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**EXECUTIVE HEALTH
Teaching Session
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At the outset I should state that my perceptions about Executive Health are based upon my experiences but I am certain the concepts are shared by many of my colleagues. Nearly 20 years ago, as a Chief Resident in Medicine in a large teaching hospital, I first became involved in a continuing executive health program. My Professor-in-Chief admitted each week as a patient for investigation, an executive from a major corporation in our area. These executives, production manager, plant manager, etc., would be admitted for one week to hospital and during the five or six days of their admission, were put through an extensive clinical investigation, including complete biochemical profile, barium meal, barium enema, intravenous pyelogram, electrocardiogram, proctosigmoidoscopy, etc. At the conclusion of this investigation, they returned to work and a letter of advice was sent to their own physician. The approximate cost of the week's investigation was in excess of \$1,000. By the end of the year their company had spent over \$50,000 for the program and when I looked back at it dispassionately, my conclusion was that there had been little gained for the considerable funds expended, for very few major findings ever came out of the entire program. To accomplish the same type of investigative assessment in 1976 would be several times as expensive and, in fact, would probably be prohibitive.

Historically, there has been continued interest in the program of periodic health examination and executive health profiling, extending back before the turn of the century. In 1891 an article published in a London, England medical journal suggested that there was considerable value in periodic complete examination of patients. The premise offered was that disease could be recognized early when something could be done about it. Since then, periodic health examination (PHE) has risen and fallen in popularity, enthusiasm peaking in times of social affluence and falling back during times of depression. The most recent rise in popularity for PHE is now cresting and a careful survey of the current literature suggests that we may be entering a period of disenchantment, perhaps indicating concerns for the economy.

We will look at periodic health examinations and screening procedures including multi-phasic screens (automated blood chemistry testing, x-ray, ECG's and specialized x-rays) and later I will discuss at some length the problem of hypertension, for this is one of the major disorders that periodic screening reveals and, finally, will discuss exercise testing and physical fitness.

This summer Time Magazine featured an article entitled, "The Annual Examination - The Great Rip-off", purporting that only two groups derived much benefit from PHE. First, we have the doctors who derived financial benefit and second, were hospitals and laboratories who stand to benefit

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financially. The conclusion was reached that the pay-off for the patient appeared to be much less than the cost would justify. (1)

Spitzer and Brown (2) at McMaster University in Hamilton, Ontario reported a cost study analysis of PHE in Canada and concluded that biennial examinations on adults over the age of 30 would cost a minimum of \$30 if a family practitioner were consulted. The same examination by a specialist in internal medicine would double the fee and add a number of additional charges depending on how many extra tests would be included. In Ontario, a complete blood count costs \$12.48 and an electrocardiograph, a minimum of \$6.50. If all eligible people in this province were so examined, the cumulative cost could be over one hundred and twenty million dollars, consuming over five percent of the province's entire health budget. I question whether the benefits justify this extensive expenditure. Costs in the United States are significantly higher and it has been estimated that the annual cost for a single patient could run as high as \$400. The total cost, then, for biennial examinations for adults over the age of 30 in the United States could run fifteen to twenty billion dollars and eat up in excess of 15 percent of the entire health budget.

In another study to determine if PHE are effective, Davinroy and Brantigan (3) at Strategic Air Command Headquarters in Colorado, analyzed 1,100 consecutive military physical examinations. 65 of the 1,100 were found to have some elevation of blood pressure, 24 patients were found to have hernias, 58 were considerably overweight, 2 had contracted syphilis as detected by a positive Blood Wasserman Test. Curiously, the key finding was dental in that half of the examinees had dental abnormalities sufficient to warrant referring them for further attention.

Lohrenz et al (4) (5) (6) in 1971 showed that it takes 10 PHE's to produce one major physical finding, e.g., diabetes, hypertension, significant obesity, coronary artery disease, tumor, etc. They suggested that even if we stopped doing expensive laboratory tests and x-rays, we would probably still pick up most of the abnormalities that could be detected in this group, 213 employees of a large mid-west paper company. As age increased in the group, it was necessary to do many fewer annual examinations to make a positive detection. In fact, with increasing age, there appears to be justification for doing annual or biennial examinations.

