastasis within spinal cord opposite level of 6th dorsal nerve. On cross section, tumor has apparently infiltrated all parts of cord.

Diagnoses:

1. Carcinoma of left lung (bronchiogenic).
2. Atelectasis, left lower lobe.
3. Bronchiectasis, left lower lobe.
4. Emphysema, left upper lobe.
5. Metastases of vertebrae, dura, spinal cord, liver, kidneys, pancreas, retroperitoneal lymph notes, mediastinal lymph nodes, lung.
6. Cystitis, acute.
7. Splenitis, acute.

Note: Referring physician's initial diagnosis was carcinoma of lung with cord metastasis.

Microscopic:

Tumor cells are completely anaplastic. They have reverted to round, small deep staining cells. No architectural pattern followed. There is a remarkable extension of tumor cells through lymphatic channels. Extension not only forms collars about larger bronchi (seen in gross specimen) but extends into parenchyma as cords in lymph vessels about arteries and bronchioli. Lung parenchyma shows varying degrees of atelectasis, both recent and old, fibrosis, infection, and abscess formation. Ectatic bronchi are intensely inflamed and hardly any of wall can be recognized.

III. ABSTRACT

CARCINOMA OF LUNG

Reference:

Simons, E. J.,
Primary carcinoma of the lungs.
Monograph. To be published.

Introduction:

No form of malignant disease offers as many interesting phases as carcinoma of the lung to the diagnostician, oncologist and therapeutist. The diagnostic procedures in patients with carcinoma of the lung may be termed "subtle"; that is, characterized by cunning or craft. The cause of the recent increase in incidence of malignancy of the lung, the relation to pulmonary infection, bronchial metaplasia and granuloma presents problems to those interested in the etiology of tumors. No less attractive but more discouraging are the phrases dealing with results of radiation and surgical removal.

History:

In the 16th century, a peculiar lung disease in the miners of Schneeburg, Saxony was described. In recent years, this malady was found to be carcinoma. The first description of a case is accredited to Morgagni (1761). Bayle (1810) presented the second case. Laennec (1819) differentiated malignancy from other diseases of lung, suggested a classification and diagnostic methods. Bell (1846) using those methods made the first clinical diagnosis. The relative rarity of the malady may be deduced from the various

series:

1878 - Reinhard - 28
1985 - Wolf - 31
1896 - Passler - 70
1904 - Schet -177
1912 - Adler -374

Increased incidence:

In sharp contrast to the rarity of cases suggested by the above data, is the report of the San Francisco Cancer Survey (deaths in U.S.).

1924	1,586	1.7 (per 100,000)
1925	1,728	1.7
1926	1,892	1.8
1927	2,012	1.9

The average incidence is said to be less than 2 per 100,000 population. Many areas in America have a higher incidence.

Locality	Period	Rate per 100,000
Albany, N.Y.	1919-1923	2.5
New Orleans	1919-1923	2.8 (white)
New Orleans	1919-1923	.6 (colored)
San Francisco	1920-1924	4.7
Boston	1920-1924	3.9
Chicago	1920-1924	2.8
Chicago	1925	2.0
Buffalo	1922-1926	3.2
Alberta, Can.	1921-1925	1.3
British Columbia	1920-1924	2.1
Winnipeg	1920-1924	3.3

This indicates a rather definite increase in incidence in recent years.

A composite table from American and Canadian statistics still further emphasizes this increase.

Author	Period	Total Autopsies	Total Carcinoma	Carcinoma of Lung	% Autopsies	% All Carcinoma.
Barron	1899-'11	1,333		0		
Klotz (Can.)	1910-'20	1,000		5	.50	
Rosahn	1910-'14	438	34	2	.46	5.88
Hueper	1911-'21	5,000		33	.67	
Barron	1912-'18	2,026		4	.20	
Rosahn	1915-'19	526	136	2	.38	4.44
Fried	1915-'25	1,400		5	.35	3.67
Scott and Forman	1916	302		3	.99	
Grove and Kramer	1917-'24	3,659		21	.54	
Barron	1919-'21	1,033		9	.89	
Rosahn	1920-'24	874	90	5	.57	5.55
Klotz (Can.)	1920-'27	1,900		19	1.00	
Moise	1921	375	29	5	1.38	17.00
Maclachlan	1921	231		4	1.70	
McCrae, Funk and Jackson	1924-'27	621	53	4	.64	7.54
Rosahn	1925-'28	1,166	145	12	1.03	8.28
Boyd (Can.)	1930	900		14	1.55	

