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THE CHANGE GOING ON IN RUSSIA

IS THERE PROOF SMOKING CAUSES CANCER?
—EXCLUSIVE INTERVIEW
IS THERE PROOF THAT SMOKING CAUSES CANCER?

Are statements that cigarette smoking and lung cancer go hand in hand really true? Just what evidence is there and what does it prove? Are there any other things involved besides cigarettes? And what progress is being made in the search for a final solution to the problem of rising lung-cancer rates?

To get the facts on the subject, U.S. News & World Report interviewed Dr. E. Cuyler Hammond, who heads one of the most extensive research projects in all medical history. Through this research a scientific effort is being made to determine the truth about whether smoking causes lung cancer. Dr. Hammond at present is director of statistical research for the American Cancer Society and is also professor of biometrics at Yale University.

Q Does smoking really cause lung cancer, Dr. Hammond? People are saying all sorts of things about cigarette smoking—

A That's just what we are trying to find out. There is some evidence that it may be so. For example, material collected years ago has shown that many smokers have had lung cancer.

Q Evidence that it may be so. For example, material collected years ago has shown that many smokers have had lung cancer. That's an important piece of information, but think about it. That smoking may not be the only cause of lung cancer, human beings. It has to be weighed together with other evidence and we are still collecting information.

Q Forms of cancer—are you doing this same type of statistical detective work?

A Some. Lung cancer is the one we are doing the most work on, because it is the form of cancer which is rising most rapidly and is fatal in the great majority of cases. Let me make something clear—all forms of cancer are rising, but lung cancer is rising more rapidly. The risk of getting lung cancer in a person who smokes is much higher than in one who does not.

Q In other fields of research in this country—on other forms of cancer—are you doing this same type of statistical detective work?

A Yes. Some of the other forms of cancer that we are looking at are those that are more easily diagnosed—you can see them and get to them. More easily diagnosed are those that are external and in organs that are on the surface. One reason is that those on the surface are more easily diagnosed; you can see them and get to them. Another reason is that cancers in vital organs are more difficult to treat. The over-all survival rate for those who get lung cancer is around 5 per cent at the present time. If we can persuade everybody—particularly men over 45—to take an X-ray screening test every year, we think we will raise the survival rate considerably; at least we hope so.

Q How many cases are there in a year now?

A About 22,000, but it is on the rise. Here we are speaking of cancer that originates in the lungs. A considerable number of cancers in other parts of the body spread, and the terminal cause of death is sometimes a lung cancer that is growing to the point of being a terminal disease. Ordinarily, the term "lung cancer" refers only to cancers which originate in the lungs.

Q Oh, you don’t call it lung cancer if—

A No, not unless it originates in the lungs. Cancer spreads throughout the body, but we name the type according to where it originates.

Q What is the lung-cancer rate among women as compared to men?

A Oh, there is no question that the lung-cancer death rate is much higher among women than among men. It is much higher among heavy smokers as well. If we could give you the actual figures on it—it is about 5 to 1.

Q And yet women have become smokers in greater numbers in recent years than men.

A But too recently for the full effect to become apparent. If smoking causes lung cancer, and if, furthermore, it takes about 20 years of heavy smoking to do it, then what is known about the smoking habits of men and women over the past 20 years would pretty well account for the difference, because women didn't start smoking heavily in early as men did.

Q You are heading a research project that is going to try to find the answer to the question of whether smoking causes lung cancer?

A Right. At least we think that it will provide important evidence leading to an answer.

Q Is that the largest project of its kind at present in the country?

A As far as I know, it's the largest project of that general type that's ever been attempted on any scale. Three weeks ago the U.S. Public Health Service started a somewhat similar study which may be about in the same kind of range as a similar study more than two years ago.

Q Is your project large because of the number of people involved in it, or because of the money being spent?

A Because of the number of people. We are doing the project largely with volunteers—we have 22,000 volunteers working for us. They interviewed 204,000 men, all between the ages of 50 and 60. Who are the people doing this research?

A The volunteers of the American Cancer Society.

Q When did this take place?

A The actual interviewing started on Jan. 1, 1952. But the men were interviewed within six weeks, but we continued interviewing until June, 1952.