We live in an age when as Oscar Goldman says at the beginning of the television show, The Six Million Dollar Man, "We have the technology." The question can well be asked, "Why not make this technology available to everybody?"

Such a recommendation is embodied in the statement of the American Cancer Society that everyone over the age of 40 should have the benefit of colonoscopy and sigmoidoscopy in order that they might have the opportunity for early detection of cancer of the bowel. Colonoscopy, using the 40-inch fiberoptic snake-like instrument is a two to three-hour procedure even in the hands of a few experts skilled in this technique. The American Cancer Society indicated that they considered this examination mandatory for anyone over the age of 40, and the key word is mandatory. This implies an obligation on behalf of all of us to offer each of you this procedure, failing which physicians, such as myself, might be legally liable if you

later developed a cancer of the colon and we had failed to do this procedure. If every physician in North America who had the capability to carry out these procedures were to start tomorrow, it would require over two years simply to process all the members of society over the age of 40 who would qualify for this investigation. During this period of time, they would have no opportunity to do any other medical practice and, of course, the cost would have to be measured in millions of dollars. Obviously, this approach seems to be impossible, even though the technology is there.

Routine mammography has elicited great interest in the last few years. This is an x-ray procedure in which a soft tissue x-ray is made of the female breast, for the purpose of discovering hidden cancer or clarifying the nature of a palpable lump. The National Cancer Institute has recommended that the procedure be done annually on all women over the age of 35. This summer the medical and lay literature contained numerous articles discussing the pros and cons of this attitude. Now that the procedure is widely available, many physicians might feel themselves open to litigation if they failed to have this procedure carried out upon a woman who subsequently developed breast cancer. However, some evidence is now accumulating that annual x-rays inflict a radiologic damage that could in itself be cancer-producing. In this case, would a physician who ordered annual x-rays upon the recommendation of the Institute, be then open to litigation if his patient should develop cancer as a result?

Going beyond this, one might question the cost effectiveness and cost benefits of such a procedure. In Ontario, the cost of mammography per examinee is approximately \$32. If the procedure is carried out on all women over the age of 50, approximately 1.2 percent of such patients would demonstrate a positive mammogram, i.e., a lesion could be seen which should be biopsied to ascertain its precise nature. The cost per positive mammogram then becomes \$2,600. If all those with a lesion were then biopsied, only one in five would be found to be malignant and consequently the actual cost per true positive could be up to \$13,000, making case discovery by mammographic screening of large numbers of patients considerably expensive. Where large-scale screening programs are undertaken, there are savings but at present, such programs are very limited in number.

By those standards, a chest x-ray or an electrocardiograph may turn out to be something of a bargain. The cost per positive x-ray in Ontario is about \$200 and the cost per positive electrocardiograph about \$56.

These considerations have led many people to ask whether we really need to do full-scale examinations. R. R. McGee (7) writing in *Medical Economics* July 1973, suggested that we do away with annual checkups and offer a "mini-checkup" which for as little as \$10 could include an erythrocyte sedimentation rate test, urinalysis, height-weight measurement, blood pressure determination, and a Pap test to screen for uterine cancer. This type of check-up would be done only for patients with no complaints and who have already had a complete history and physical and whose base-line data were on record.

A storm of protests (8) subsequently appeared stressing that you really have to have something very wrong before a mini-checkup will pay off. The

early warning of diseases missed is too high a price to pay, suggested other consultants.

This has led many of us to believe that, perhaps, preferable to PHE is the Early Sickness Consultation (ESC) (9). In ESC we tell a patient, "We will be glad to do a complete checkup on you, but do not expect too much from this. We may, or may not, find anything, but we want you to report back at once if you have any complaint you feel is unnatural." At that time, multi-phasic screening and other appropriate investigations are ordered determined by the nature of the complaint reported.