It is to be noted that:

Period	Total Autopsies	Total Carcinoma of Lung	% of Autopsies
Before 1920	16,687	88	.52
After 1920	6,067	63	1.08
Total	22,754	137	.60

In England according to the Proceedings of the International Conference on Cancer (London), based on an analysis of 25 years experience, there was an increase from .94% in 1903-'07 to 1.69 in '23-'27.

German statistics show the same change. One difference has been noted. Here, the increase began somewhat earlier in the century than in other countries. The following summary of one set of figures (Berlin) is typical of many other such tabulations.

Period	Autopsies	Carcinoma of Lung	%
1903-20	23,406	112	.48
1921-25	6,602	87	1.16

In France, while no statistics are available, Huguenin who is considered an authority agrees with the above.

The only conclusion possible is that there has been a sharp increase in incidence. This increase is not due to better diagnostic abilities because the statistics deal with autopsy material. Some differences may be due to variations in classification. Nearly all the men collecting the data agree that the incidence has been "real and significant." The increase is out of proportion to all other types of malignancy. Certain features of the curve of this increase are to be noted. In some areas, the rise started early in the present century (Germany). In almost all parts of the world, however, the sharpest increase occurred after 1919. In a few places, the peak was reached by 1924; in others, the curve is still going up.

Etiology:

The above data indicates a significant problem. In this case, there is a sudden increase of incidence over a fairly limited period of time. To what factors can this increase be attributed?

Heredity

Number of cases	770
Heredity not mentioned	290
Positive heredity strain	34
Negative heredity strain	68

Conclusion: No significant difference.

Trauma

Total cases	746
Trauma possibly significance	19

Conclusion: no significance.

Schneeberg (Saxony) Miners Cancer

This unusual pulmonary malignancy has been extensively studied. The frequency is remarkable. In 1924, 154 miners were studied; by 1926, 21 had died; 16 were autopsied and had pulmonary carcinoma. Two of the others, clinically, had the malady. In 362 non-miners of the same area, none had the disease. Only those who mine the ore are affected. The dust of the mine contains stone, bismuth, nickel, cobalt, arsenic, fungi and radioactive substance. Studies by several investigators on the part played by these various substances have been made. The conclusion is that there is no evidence pointing to any one element or combination of such as the causative factor. Cause still remains obscure. Dust in various other mines does not lead to carcinoma with the exception of one mine adjacent to the Schneeberg mine from which the same type of ore is obtained.

Tuberculosis

Cases with carcinoma of lung	2,031
Cases with both carcinoma and tuberculosis	187 (9.2%)

The above statistics probably are distorted because cases showing the combined lesions are reported more often than the single lesion. If only series of 50 or more cases are studied, the percentage of combined lesions drops to 7.24%. This is not significant.

Influenza

This disease early attracted attention as a possible explanation for the sudden increase of incidence in 1919-25. To further suggest this relationship, data from parts of Germany showed a doubling of the incidence of lung cancer after the influenza epidemic of 1901. Influenza is primarily a disease of bronchi. It induces several chronic changes particularly metaplasia (to squamous epithelium), benign adenoma and granuloma formation in the bronchi. Pathologically, these changes (see under chronic infection) suggest strongly precancerous lesions.

The following table shows the actual statistical incidence of previous influenza in cases of carcinoma of lung (summary):

Total cases	795	
"Flu" history	55	(7%)

In 1901, while there was an increase in pulmonary carcinoma, only 21 out of 246 cases had had "flu" and in 12 of these, the interval was 10 years or more. From this data, influenza cannot be considered as a significant factor in the production of pulmonary carcinoma.

