DIAGNOSIS: LUNG CANCER?
The Surgeon Operates

CASE 248301

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Cancer of the Lung—Case No. 248301

Fifty years ago, cancer of the lung was virtually unknown. Today, it kills more than 35,000 Americans a year, strikes down hundreds of thousands throughout the world, and is increasing at a rate that some doctors call "epidemic."

So far, despite intensive research, the only hope of cure is surgery—the massive, radical chest surgery recently undergone by such prominent men as Gen. Nathan Twining, chairman of the Joint Chiefs of Staff, and TV-radio star Arthur Godfrey.

In the following Special Report, Newsweek's Associate Editor Calvin Tomkins goes into the operating rooms at New York's world-famous Memorial Cancer Center to watch the surgeons, as they battle this insidious killer with all the latest skills and techniques of modern medicine.

In an air-conditioned, green-tiled operating room on the twelfth floor of Memorial Hospital, a middle-aged man with thinning gray hair lies quietly waiting. He is goggy from medication, but still awake enough to notice the cloth-draped instrument tables, the hushed coming and going of nurses, the compressed silence of the strangely cluttered room. He is 58 years old, an automobile salesman in a large Eastern city, married and twice a father, once a grandfather. He is listed impersonally on the records of this renowned hospital as Case No. 248301, and he is about to undergo massive surgery. The reason is visible on the wall: Two large, illuminated chest X rays, which show an irregular shadow on his left lung. The shadow is unexplained, but everyone in the operating room, including the patient, has a pretty good idea of what it probably is—cancer of the lung.

At precisely 8:10 a.m., fifteen minutes after the patient has been wheeled in, the operating surgeon enters briskly. A white face mask and green cotton cap frame his alert brown eyes. In these eyes, there is a hint of the "aggressive optimism" this surgeon brings to his austere and complex profession, a hint of eagerness to get on with the job and come to grips, once more, with the forces of life and death. It is like a tremendous game, the surgeon thinks, and he is "up for it. He has performed hundreds of operations. This morning, as usual, he is well rested from a good night's sleep.

Casually, the surgeon greets the patient, and the men and women whose skill he will need almost as much as his own in the hours that stretch before him: The resident and assistant surgeons, fully qualified young doctors who have volunteered for Memorial's two-year program of specialized cancer training; the anesthesiologist, also an M.D., a darkly pretty girl from the Philippines (Memorial's staff has dozens of foreign-born doctors who have come to learn the new techniques of cancer warfare); the "sterile" nurse who handles the glittering array of several hundred instruments and the "sterile" nurse who helps her but who need not be sterile, because her hands never touch an instrument (if she is called on to procure a special instrument from a cabinet, she uses tongs). The anesthesiologist gives the patient an injection of Sodium Pentothal, and asks him to begin counting aloud. "One ... two ... three ... four ..." The patient's voice thickens—"five ... six"—and then breaks off as the drug takes rapid effect. Two more injections follow: A local anesthetic below the Adam's apple to deaderen the vocal cords and prevent coughing, and a paralytic (derived from curare, a South American Indian arrow poison) to prevent muscle spasms. Suddenly this man, who but a moment before was counting aloud, seems hardly a man at all.

**Tubing:** He must be made to breathe, and to keep breathing during the long hours ahead. And so the professionals deftly insert a hard rubber tube down his windpipe, through which the anesthesiologist will pump a mixture of oxygen, ether, and other gases throughout the operation. (Without this tube, the patient's lungs would collapse the moment his chest was opened and the body's delicate pressure balance was upset.) He must be turned on his right side, and firmly secured with broad strips of adhesive tape; they put him into position. His left side must be painted with an orange-tinted antiseptic. And then he must be draped with sterile green sheets and towels, until only the operative area, about a foot square, is still exposed. Even his head is cur-
tained off from the operating area.

To an onlooker, the patient has lost all his identity. But not to the three surgeons who now go into the next room to scrub their hands and arms for five full minutes (sundial timers over each deep sink mark the time). As they scrub, the doctors review the details of the case. The time is 8:40.

Three months ago, Case No. 248301 became aware of a dull pain in his chest. At first he blamed it on a fall from a stepladder a few days before, while he was painting a living-room ceiling. “That’s what’s so insidious,” the surgeon observes, still scrubbing. “The pain masquerades as something else—a bruise, a touch of neuralgia—and they think nothing of it.” When the chest pain persisted, record of his pulse and blood pressure. It is now 8:55.