Physicians themselves are perhaps the most obvious examples of ESC. They report at once to their colleagues unusual or significant symptoms and rarely indulge in PHE. This summer in the Canadian medical news magazine, The Medical Post, an article entitled, "Doctors' Own Survey Shows Them in Shape" was published. A review was presented of a questionnaire completed by 65 percent of Nova Scotia doctors who had responded at the time of their registration. The findings were most interesting. 59 percent did not smoke, another 18 percent smoked less than one pack a day, and 15 percent smoked pipes. 17 percent did little or no exercise, 44 percent did some and 28 percent were high-moderate exercisers and only 10 percent were vigorous exercisers.

For Coronary Thrombosis, the average for the province is 3,000 per 100,000 but the rate for the average doctor is 1,300. For lung cancer the rate for the general public is 562 per 100,000 but the doctors' rate is 168. For stroke, the general public rate is 354 per 100,000 while the rate for doctors is 168. Perhaps much of this relates to the very improved attitude of physicians toward smoking, which has many hazards including lung cancer and increased incidence of heart and blood vessel disease.

I do not wish to leave you with the feeling that I am against PHE, for I am very much for them in proper perspective. Physicians undertaking PHE cannot guarantee longevity nor diagnose everything. There are very real limits. I personally try to talk to the patients, examine them carefully and give them the best advice I can, but there really are only a very few things that I consistently discover on these examinations. Many such patients are, in fact, heavy smokers and although I attempt to discourage this, I am disappointed in the impact that I have made to date. I look carefully for breast cancer in women, cervix cancer by doing Pap smears, or referring the patients to someone who can, and I search for cancer of the colon and rectum, which is discoverable with a bit of thought. The finding of occult blood in a stool, a very simple test that can be done in any office, should lead to further examination and perhaps x-ray of the stomach and colon.

Hypertension is the big pay-off in the group that I see. I find more hypertension than any other single item and it alone, perhaps, justifies the effort that we are putting into PHE. Occasionally, diabetes is discovered by doing a Blood Glucose or testing the urine. In 20 years of doing periodic checkups on executive people, this has been about the scope of the findings and the areas where I have been able to make a dent. Many other diseases are discovered in the course of examination but usually they have followed the presentation of a symptom and ESC.

There are, however, hidden values to PHE which should be stressed. Up to now my point has been that cost benefits may be lacking and that cost effectiveness is poor. Cost benefits, however, are relative and have to be determined in the minds of the people who are spending their money for the examination. One of the real values of PHE is the opportunity to talk to the patient, impart information and provide reassurance. (10) Many of my patients are, "the worried-well". I attempt to find out what really is worrying them. Sometimes this can only be done by very direct questioning. One needs to look for little clues, often the simple question given just as the patient is leaving, may in fact be the tip to the whole problem. The periodic examination offers the physician the opportunity to keep a record of certain findings which need to be monitored over a period of time, including uric glucose testing, blood pressure recording, Pap smear recording, etc.

I would like to stress to you my observations about vacation. Often, executives allow themselves a totally inadequate vacation. Many will take brief one-week vacations on multiple occasions during the year. Often this is an inadequate period of time to allow proper resting and re-grouping. Likewise, plans for retirement often seem inappropriate and ill thought through. The opportunity to discuss such meaningful aspects of one's life gives the physician a real opportunity for guidance and counsel.

What happens to the advice that we give our patients? The Medical Post several months ago reported on the observations from the Framingham Study in Massachusetts. This well-known study involves assessing an entire community in an attempt to define the frequency or incidence of common diseases such as hypertension, coronary artery disease, etc. Patients who had been discovered to have an abnormality were given the best possible counsel and then one year later at a follow-up, they were assessed to see how well they have carried out the advice which they had been given by their physicians. The results were disheartening. The worriers were still worrying, the smokers kept right on smoking, the drinkers still drank and the obese were still fat. One curious thing, and this has interested me very much, is that when further investigations were recommended as a result of the examinations, all patients cooperated extremely well with the plan of investigation. It is just one of the little curiosities that one sees in clinical practice.

The second principal item to which I wish to address myself is the problem of hypertension. If I have uncovered one disease more than any other in my practice, it is hypertension. This is a disease that affects certain target organs, such as the heart, the kidneys, the brain and the arterial vessels. These structures are all adversely affected by hypertension in a real and serious way. So, when hypertension is recognized, I feel I must do something about it and I try my very best to correct the elevated blood pressure.