War gases:

like influenza, induce a marked bronchitis. This has also been suggested as a possible cause because of the abrupt rise in incidence after 1918. In this case, the answer is very convincing. Most of the war gas victims have been followed in veteran hospitals. The literature on such follow-ups is almost devoid of any mention of pulmonary carcinoma.

Chronic Pulmonary Disease

The pathological appearance of the lung and bronchi in many of these conditions suggests neoplasm or a "precancerous" nature to a remarkable degree. The pathogenesis of this picture (Winternitz, etc.) is interesting. The repeated infections produce collapse of parts of the parenchyma with subsequent fibrosis. The normal alveolar epithelium is destroyed. The bronchial epithelium grows out along the atria and relines the remnants of the alveolar spaces. The resultant picture suggests carcinoma. There is a heavy stroma of fibrous tissue in which are imbedded irregular cords and nests of cuboidal epithelium which is actively growing. Occasionally, the epithelium is squamous (metaplasia) which makes the appearance even more "malignant". Often large, plump phagocytes are to be seen in the fibrous tissue giving the appearance of infiltration.

The author found that a summary of the various workers' impression of the value of these factors in inducing carcinoma was almost impossible. No concrete statistical evidence proving a relationship could be developed. An "unmitigated acceptance" of a casual relationship could not be accepted but basing his opinion on the impressions of the majority of writers, the author states that "this whole group of disease processes must be considered etiologically important".

Inhalation of dust, smoke, tar particles (from modern roads), motor exhaust fumes, occupational dusts (except Schneeberg miners), etc., apparently cannot be implicated as causes of cancer. It is true that the laboring classes show a higher incidence.

Summary of etiology:

The tables and statistical data collected by the author are very extensive and impressive. All such available data apparently has been collected. No one specific factor can be proven to be an etiological factor. However, many of those who have studied the problem feel that the pulmonary changes induced by various forms of chronic inflammation are significant etiological factors.

Pathology:

The general characteristics of pulmonary carcinoma are the same as those of other organs. A few special features are to be noted. The size on the whole is small because mechanical interference with respiration does not

usually allow the tumors to become massive. There is a marked tendency to secondary changes not equalled even by such tumors as those of the bowel or lower urinary tracts. Collapse of the lung by obstruction by the tumor mass of the bronchus leads to fibrosis, bronchiectasis, abscesses, pleural effusions or empyema. The closure of the bronchus is ideal for the development of such inflammatory processes. In the great majority of cases, these secondary changes are the ones producing the signs and symptoms. It must be kept in mind however that bronchial occlusion and the attending secondary changes are not always due to a tumor.

The point of origin of the tumor is almost invariably in the bronchus. Less than 10% (and this is doubtful) arise in the lung parenchyma. The commonest site is 1 to 2 cm. beyond the bifurcation of the trachea, roughly, in the hilus of the lung. The location as to right and left in 1947 cases was: 868 right, 742 left and 37 bilateral. The various lobes are almost equally involved: right lower 87, right middle 61, right upper 88, left lower 90, left upper 80.

The microscopic appearance is characterized by its extreme variability. The cells may be completely anaplastic and such tumors were up to recently called sarcoma. The cells may be round or spindle-shaped (oat-cell). In other tumors, cuboidal or cylindrical cells form sheets (medullary or simplex carcinomas) or alveolar structures. Squamous type tumors either with or without keratin may be found. This highly variable appearance added to the unusual picture produced by the secondary chronic inflammatory disease makes the diagnosis of bronchogenic carcinoma sometimes very difficult. This is especially true when only small biopsies obtained through a bronchoscope are available for study.