“All right,” the surgeon says. The sterile nurse hands him the razor-keen, 4-inch-long scalpel. “Ready?”

The scalpel moves in a swift, unhurrying arc from mid-chest all the way around to a point near the spine, slicing through the thin envelope of skin and exposing fat and muscle. A spot of blood appears, and the resident quickly pinches off the blood vessel with a blunt, scissors-like clamp, which the nurse slaps smartly into his outstretched hand. Another spot of blood, another clamp, and still another and another. All three men then collaborate on tying off the clamped blood vessels with silk thread. The assistant sponges away what little blood has escaped.

**Basic Cycle:** Twice more the basic surgical cycle of cut-clamp-tie is repeated as the incision deepens. The surgeon is cutting “through the Lats” as they used to say when he was at Columbia College of Physicians and Surgeons—through the large muscles known as Latissimus Dorsi. A good surgeon, the old saying goes, must have “an eagle’s eye, a lion’s heart, and a woman’s hand.”

The ribs are visible now under their tough coating (periosteum). The surgeon counts them with his fingers, locates the fifth, and scrapes away the periosteum with a Baily scraper. With a pair of powerful Bethune rib cutters he severs the curved bone at either end, and hands it across to the nurse. Ordinarily, the rib would go to the bone bank for possible use in plastic surgery (particularly useful in nose grafts). The surgeon says: “I wouldn’t save this one. I think this fellow has cancer.” Just beneath the rib cage, the lung can be seen through its translucent coating.

**Inventory:** “Can we have a sponge count?” the surgeon asks quietly. “We’re going into the chest.” The “unsterile” nurse gathers up all the gauze pads (sponges) used so far and checks them against the inventory taken before the operation. From now on, to be sure that no small pads get misplaced inside the patient, only large sponges with heavy metal rings attached will be used in the chest. “Your count is correct,” the “unsterile” nurse says. It is now 9:35; it has taken 1 hour and 25 minutes to reach this vital stage of the operation.

The pleura, a delicate membrane enclosing the lungs, is severed easily. Heavy metal rib spreaders that operate like a vise in reverse force back the ribs on either side of the missing fifth, leaving an area some 5 inches across in which the surgeon can now maneuver. Suddenly the whole interior of the chest is laid open. It is nearly filled by the enormous, shiny, soft expanse of the lungs, purple and dark-mottled from years of (normal) carbon deposits, swelling and contracting as the anesthesiologist rhythmically squeezes a pressure bag to make the patient breathe.

“How’s he doing?” the surgeon asks.

“He’s doing fine,” the anesthesiologist replies. (She had started a blood transfusion some time ago.) The surgery of the chest, heart, and lungs is a twentieth-century miracle, made possible by improved techniques in blood transfusion, anesthesia, and the antibiotic germ killers. Thirty years ago, this operation would have been unthinkable; today, less than 2 per cent of patients fail to survive chest surgery. But the statistics of lung-cancer survival are grimmer. In about 55 per cent of its victims, surgery is impossible because the cancer has already spread too far; when surgery is performed, only about 25 per cent are alive five years later.

The surgeon has now begun his careful, thorough exploration of the chest cavity. He massages the lung, feeling over the entire surface and probing between the lobes (two for the left lung, three for the right). On the left upper lobe he has located the hard, grayish cellular lump that corresponds to the X-ray shadow. The resident and assistant both feel it, in turn. The surgeon then shaves off a small piece with a scalpel and hands it to a nurse, who quickly wraps it in waxed paper and sends it by pneumatic tube to the pathology lab ten floors below for a “frozen section,” or quick microscopic analysis. It is 10:10.

With the lungs partially collapsed, the surgeon then reaches behind them to examine the heart and its major artery, the aorta. Adhering to the aorta, which

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**Cigarettes . . .**

Q. Since the 1920s, the American death rate from lung cancer has spiraled upward: Each year, lung cancer kills 2,000 more Americans than the year before. What causes this rise?

A. One reason is that people today are living longer. Tuberculosis and pneumonia deaths have been sharply reduced. And cancer strikes mainly those over 50.

Q. But why is lung cancer increasing so much faster than all other cancers?

A. Scientists are investigating several possible factors, including air pollution, radiation, diet, viruses, and cigarette smoking.