Q And this is a project to find out what you can about whether lung cancer is caused by smoking or not—

A Well, it's actually a little more than that. We are undertaking the project because there is reason to suspect that smoking may cause lung cancer—we don't know it, but there is good reason to suspect it. Now, what we have actually done is get the smoking history from a very large number of men. We selected white men in order to avoid bringing in the complications of race, because the death rate is different in the different races. We took the age group 50 to 69 only because the lung-cancer death rate is much higher among men in that age group. If we had chosen younger people, the study would have taken at least 20 years to show getting a large rise in the death rate. And we think we will find out the answer to the question of whether smoking causes lung cancer.

Q That is, whether people who smoke die faster than people who don't smoke—

A Yes, that is the first and most important question. There is some reason to suspect that the death rate may be twice as high among heavy smokers as among non-smokers. This is based on past evidence, but we don't know yet, and we are going to find out on a large scale.

Q When you have a selection of 204,000 cases, selection of State, selection of county, selection among the people themselves—

How do you know that you have a representative and statistical sample?

A Our volunteers for the most part are of the middle or upper-middle social-economic group. So there was some selection in that respect. In a few counties of Wisconsin, for example, they broadcast over the radio asking for people to volunteer. In rural counties and small towns there was virtually no selection on the basis of social-economic conditions, or that type of thing, because in a small town everybody knows everybody else and they can all be followed up.

Furthermore, in some States the local radio and press were of tremendous help to us when we were questioning the men. In a few counties of Wisconsin, for example, they broadcast every 15 minutes, asking men to come in and give their smoking history. In two of those counties we obtained very nearly 100 per cent coverage on all the men in that age group from the area. So that is the kind of thing that can happen by mass communica tion speaking. Now, it is true that there was some selection in the cities.

Our volunteers for the most part are of the middle or upper-middle social-economic group. So there was some selection in the social-economic classes among their friends. That's also true that fraternal orders helped us and church groups helped us with the lower economic level. Some labor unions and some priests helped us. We have none of these, and so for each group we know what sort of people we are dealing with.

Q When you have a selection of 204,000 cases, selection of State, selection of county, selection among the people themselves—

How do you know that you have a representative and statistically valid sample?

(Continued on next page)
..."It is possible that smoking has some beneficial effects"

A • In the first place, we don't need a representative sample. We do need to know in the facts about the people we question.

Q • There is no need to have a group composed half of smokers and half of non-smokers.

A • I suppose, if there had been any feasible way of doing it, we would have set up only those people who smoke very heavily and people who don't smoke at all, in order to get a quick general answer to the question. But in order to answer the question scientifically, you have to have two groups.

Once having questioned them, there is no good reason to eliminate the group they are from the sample. The real conclusion is going to be among those who have smoked smoking habits—for example, those who smoke a pipe for a while, then quit, before then smoking, and then start cigarettes.

Q • Now that you have this, what happens next?

A • Our next step is going to be to give our volunteers a report on all the men she questioned. She will then tell us whether the man is alive or dead as of October 1. If he had died, she will give us the date and place of his death certificate. When possible we will also look into the records of this study that wouldn't have been done any other way. That is getting in touch with the volunteers. But we have a staff that travels to get in touch with the volunteers, anyway, and talk and get additional information from the doctor who signed the death certificate. When possible, we will also look into the hospital record and pathological reports to get the most accurate information on the cause of death.

Q • How much does it cost to do all of this?

A • I don't think you can put a dollar figure on it. The main work is done by volunteers, and the work they have done for us would have cost several million dollars if we had had to hire outside people. The data has been subjected to thorough checking to make sure that it is accurate and that it is not biased against any point of view.

Q • How many people in America know about this study?

A • We simply have the facts as given, then supply all the facts we can, and then start cigarette smoking.

Q • That's the problem. How will you ever put a dollar figure on it. The main work is done by volunteers, and the work they have done for us would have cost several million dollars if we had had to hire outside people. The data has been subjected to thorough checking to make sure that it is accurate and that it is not biased against any point of view.

Q • How long do you think it will take before you get a report on all the men she questioned?

A • Well, I feel this way about it: If I get altogether too nervous personally about everything I am working on, I would be one miserable man. I am not going to let it have any effect on my personal habits until all the facts are known. Fear is an occupational hazard which must be guarded against by people who are doing research on fatal diseases. If a cause-and-effect relationship is established, then it may be that the nicotine is increasing the death rate from lung cancer and that something else is increasing the death rate from cerebral hemorrhage. Then, if you will look at all the evidence we have on cancer, you will see that the evidence is in favor of the conclusion that smoking causes lung cancer, but is not conclusive in favor of the way smoking causes lung cancer. Furthermore, by and large, they are higher in the richer sections of the country than they are in the poorer sections, and putting it on a world-wide basis, you find that the cancer death rates are higher in the poorest countries than in the richest. Furthermore, by and large, they are higher in the richer sections of the country than they are in the poorer sections, and putting it on a world-wide basis, you find that the cancer death rates are higher in the poorest countries than in the richest.