Metastasis

From pulmonary carcinoma are noted for one thing: the metastasis may be more apparent than the primary tumor. This may occur for two reasons: either because the primary tumor metastases early or because it has not yet produced the secondary changes which give rise to symptoms and signs. The location of the secondary growths in 1380 cases was as follows:

Hilar and mediastinal lymph nodes	515
Liver	445
Bones	262
Lungs	261
Kidneys	228
Pleurae	207
Brain	186
Adrenals	172
Pericardium	98
Abdominal lymph nodes	94
Pancreas	64
Heart	60
Thyroid	54
Cervical nodes	49
Spleen	38
Intestines	24
Dura	20
Ovaries	20
Supraclavicular nodes	20
Peritoneum	18
Skin	18
Axillary nodes	16
Stomach	9
Gall-bladder	6

Clinical Considerations:

In the entire group on record, relatively few have been diagnosed correctly. In 1904, in 178 cases a diagnosis was made in only 6. In 1922, in 458 cases, these accurately diagnosed had arisen to 109. In more recent years, the percentage of accurate diagnoses has risen to 27, 48, 60 and 78% in different series.

Sex Distribution:

Males, 3007; females, 828:
Ratio 3.6: 1

Age:

0-9 - 0; 10-19 - 5; 20-29 -49; 30-39 - 173; 40-49 - 435; 50-59 - 666; 60-69 - 511; 70-79 - 161; 80-89 - 18; Total - 2031.

The author presents a case in a 19 year old boy. A complete search (of 3,468 cases) showed only 8 cases

below the age of 20.

The symptomatology can be best summarized by the following table:

Symptom	Cases Analyzed	No. with Symptoms	%
cough	1,031	739	71.6
sputum	1,167	788	67.4
pain	1,154	698	60.4
dyspnea	1,014	591	58.2
pyrexia	927	426	45.9
emaciation	902	407	45.1
hemoptysis	1,171	479	40.8
dilated veins	160	36	22.5
cyanosis	193	40	20.7
night sweats	184	35	19.0
edema	160	29	18.1
dysphagia	143	17	11.8
vomiting	152	16	10.5
metastasis (clinical)	772	60	7.7
hoarseness	887	54	6.0
clubbed fingers	866	39	4.5

Onset:

This may be sudden (34%) or insidious (66%). When sudden, it is with pain, dyspnea, hemorrhage, pleurisy, bronchitis or pneumonia. When insidious, the typical history is "I have not been well since my pneumonia a few months ago." The first symptoms are so variable that a summary in table form could not be made.

The physical findings show a marked variability. The changes which take place in the course of the illness offer an opportunity for ingenious interpretation of physical findings. These can be interpreted only if a picture of the mechanical changes in the lung are kept in mind. When the tumor is small, the obstruction of the bronchi is partial and emphysema is the result. This stage is rarely detected because the patient does not have symptoms and is not examined. When the tumor is larger, it obstructs one part of a lobe. At this stage, a simple lobular atelectasis is found: A localized area of suppressed breathing, dullness and absent fremitus. Rales are absent. As the tumor grows, more branches of the bronchus are obstructed. The area of collapse becomes larger, the diaphragm and mediastinum are pulled into the side to compensate for the loss of volume. Moreover, infection behind the obstruction has begun. Signs of cavitation, pneumonitis, bronchiectasis make their appearance. Later, the exudate from these overflows into normal bronchi and the cycle of obstruction and infection is begun in other lobes. The entire lung and parts of the opposite lung became involved by the secondary changes. Effusion may occur but more often the signs of effusion prove on needling to be signs from an atelectatic lung.

The physical examination follows this course accurately. In the late stages when signs of atelectasis and adjacent infection such as abscesses or bronchiectasis or pneumonitis are present side by side the examination is very confusing. The number of cases of atelectasis needled for fluid (or even operated upon under the diagnosis of empyema) apparently is quite considerable. Fluid, however, is present in many cases: 15% in the early cases and 45% sometime during the complete course - usually in the late stages. In about 1/3 of these, the fluid is hemorrhagic. Examination of this fluid has been regarded in the past as very valuable. Lenhartz described a large cell with many fatty bodies in its cytoplasm as characteristic of carcinoma. This Lenhartz cell is no longer considered specific. Mandelbaum's method of imbedding the sediment in paraffin and treating it as any biopsy is recommended (Seecoff's modification). Seecoff reported the finding of tumor cells in 70% of his cases.