Q. What about cigarettes?

A. Dr. E. Cuyler Hammond, chief statistician for the American Cancer Society, believes increased cigarette smoking is the major factor in lung cancer’s rise. Two years ago, with Dr. Daniel Horn, he announced the results of a statistical
is the size of a garden hose, is a suspicious growth.

While the assistant holds the lungs back with his hand, the surgeon reaches deep into the chest with long-handled scissors. Very slowly, he pushes the blunt tips between the aorta and the suspicious layer, snipping it up and away. A slip could mean disaster. Blood flows through the aorta under such pressure that a puncture could make it "hit the ceiling."

Ten minutes later, he has freed the growth and handed the nurse another piece of tissue for frozen section.

In the pathology lab, the first frozen section has been under the microscope, and the mosaic-like characteristics of the malignant cells are clearly visible. The pathologist telephones the surgical floor and, in a moment, a nurse pushes open the swinging door to announce in careful diction: "Doctor, Frozen Section No. 1 shows carcinoma." Minutes later she returns with the report on Section No. 2; it, too, shows cancer. The surgeon and his resident look at each other, over their masks.

"Radical pneumonectomy?"
"I'm afraid not," the surgeon replies. "The patient can't live on one lung."

Decision: Removal of the entire lung, or radical pneumonectomy, would perhaps give a better chance of catching all the cancer in this man. But preoperative tests, which included having him run up a flight of stairs, proved that his respiratory system was too weak; with one lung gone, he would be a "respiratory cripple," unable to stand the least exertion. The surgeon has therefore decided to perform a radical lobectomy—removal of the diseased upper lobe and its regional lymph nodes—glands in which the cancer cells may be entrapped.

With the decision made, the tempo changes, quickens. The surgeons locate the main arterial branches leading to the upper lobe, tie them off, cut between the ties. They do the same with the corresponding pulmonary veins. Only a spur of the bronchus—the organ that brings air to the lungs—now joins the upper and lower lobes. The surgeon severs this with a right-angle scalpel. The assistant lifts out the soft, spongy lobe and passes it to the nurse. She wraps it, also, in waxed paper, labels it, and sends it to the lab for a thorough painstaking analysis.

The severed bronchus is sutured, then sealed with a flap of pleural tissue. Sewing deep within the chest is a delicate art; as a younger man, the surgeon used to practice by tying knots inside an empty tennis-ball can. Two bowlfuls of water are poured into the chest, to test for air leaks. There are no bubbles—the bronchus seal is tight. The resident injects a local anesthetic into exposed nerve endings, to deaden postoperative pain (its effects last five days). Now the doctors begin closing the chest.

Renewal: Steel rib "approximators" pull the ribs back together. The patient will not miss his rib for long. In a year he will have grown a new one. Layer by layer, the chest wall, muscle, and skin tissue are sutured with curved needles. Muscles grow back better than before. "I've taken more slices out of golfers'... And What the Experts Say of Smoking Now

study of 187,783 white males aged 50 to 69. They reported that men who smoked two or more packs of cigarettes a day had a death rate from lung cancer 60 times as high as nonsmokers.

Q. What ingredient in cigarettes may cause lung cancer?
A. Some U.S. scientists are searching for specific cancer-causing agents in tobacco tar. Dr. Hammond doubts they will find any. "More likely, we will find that cigarette smoking puts a general strain on the body," he predicted. "It's as though a seriously ill man were to run up a flight of stairs and drop dead. The flight of stairs didn't make him sick. Just the same, it did bring about his death."

Q. Have other scientists accepted the statistical evidence linking cigarette smoking with lung cancer?
A. After a study of eighteen research reports from five countries, the American Medical Association and the U.S. Public Health Service both warned that excessive cigarette smoking (more than a pack a day) is one of the causative factors in lung cancer.

Q. On what grounds, then, has the Tobacco Industry Research Committee questioned the Hammond-Horn findings?
A. Dr. Clarence C. Little, the committee's scientific director, has pointed out that the Hammond-Horn study failed to take into account such other possible factors as sex, personality, and previous infections. His view is shared by a Mayo Foundation statistician, Dr. Joseph Berkson, who recently said that no statistical study to date has defined the biology of lung cancer.