Q • How much higher is it in the city than it is in the country?

A • We are talking about lung cancer, not about the city death rates.

Q • How much lower is it in the city than it is in the country?

A • We are talking about lung cancer, not about the city death rates.

Q • Where something has to be operating for a very long time and then it is something else which will produce cancer?

A • We are talking about lung cancer, not about the city death rates.

Q • What is lung cancer greater, then, among cigarette smokers or among non-smokers?

A • We are talking about lung cancer, not about the city death rates.

Q • What do you mean by human experiments? What kind of substances are they?

A • We are talking about lung cancer, not about the city death rates.

Q • What do you mean by animal experiments? What kind of substances are they?

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The factors in the environment which produce cancer probably have to operate for—oh, maybe, 10, 20, or 30 years before there is any evidence, if we think back over the last 30 years, look at all the things that have happened in that time, and many of those things are correlated with each other.

Q What things are you referring to?

A Oh, a tremendous number of things have changed which must have had something to do with the habits, eating habits, smoking habits. People now get more vitamin A, which produce malnutrition, and it is conceivable that this pene
trates to the next generation, so in this generation we are more or less

Q But in all cases?

A Well, there is probably a hereditary factor in virtually every case to some degree. But human cancer is probably not inherited in the ordinary sense of the word.

Q Is there any reason to believe that there is a hereditary disease?

A Yes, to some degree. At a generalization, it may be said that every disease is the manifestation of a reaction between an individual and his environment (the environment containing such factors as bacteria, viruses, and chemical agents). Therefore, it is conceivable that some is transmitted by heredity as always is a matter of importance. You have been a strain of animals in some experiments on the environment. And there are other strains of animals that have a high proportion of spontaneous cancers, and are very susceptible to experimental agents. I'd guess that here are clues to the environmental agents.

Q There are animal experiments showing any ill effects from smoking, smoking from a disease or smoking from deaths?

A Yes, but the difficulty is that if you try to expose them to a very high concentration of smoke, many of the animals die before cancer has a chance to develop. One experiment has reported an increased incidence of lung cancer among animals which survived the acute effects of a high concentration of tobacco smoke, but the type of cancer was not the same as the natural type of lung cancer seen in human beings.

Q They chose to death?

A In some cases of the type we were speaking of a few minutes ago.

Q If you took too much of any substance, would you die?

A No. But that, then, would be a direct effect of smoking. Isn't it also true that among these associated factors in cancer smoking?

A I am not trying to prove anything. I am just trying to ascertain the facts. I hope I am disinterested. There's one other form of cancer that I believe we should find that the death rate from lung cancer is not one bit higher among heavy smokers than among nonsmokers in the human population. There is some evidence that smoking increases the incidence of cancer, because a real chronic alcoholism are practically on starvation diet. They are eating more.

Q Isn't that largely what happens?

A Isn't it true that a lot of women feel that smoking keeps their appetite down?

Q That's right. But, nevertheless, smoking would be bad for you, wouldn't it?

A Yes, the same type of evidence. There is also some evidence that smoking increases the incidence of cancer, because among heavy drinkers the new disease usually is a death, not death, the death rate from lung cancer is not one bit higher among heavy smokers, then I'd say that the evidence would be extremely strong that there is a cause-and-effect relation. You see, the other forms of cancer act as a control. Cancer is something that is not a single individual. Nutrition might cause a change in hormone secretion, or something of the sort, and if that alone would increase cancer in one part of the body and not in another in any part of the body, it would be a general phenomenon. There'd be no reason whatsoever to suppose that it would affect the lungs more.

Q If you establish that there is some relationship between lung cancer and the environment, and you prove it, do you think smoking is the cause of cancer of the lip, tongue and mouth?

A It is the same type of evidence that you've been talking about. The other forms of cancer act as a control. Cancer is something that is not a single individual.

Q By "associated causes," do you mean that the thing that usually isn't subject to human cancer shows an increase in the number of cancer deaths?

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Q But in all cases?

A Yes, it might be that. Or it might be that heavy smokers because they rough, are more apt to go to the doctor for diagnosis and therefore lung cancer is diagnosed among heavy smokers. That would be the sort of thing I am talking about. The interesting thing is that if you take too much of any substance, you would die.