X-ray Features:

The development of much of our knowledge regarding pulmonary cancer has been brought about by the roentgenologists. The findings here are as variable as they are on physical examination. The changes over a period of time are most diagnostic. The progression of atelectasis as outlined

above is characteristic. The earliest changes, however, may be hidden in A-P plates behind the density of the heart or liver. While the atelectasis is the only process usually visualized in some cases, the actual tumor is sometimes seen before localizing symptoms are present. In these cases, it is evidenced as a shadow with a convex outer border located in or near the hilus. The presence of metastasis is very helpful in making the diagnosis. Lipiodal injection and pneumothorax often aid in visualizing the tumor.

Prognosis:

No good estimate of the duration of the disease is possible because the tumor often produces no symptoms in its early stages and its symptoms often fuse with those of preceding illnesses. Therefore, the total duration ranges from 3 days to 40 years. The average duration estimated by numerous authors is $6\frac{1}{2}$ months and few are said to live over 1 year.

Radiation therapy:

An almost general consensus of opinion is that this form of treatment is an excellent palliative agent. The stenosis is decreased, drainage of purulent material in the bronchi is facilitated and the general well-being is improved. The ultimate results, however, are the same as in untreated cases. At the Mayo Clinic between 1921 and 1926, 19 cases were treated with the general duration of life stated above. One patient lived 10 months. The average duration of life was 3.6 months while in the untreated group it was 3.5 months.

Vincent in 1932 reported 42 patients treated more recently. 30 cases lived an average duration of $6\frac{1}{2}$ months, 2 more were failing after 7 months and 10 were living and considered themselves much improved after 15 months. One of these had lived over 4 years.

Interstitial radiation has been suggested because the dosage given is greater. Results of this treatment are not yet available except in scattered cases.

Surgical removal:

Palliation can be attempted by bronchoscopic removal of all or part of the obstructing mass. Jackson reported a case well 11 years after such removal. It is said that microscopic examination "confirmed the diagnosis of malignancy." (Endothelioma)

Cures by radical surgery have been attempted. Lobectomy or pneumectomy by cautery or direct excision have been done. The mortality naturally is high. The cures are listed as follows:

Sauerbrush	1	case	5 year survival
"	1	"	3 " "
Lenhartz	1	"	15 months "
Reid	1	"	18 " "
Davies	1	"	2 year "

While these methods today seem unattractive, Lilienthal is quoted as saying that "we have before us the same task that confronted the surgeon in the early days of appendicitis." He is convinced that early cases can be extirpated easily and successfully.

Summary:

1. Carcinoma of the lung presents an extremely interesting problem for internists, radiologists, pathologists, and now to surgeons and radiotherapeutists.
2. First case was described by Morgagni in 1761. The Schneeberg miner's disease has been known for a long time.
3. In older pathological series, the tumor is relatively rare.
4. Since about 1919, there has been an increase in incidence. Throughout the world, the incidence has approximately doubled. These are autopsy statistics and the increase is considered to be real and not relative.
5. Such a sharp increase has stimulated investigation regarding pre-

disposing factors.

6. Heredity, trauma, inhalation of dust, tar or exhaust fumes apparently cannot be implicated as causes.

7. Influenza, strongly suspected by some workers, appears to be of no consequence on the basis of statistical studies. War gas poisoning is in the same category.

8. Chronic bronchial and pulmonary disease as a cause cannot be proven or disproven. Several types of bronchial change which histologically fit our concept of potentially malignant lesions are produced by these processes. On this basis, rather than on actual statistics, such diseases are considered to be significant causative factors.

9. The pathology of the tumor is of interest histologically because of wide variability in cell structure.

10. The sequence of changes in the lung is the basis for interpretation of both physical signs and x-ray shadows. The progressive bronchial occlusion results in advancing degrees of atelectasis and this in turn is followed by septic processes: abscess, bronchiectasis, pneumonia and pleurisy.