How common is hypertension? In the past few years, several very wide-scale community studies have been undertaken to determine this. Typically volunteers are trained to make blood pressure readings and record the blood pressures of all customers who come in to supermarkets, etc. Very large-scale epidemiologic studies are quickly monitored in this manner and the surprising thing has been the marked frequency of hypertension on

casual readings on such a population. These studies suggest that hypertension may affect up to 12 to 15 percent of the adult population. The surprising observation is that over half of the people in whom such elevation is discovered, were totally unaware that they had increased blood pressure. The subjects were advised to seek medical consultation and then unbeknownst to them, they were contacted one year later to assess the degree of follow-up and the adequacy of therapy. The results were disarming. Over one-half of the people in whom elevated blood pressure had been found, had failed to maintain contact with their physician or if they had been started on treatment, had discontinued treatment either on their own volition or on the inappropriate advice of their physician. Suffice to say that hypertension is perhaps one of the major public health problems we are facing today.

The serious prognosis of untreated severe hypertension can best be seen from the results of a long-term study carried out by Professor Maurice Sokolow at Stanford University in San Francisco. (11) Patients attending their hypertensive clinic were graded as mild, moderate and severe based on increasing levels of average hypertension figures. These figures were accumulated in the late 1950's before modern antihypertensive therapy really became available. In the severe group, it was apparent that 60 percent of the patients had succumbed within five years. In the mild group the fatality rate was 15 to 20 percent. Today there has been a significant change.

Perhaps the best evidence for this is the study carried out by Doctor E. D. Freis in the Veterans' Administration Combined Hypertension Study in the United States. Hypertensive patients were divided into two groups, mild and moderate, based on levels of hypertension and each group was then subdivided into either a treatment group who received three drugs—hydrochlorothiazide, reserpine or hydralazine, or into a placebo group who received similar-appearing tablets with no active ingredient. The results were dramatic.

In the group with moderately severe hypertension with diastolic readings between 115 and 130 millimeters of mercury (mm Hg), the treatment group experienced no fatalities whereas four out of seventy in the placebo group died within the three years of the study. Those on treatment had a fall of 45 over 30 mm Hg in their blood pressure as against no significant change in blood pressure in the placebo group. Finally, complications such as cardiac failure, renal failure, etc., were vastly diminished in the treatment group. In fact, within three years, the statisticians advised Freis and his colleagues to terminate the study as it was obviously unfair to patients in the placebo group. In the mild hypertensive group with diastolic blood pressures between 90 and 115 mm Hg, very similar results were experienced although it required six years before the study reached a significant conclusion.

My deductions from this study, I think, are fairly clear. Any patient, male or female, whose diastolic blood pressure is 104 mm Hg or higher, definitely needs therapy. If diastolic pressure is between 95 and 104 they probably need therapy, and, in fact, I personally treat patients in this range.

You may ask, "Does this do any good?" Figures from the National Centre of Health Statistics show that in 1959 the death rate for males from hypertension was 27.8 per 100,000. Eight years later, in 1967, the death rate had fallen to 18.7. 1960 was the beginning of the period of meaningful antihypertensive treatment. Since that time, there have been significant additions to our therapeutic armamentarium and I believe that the fall in mortality rate is a reflection of our much improved ability to treat hypertension and we have enjoyed a significant increase in survival as a result.

Sokolow's group at Stanford developed a clever portable blood pressure recording device which they called a "Portometer", capable of automatically recording blood pressure readings every 15 or 20 minutes over a 12-hour period. A series of slides was projected taken from Sokolow's study (12) demonstrating striking lability of blood pressure during the 12-hour period under varying circumstances, e.g., presence or absence of physician, sleeping versus activity, home versus hospital and under varying emotional circumstances, such as anger, frustration, etc.