Q For some cancers, pipes are worse than cigarettes.

A It can't do that with a human being. The animal experiment can be carried out in two or three years, while a comparable study on human beings would take a generation.

IS TENSION A CAUSE?

Q In all the studies of cancer, there is something that indicates statistically whether people with tension, what they call "tension," have a very low death rate, and there is no evidence whatever that heavy smoking increases the death rate from lung cancer, except of the lung, lip, tongue, and mouth.

Q Now, it is known that tobacco smoke contains something which can cause cancer—at least in mice—and it only causes cancer in that part of the body with which it comes in contact. Smoking can cause cancer only in the part of the body to which it comes in contact.

A Yes, but that is not the cause of the death rate from lung cancer.

Q If we find that the death rate from lung cancer is much higher among heavy smokers and the death rate from other forms of cancer is not one bit higher among heavy smokers, then I'd say that the evidence would be extremely strong that there is a cause-and-effect relation.

Q If you establish that there is some relationship between heavy smoking and lung cancer, and you prove it, do you think smoking is the cause of cancer of the lip, tongue and mouth?

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Interview

"I hope to find some cause of lung cancer"

Q. What do you hope to prove?
A. My only real hope is that we will be able to find a definite answer to the question one way or another. What would make me very unhappy would be to come out with any conclusive results.

Q. Do you hope that you will be able to dispel that it is infectious?
A. No. I hope to find some cause of lung cancer which we can then eliminate in order to prevent the disease. It is likely well be cigarette smoking. Lung cancer is going up, so, the hope is that we will find the cause. I will be very disappointed if we don't find a cause which is removable one way or another.

Q. Personally, don't you feel that it's something from an automobile engine which could be altered, or whether it's soot which could be controlled, or whether it's smoking, in which case you would advise people not to smoke or take the active ingredient out of cigarettes.

CHARTING DEATHS SINCE 1910—

Q. You were speaking of carbon monoxide being a poison. A lot of carbon monoxide is being given off in our garages and in using oil, and people are inhaling it. If we had some statistics to show that people died as much of lung cancer before the automobile was invented as they do now, would we have a cause-and-effect relationship there?
A. I can show you some graphs on that. Here are the death rates from about 1910 on. Figures back of that are unreliable. In the earlier period influenza and pneumonia—you have to lump them together—were among the principal causes of death, along with tuberculosis. In the 1918 epidemic it goes right up there off the paper. That's 200 per 100,000 white males per year.

Q. Then it comes down to where it's scarcely 30 per 100,000 white males per year—
A. Right. Tuberculosis death rates went from 350 per 100,000 in 1910 down to 20.

Q. And lung cancer?
A. In 1910 it was just above the zero mark on the graph, and has gone up to about 24.

Lung Cancer—22,000 Deaths a Year

Q. Then lung cancer in relation to total diseases and total death rates is negligible, isn't it?
A. In a sense, yes. But I wouldn't call 22,000 deaths a year negligible. The trouble is how to get from that to cause. That's the point where I think you are getting somewhere.

Q. Are there studies now that show that people living around factories where a lot of soot comes out have more lung cancer than people in other areas?
A. The trouble with such studies is that the American population moves too much and things change too much. It probably takes 20 years for a low concentration of something like coal soot to cause cancer in man, and these studies in America just don't mean much.

Q. What do the English studies show?
A. Those studies have just been started. There are higher death rates in places where there are a lot of factories—there's no question about that. But, again, it may be a spurious correlation.

Q. What is the evidence on the soot?
A. It was noted, many years ago in England, that there was a lot of cancer among chimney sweeps, where as cancer of this part of the body is a rare disease in the general population. The soot tends to be moist, and that is perhaps the reason. Practically all we know about cancer-producing agents originated with that observation. That is composed partly of coal tar and oil products, but what we know about a specific, known carcinogenic agent is produced every minute that an automobile motor is idling.

Q. If you have proven carcinogenic agents in cigarette smoke, aren't there studies that show that people living around or in factories where a lot of soot comes out have more lung cancer than people in other areas?
A. Possibly. Chimney sweeps may also have had more skin cancer, but the actual observation was cancer of the scrotum. The reason it was noticed is that cancer of this part of the body is a rare disease in the general population. The scrotum tends to be moist, and that is perhaps the reason. Practically all we know about cancer-producing agents originated with that observation. That is what anybody ever worked with on any laboratory scale in determining all the factors responsible for changing death rates from specific diseases.