11. The metastatic lesions are unusual in some cases because of their early appearance. Brain metastasis are 7th in frequency.

12. Male-female ratio is 3:6 to 1. The age distribution is not significantly different from that of other tumors. 8 cases under 20 years of age are on record.

13. The symptomatology is primarily that of the secondary changes: atelectasis and pulmonary sepsis. The frequency of symptoms is listed. The onset is insidious in 2/3 of the cases.

14. The physical findings and the x-ray picture again are dependent on the secondary changes in the lung. In a few cases, the primary tumor is visualized on x-ray before the parenchymal changes have occurred.

15. The examination of pleural fluid is probably not as significant as it has been considered to be in the past.

16. Bronchoscopic biopsies are very significant but erroneous diagnosis may be made if infected tumor tissue or benign hyperplastic lesions of the bronchi are not kept in mind.

17. Radiation is an excellent palliative procedure. Its value as an agent in prolonging life is still questionable. Interstitial radiation is in the experimental stage.

18. Surgical removal of the lung has been tried. In early lesions, successful techniques may be developed.

19. The average duration of life after symptoms begin is estimated at 6.5 months. Both very short and very long histories are on record.

IV. ABSTRACT

THE OPERABILITY OF CARCINOMA OF THE LUNG

While Dr. Carlson was with the medical and surgical chest service of Barnes Hospital at St. Louis in 1932, he had an opportunity to study with Dr. Harry C. Ballon 26 cases of carcinoma of the lung. This is of special interest inasmuch as Dr. Evarts Graham has recently reported a successful extirpation of one of these tumors. The paper appeared in the Journal of Thoracic Surgery, Vol. II, 323 (April) '33. The methods of diagnosis are evaluated (clinical history, physical findings, fluoroscopy, roentgenography, bronchography, bronchoscopy, biopsy or aspiration of tumor, diagnostic pneumothorax, examination of pleural fluid or sputum, thoracoscopy, exploratory thoracotomy. According to these authors, their observations do not permit them to draw any sweeping conclusions. They indicate rather where further attention must be directed.

The clinical history was found to be suggestive of carcinoma of the lung only when complaints referred to made their appearance in an individual of the cancer age. Pain was especially significant, dyspnea due to a variety of factors, but both suggested intrathoracic disease. The disease may run a relatively slow course in some instances, while others are apparently hopeless when first seen. Fluoroscopy was most helpful as the preliminary to roentgenography, because it gave

certain information about the tumor and other conditions of the chest which were not revealed by the flat plate. Lipiodol injections were done on 13 of the patients, filling defects found in 2 and in 6 a bronchostenosis. (Other conditions may cause bronchostenosis or filling defect.) Bronchoscopy is the only method which makes it possible to make a positive early diagnosis. In 3 cases, tumor cells were found in the pleural fluid. Exploratory thoracotomy was done in 4 patients confirming the diagnosis in 3. The method can probably be reserved for cases in which a diagnosis cannot be made in any other way or in which an attempt to remove the new growth is contemplated.

The accuracy of diagnosis is interesting. Of the 26 patients, a correct diagnosis was made in 17 (and in 15 the diagnosis was established during the first week in the hospital). In the remainder the patients were either moribund, the diagnosis suspected or the condition obscured by some other chest condition. Metastases were also investigated. The kidney was frequently involved, 7 of the 26 cases. It must be remembered that the kidney may be responsible for lung tumors (metastatic deposits). The author stresses the importance of a complete examination of the genito-urinary and respiratory tracts before undertaking lobectomy for tumors. Three of 26 patients who came to necropsy failed to show any regional metastasis. One of them had a metastatic axillary node removed during life. In one patient, the carcinoma was an accidental necropsy finding.

In regard to treatment, the results obtained by radiation therapy have been extremely disappointing. Up to the present time, the literature contains reference to only 6 malignant tumors of the bronchus which have been treated bronchoscopically. The treatment of carcinoma of the lung by such operative procedures as lobectomy and cautery pneumectomy have been disappointing.