The final portion of this talk I wish to devote to some observations on physical fitness, training, and the benefits derived therefrom. So many patients now indulge in various forms of physical fitness, including jogging, cross-country skiing, bicycling, swimming, etc., that one perceives many social, internal or peer pressures encouraging this involvement. It should be borne in mind that about 10 percent of the population aggressively want to exercise, are highly competitive people, athletes, etc., but the other 90 percent may really not be that keen about a program of fitness.

How can physical fitness be defined? Physiologically, physical fitness is the ability to move oxygen rapidly and efficiently to muscles. This implies an efficient heart that pumps blood well around the circulation. One must have lungs that work well and oxygenate the blood efficiently. One requires good muscles, good diaphragm and the ability to move the rib cage well. The maximum intensity of exercise of which one is capable depends on the amount of oxygen that can be delivered to active muscles. Put very simply, a person who is totally out of condition becomes extremely winded if he runs up the steps to the back of this theatre. Someone who has gone to the trouble of running daily and has become conditioned, could easily run not only to the back of the theatre but all the way up the steps without taking the escalator and out around the hotel several times, come back, and not be much more winded than the person who was unconditioned and could only make it to the back of the auditorium. The reason for this is that the conditioned person delivers much more oxygen to his muscles than the untrained. (13)

There is, however, a maximum limit to the improvement in oxygen consumption that can be accomplished by training. The maximum consumption of oxygen a person is capable of utilizing is called, "the maximum oxygen uptake." The improvement with exercise over a period of time is called, "Adaptation." The cardiovascular system, the heart and lungs, adapt readily to strenuous exercise that is repeated every one to three days. It is not necessary to exercise vigorously every day. In fact, if you only exercised twice a week, there is evidence that you would condition yourself

almost as fast as a person prepared to do so daily. Lower pulse rate and higher cardiac stroke volume results. "Stroke Volume" is the amount of blood ejected by the heart with each beat. Conditioning allows increased ejection of blood with each stroke, slowing of pulse rate, and both of these are thought to be desirable. Athletes often find pulse rates as slow as 46 to 50 per minute. Finally, cardiovascular system recovery from exercise, the slowing of accelerated pulse and falling in elevated blood pressure due to heavy work, becomes more rapid and is better in the conditioned person. These are worthwhile goals.

The maximum oxygen uptake peaks by about age 20. (14) Males, genetically, are able to do more work because their hearts are larger and more muscular. They can, on the average, generate a higher maximum oxygen uptake than can females but for both sexes the peak is reached around age 20. A person at age 50 or 60, no matter how hard he or she conditions or trains, simply cannot recapture the kind of performance of which they were capable at age 20. This is a physiological fact we simply have to accept.

What are the benefits of exercise? (13) I realize that this area is debatable, and I am uncertain in my own mind what the actual benefits may be, but here are some that are talked about. Many people believe actively conditioning prevents heart disease. I wish I could assure them that this is so, but I really do not know of hard evidence that supports this contention. Even the conditioned person can be the victim of heart attack, although perhaps less likely. Some of my patients who are devoted joggers had to be told to stop because they could not stand the effort, which produced fainting, chest pain or other adverse symptoms. There is one established benefit from training, however. If one has already had a heart attack, there is fairly solid evidence that one's chances of coming through a second attack are better in the physically fit individual. Furthermore, the person who is fit can better handle some of the sudden physical emergencies of life than can the untrained person. Have you ever been summonsed out into the street to help push a car out of a snowbank? Having gone out and pushed and heaved as forcefully as you could, how many of you have then staggered back to the house with your knees like rubber and feeling almost physically sick because of the effort? If your blood pressure could be measured at that particular moment, it would probably be found to be in the neighborhood of 220 over 120, as against the normal of 120 over 80. References suggesting that only systolic pressure goes up with heavy effort are in my experience incorrect. The diastolic pressure also goes up as well. Hypertensive patients under similar sudden heavy effort can experience blood pressure readings of up to 300/150 mm Hg and they may very well go into acute heart failure or serious cardiac rhythm disturbance with sudden syncope and perhaps even sudden death. I presume this is why people may die pushing cars out of ditches, shovelling heavy snow, etc. The purpose for making these observations is to alert you to the fact that conditioning reduces markedly the tendency to have such an abnormal response to that type of heavy effort. That alone, in my judgment, makes it all worthwhile. In addition, patients who do exercise regularly, often tell me they feel much better for it. I am sure they have marked subjective improvement in health and for them, this may be very worthwhile. A regular exercise program is helpful for those who have a high calorie input and need a high level of effort to burn it off, so to avoid a developing marked obesity. Finally, as mentioned before, training and conditioning very much improves one's tolerance to unforeseen stress.