Q. What about the smog we hear about now?
A. I mentioned the decline in death rates from the infectious diseases of the lung primarily to show how few things one has to be in interpreting parallel trends. From about 1910 on we would have no difficulty explaining why the death rate from pneumonia has gone down. The antibiotics and sulpha drugs have had a great effect. In the period just back of that, we'd have said it was the serum therapies. The decline, however, started before the wonder drugs and serum came in. We have something to account for here.

Q. You have something to account for, but you're not certain what?
A. We are not certain that this whole trend for this length of time can be accounted for fully on the basis of more effective treatment—most of it, yes, but not necessarily all of it. For example, there may have been a change in the virulence of the disease-producing organisms. Closely smoking was a contributory factor, but more evidence would be needed before one could possibly draw the conclusion. This merely illustrates the difficulties in determining all the factors responsible for changing death rates from specific diseases.

CIGARETTE: PNEUMONIA FOE?

Q. Is there any laboratory evidence that cigarette smoking may be related to the decrease in death rates from pneumonia?
A. Yes, some evidence. If you hubble the smoke from three cigarettes through a solution containing millions of the bacteria which cause Type I pneumonia, all of the bacteria are killed. Look at the time these things would happen if you inhaled the smoke the same way you would inhale the smoke in the human lung. Nevertheless it is interesting and more work should be done on the subject. (Continued on next page)
**Interview**

**"Lung cancer was a rare disease before 1920"**

Q You spoke of poisonous agents--of toxic agents. Would an individual build up a tolerance to these over a period of time? Is this a realistic supposition?

A As a generalization, the body builds up a tolerance for toxic agents, but it is not always certain that not many of such had caused long cancer earlier--or was it a rare disease before 1920?

Q Yes, but again, if we assume that there were cases of cancer, would your figures show a hereditary cancer among these smokers and non-smokers?

A Well, now, I would be extraordinarily surprised if there were any hereditary factors. I think it was more that when there was a cooperation of factors and a susceptibility to the cancer that was the cause of the lung cancer.

Q In other words, you would have to, for statistical purposes, go out on a farm, find some of these farmers that never leave the farm, and never ride a tractor, and never get any of these environmental factors, just as a yard, and look at those heavy smokers, and compare them with heavy smokers somewhere else in order to get an answer.

A That is exactly what we have been doing in New York. We have taken a small group of farmers and looked at the cases of lung cancer in them. You will have that answer in a year or two, and I am confident that we have the right answer.

Q Would you have any figures to show how many of the parents of non-smokers died of cancer, so that the factor of heredity might be shown?

A Yes, but again, it is very difficult to prove that heredity is more important than the environmental factors. And so we have to look at the statistical evidence in support of the theory that smoking causes cancer.

Q In other words, you might expect that there would be a higher proportion of lung cancer in the parents of smokers, but if you question them they will tell you that they are not related.

A Not if you ask the right question. If you ask the right question, you will get a definite answer.

Q You will have that?

A Practically speaking, you will have that problem, but we have not been able to solve it. But we are working on it and we will have the answer in a year or two.

Q And then it is an oversimplification to say that results among heavy smokers show one thing, and among non-smokers show something different?

A Yes, in so far as possible, I think I will agree with you. Let us say that two things must be present in order to produce lung cancer, and let us say that two things are involved in the causation of lung cancer. The statistical evidence is not sufficient to show that.

Q What can you do when signs of cancer do show up?

A Operate for which.

Q Operate to remove the lung that has the cancer. An early cancer of the lung is quite curable. However, the difficulty is that it is seldom found early. Until we find a way to prevent lung cancer, we are doing the best we can to get earlier diagnosis through X-ray screening, and persuading people to come to us in time so that they do what will be the best possible chance of being cured.

Q Ask do you think that smokers should have X-rays often, and if so, how frequent?

A That's a leading question if there ever was one. My answer is yes. And so far as there is any evidence that smoking causes lung cancer, it is smoking that is involved. It is not X-rays that cause lung cancer. And that is why we have to look at the statistical evidence and the facts of the tobacco companies, and the tobacco industry.

Q That is what we will have to do. We should not try to do what we have not done before.

Q In other words, it is not the X-rays that cause lung cancer. It is smoking that causes lung cancer. The tobacco companies had of course. Now, would you try to show how many of the parents of smokers died of cancer, so that the factor of heredity might be shown?

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