Q. Does Dr. Little completely reject the Hammond-Horn study?
A. No. Last week, Dr. Little said: "The statistics show some kind of association—but not a causative relationship—between excessive cigarette smoking and lung cancer. I think the results are highly suggestive. They cannot be ignored." Dr. Little said he agreed that the possibility that excessive cigarette smoking may weaken the body, leaving it open to attack by cancer as well as other diseases, should get further study. But while Dr. Hammond calls smoking "the major factor" in this weakening, Dr. Little thinks that other factors, including radiation and air pollution, may be more important.

Q. What about experiments which have shown that certain chemicals in tobacco tars cause cancer in mice?
A. Dr. Hammond agrees with Dr. Little that these experiments do not necessarily apply to humans. "We know," he said, "that arsenic causes skin cancer in humans, for example, but we have not been able to make arsenic produce cancer in mice."
In cancer surgery, nothing is ever certain or obvious.

Another patient at Memorial Hospital at the same time as Case No. 248301 was a 217-pound giant of a man over 6 feet tall. A week before his operation, he had started coughing blood. His family doctor had him X-rayed, and told him the bad news: It looked like lung cancer. He panicked, this vigorous, 62-year-old man (a two-pack-a-day smoker) who never in his life had smoked. "Oh, Lord," he breathed, shaking his head. "This is what we don't like to see," the surgeon mused. "We'll see what the next report shows."

Because the suspected cancer seemed to have invaded so many areas, surgical removal was impossible. The surgeon called in a specialist who would inject small metal seeds containing iridium (a radioactive isotope) into the diseased area. These seeds remain inside the patient, who must then undergo a period of relative isolation until he "cools down" radioactively; for two months after leaving the hospital, he should stay at least 6 feet away from all other people. The treatment may give a long remission of his symptoms, but the cancer usually returns.

While waiting for the radiologist, the surgeon was probing the chest cavity with long gloved fingers. He felt the upper lobe, then the lower; with his right hand, he supported the lung, which had already disintegrated and dropped to the lower lobe. "This is what we don't like to see," the surgeon said, hands tucked away. "Everywhere it's the same."

Two frozen sections were done. One was benign. Possibly the other was malignant. But it was not possible to make a definite diagnosis.

The radiologist's impression was the same as the surgeon's: Cancer invading the heart. "Everywhere it's the same story," the surgeon said, hands tucked in the front of his green gown. "We're getting there too late to save them."

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(Continued from Preceding Page)

plastic tubing of woven Dacron fibers, which comes in many shapes and sizes. With this technique, Dr. De Bakey estimates that at least one-half of all stroke victims could be spared paralysis if operated on with the plastic grafts immediately after an attack. For this delicate surgical feat, now in use in more than twelve U.S. medical centers, Dr. De Bakey received the Distinguished Service Medal of the AMA.

Walter Reed Army medical researchers have developed a new "sword-swallowing" test for cancer and other conditions. The "sword" is a small, rotating, spring-activated knife, contained in a tiny capsule, which the patient swallows. The capsule is attached to a long, thin tube. Suction through the tube pulls a piece of tissue into the capsule. The knife is automatically opened and cuts a sliver of tissue, then the capsule is drawn up through the patient's throat.

Acne is an inherited disease, which cannot be cured by cleanliness, vitamins, or a controlled diet, said Dr. Albert M. Kligman of the University of Pennsylvania School of Medicine, Philadelphia, and Dr. John Strauss of Boston University, directors of the first strictly controlled, long-term acne experiment on a group of adolescents. The stubborn skin disease is caused by inherited large sebaceous (oil) glands that secrete sebum, a fatty substance that lubricates the skin. X rays help, but they are potentially dangerous, and can be used only in limited quantities. Sunlight is now the most helpful balm, but "not a 100 per cent cure." Currently, skin specialists are using a modified female sex hormone to lower the fatty substance, with encouraging results.

The stubborn fungus infections known as "ringworm" (including athlete's foot) can now be relieved, quickly and effectively, by tablets of a new germ killer called fulvin—the first "consistently reliable" therapy for these age-old infections.

A new metal "spine jack" to reduce curvatures of the backbone, was demonstrated by Dr. H. Leslie Wenger, New York orthopedic surgeon. The jack, about 6 inches long, operates much the same as the jack used to lift the front of a car. The device is attached through the skin to the curved spine with two screws, then cranked with a wrench to gradually straighten the backbone. In 50 cases, described by Dr. Wenger, curvatures were reduced 30 to 80 degrees. Patients are on their feet in five days, instead of spending months in a hospital bed, or in plaster casts.
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