When patients ask for advice as to suitability for embarking on an exercise program, it is necessary to categorize them and often to test them in a controlled situation in order to establish whether they can safely embark on an exercise program. We think of patients as belonging to one of four groups. Group 1 individuals are well people, under the age of 35 years. I will often ask for a resting electrocardiogram and will sometimes carry out an exercise test, but really only for the purpose of being able to tell them that they are safe to do any kind of exercise they would like. Group 2 people are well, but are age 35 years or over and for them we must show a little more concern. All of them should have a resting electrocardiogram and many should also have an exercise test to determine their maximal oxygen uptake capability. A physician should be available for such testing. Group 3 comprises of people who are well, of any age, but in whom there is an additional risk factor, such as a strong family history of coronary heart disease, overweight, elevation of blood pressure, heavy smoking, etc. For these people, a physician must be present during exercise testing and if it can be arranged, it is advantageous to have electrocardiographic monitoring available during the test. Finally, Group 4 individuals are those who are already afflicted with heart disease, who have had a coronary thrombosis, but for some reason or other, one has to know what their exercise capabilities may be. These people should be referred to a special centre which is fully equipped with monitoring facilities, cardio resuscitative equipment and where skilled physicians are supervising the test maneuver. Physicians should generally not attempt to do exercise testing of such people where this kind of backup facility is not available. (13)

The purpose of such testing is to allow an accurate exercise prescription. The principle of the test is to exercise the person with graduated and increasingly intense exercise, monitoring the heart rate until a level of exercise is reached where the heart rate cannot be increased further. This is the maximum heart rate and it varies with age, being higher at young age and falling steadily with increasing age. Maximum heart rate is reached at a point of maximum possible exercise intensity and the patient is maximally utilizing oxygen (he has reached his maximal oxygen uptake.) In practice, it is necessary only to exercise to a point which represents a heart rate of 80 percent of the maximum. Readily available charts permit calculation of this point for patients of various ages.

When the doctor has established the maximum capability for exercise displayed by his patient, he may then enter an appropriate table of activities and suggest exercise activities appropriate to his patient's state of condition. (See accompanying tables describing the metabolic average cost of activities). (13)

Reference to the tables will illustrate that one of the most arduous of activities is shovelling the snow out of a lane in the winter time. This is often done under stress, such as hurry and often right after breakfast when the blood is thick with fats absorbed from the recent meal. This effort is, in fact, very far beyond the capabilities of a great many persons.

Many patients are surprised to learn the amount of effort necessary to burn off just 100 calories - 30 minutes of medium hard gardening, 15 minutes of vigorous tennis, $2\frac{1}{2}$ miles of bicycling, 5 minutes at skiing

at competition speed, or a very brisk $1\frac{1}{2}$ -mile walk. For perspective, note that a $2\frac{1}{2}$ -ounce chocolate bar contains 350 calories. The amount of exercise necessary to burn off that simple snack is beyond the capability of many of us, frankly. One just cannot burn off that many extra calories unless one is constantly on the go. When patients ask, "What do I do about this overweight?", I tell them to do more skipping - skip the potatoes, skip the bread, skip the desserts.