Reference could be found on 35 occasions in which the treatment was undertaken. The implantation of radon seeds through the bronchoscope have produced fairly satisfactory results. The use of raden through an exploratory thoracotomy has received little attention. The combined form of treatment however appears to be deserving of further trial.

Rudolph Koucky

V. MEETING

Date: Nov. 1, 1933

Place: Recreation Room, Nurses' Home

Time: 12:15 to 1:00 P.M.

Attendance: 171

Program: Chronic ulcerative colitis. Joint Meeting - Association of American Medical Colleges

Discussion: H. A. Reimann
L. M. Larson
J. C. McKinley
L. G. Rigler

Theme:

Medication of Today's Case:

Suppositories - cocain
opium
Dilute Hydrochloric Acid (Oral)
Calcium chloride - 10 cc. intravenously.
Sodium sulphate 8 cc. b.i.d.
Metaphen 1:500 4 cc. t.i.d.
Calcium lactate gr. xxx t.i.d.
Luminal, amytal, nembutal
strict bed rest
Haliver oil
Elix. Iron, Quinine and Strychnine
Blaud's pills
Insulin U. x t.i.d.
Euphyllin
Ultraviolet light 15 general body baths
Parenteral fluids (terminally)
Phenol, zinc ointment (to skin)

H.A.R.: This patient's condition seemed hopeless as he did not respond to any type of therapy. The

organism described by Bargen and his associates is thought by many to be the enterococcus. It is doubtful if we would have used the specific anti-serum if we had found it in this case on that account. There is very little evidence to show that the treatment is specific. Mention has been made of diet (roughage in these cases). We have recently observed two cases who had an ileostomy, therefore no food residue passing over the colon, who showed no alteration of symptoms. Chem. therapy seems rather disappointing. The absence of specific effect is obvious. Although it was tried in this case, we did not anticipate or get any results. I would like to call attention to the use of Dakin's solution in chronic colitis due to the dysentery organism. It is apparently very beneficial and non-irritating. The treatment in these cases is purely symptomatic. We attempt to make the patients comfortable but the outlook is usually very disappointing.

L.M.L.: In interviewing these patients, it is interesting to note that the majority do not have any complaints except those referred to the bowel. They appear to be in good health otherwise. In going over the list of infections which have been listed in the bulletin today, you will note the large number involving the upper respiratory tract, influenza, head colds, sore throat, etc. In a considerable number of these cases, there is a history of bowel disturbance, i.e., some form of chronic irritation, characterized by marked chronic constipation, the use of enemas, cathartics, etc. In some of these, we attempted to ascribe the symptoms to the long irritation which had preceded the development of ulcers. These patients should be treated as we would the person with chronic tuberculosis. All of the auxiliary aids and the management of the disease should be employed in the patient with chronic ulcerative colitis. The chief thing to remember in the diet is not to include too much roughage.

J.C.McK.: One might get the impression, the way the attempted suicide matter was presented, that there was some relation between our visit and the attempted self-destruction. I would like to add, particularly for the benefit of the younger men, that cause and effect must be very carefully evaluated before any direct statements are made. In spite of this we must be very careful in talking to despondent patients that we do not make our inquiries too suggestive.

L.G.R.: We recently saw a student who had this disease. He has had a varied experience with the various forms of treatment and had some rather definite impressions of the same. He did not find the Bargen treatment specific anti-serum helpful in his case. He did find, however, that the diet which is mentioned in the abstract today was of particular help to him and he relies on it to keep the number of bowel movements down. He particularly fears the use of barium in any form in his case. He feels that the use of a barium enema has been the cause of an exacerbation on several occasions. Following one barium enema, he had a very severe hemorrhage from the bowel which persisted for 48 hours, and the exacerbation lasted for some time. What this factor is, is unknown, although it has been suggested that the spines or spicules may produce the irritation. (Dr. Rigler then presented the two characteristic types of pictures seen in the x-ray: One with roughening of the colon, and the other the so-called gas pipe condition).

Gertrude Gunn,
Record Librarian.

N E X T W E E K

ASYMPTOMATIC HYPERTENSION