Many of my patients attempt the wrong exercise in a well-intended attempt to improve their fitness. One of the commonest causes of knee joint effusion in my office is jogging. These people are a bit too old to be running hard and consequently they get fluid on the knees. They need to find another form of exercise more suitable to them. I suggest bicycling or swimming, or cross-country skiing. It is difficult for someone at the age of 50 to commence an exercise like jogging and they may, in fact, get more arthritis in their knees and hips than the jogging is worth in benefit to them. For the older patient, adequate benefit may well be obtained from simply briskly walking in the evening after supper, one or two times around the block. A key instruction to such patients is that they should not return home and have a snack after their walk. This will entirely undo the good of the effort they have just undergone. Many of my patients who jog at noon, return to the locker room feeling so set up by the exercise that they destroy the whole purpose of the maneuver by then visiting their club or restaurant for an extraordinarily high-calorie meal. I suspect the serious joggers are those who jog at night. Unlike many of the noon-hour overweight joggers who I see, the evening joggers are slim and lean.

Those sum up many of the thoughts that I have had about periodic health examinations, physical fitness and hypertension. I will be very pleased to try and answer any questions that you may have.

MR. J. H. MILLER: That was most interesting Doctor Walker. Perhaps you would speak about 'do-it-yourself' home apparatus for taking blood pressure. We see them advertised.

The main question has to do with a broader scope of rules for physical fitness. This morning there was a very interesting session on demography and my friend, Mort Darrow, mentioned booze and tobacco and Professor Hickman added exercise and nutrition. This brought to mind an interesting study, made at the University of California under the direction of Doctor Leslie Breslow. They had, I think, 7,000 people, traced over a five-year period. Most of my friends here would say that is not a big enough exposure for credibility, but the results were most interesting. They found a very close correlation between good habits and these aspects of living and the survival of the group over this five-year period.

When I wrote to Doctor Breslow asking about this, he sent the material and said maybe you would tell me why your actuaries limit your measurement of risk to generally age and sex and do not take more note of habits, including tobacco. I did a little investigating and sent him back a statement of the conventional wisdom as to why the great majority of companies have not gone into a credit for non-smokers. But I said in my opinion, I think they should do more of this and perhaps one way to avoid

relying entirely on the facts or fiction the applicant gives as to his habits, would be to have an objective test, which you would ask about smoking, alcohol, exercise and any of these things which seem to be significant. In addition to having the good habits of living, you must qualify on this double entry chart which records both your build and your blood pressure. So a man might report that he jogs, he smokes not and so forth, but if he is like your noon jogger, he will fail on this objective test and we rule out the discount because he is too big, too heavy or has too much hypertension. I am interested in comments you would have on this sort of approach or on the habits beyond the smoking that you mentioned, and nutrition.

Dr. J. B. WALKER: Well, certainly I am all for it. As a clinician I have to tell you that some of the most disheartening work that I have to do is try to repair, if possible, the ravages of tobacco and alcohol. The ward in which I work in my hospital with my young internes is always filled with patients with lung cancer, chronic obstructive lung disease which is called emphysema, and with the various ravages of alcohol and cirrhosis. I see in a very real day-to-day way the impact of this. It is curious that knowing I am a medical director of an insurance company, my colleagues' most common question to me is, "Why do you not give a credit, as you suggest, to the non-smoking applicant?" I do not have a good answer to that. I really think if you could select that group out, there is probably evidence that they merit a credit as against the normal, since the statistics I read in Barron's and elsewhere, tell me that smoking has not declined on the average.

The other question you asked me is a very good question about home blood pressure recording. I, myself, and many of my colleagues were taught when we were in school that we should dissuade our patients from home blood pressure recording. The theory was that you make these people hypertensive neurotics who become obsessed with taking their blood pressure. I do not believe this. The fact is, doctors see their patients only infrequently in their offices and do not really get the whole picture as to what their blood pressures are doing. Home blood pressure recording does, in fact, very often give meaningful information that we tend to slip over. So, I think the earlier teaching that I was given, was, in fact, incorrect. I have encouraged those patients who I feel are dedicated and bright enough to handle this, to buy a good pressure cuff. There is a blood pressure cuff designed for this purpose in which the stethoscope is fastened right on to the cuff so you do not need about three hands.

MR. G. B. CORBETT: Further to a subject you mentioned, I do not know the details of this and I do not know how far it has proceeded but in conjunction with Kenneth Cooper and his, "Aerobics", there is one life insurance company that will give credit when people pass certain levels of the treadmill testing, plus the body fat determination, the leanness, coefficient and so on. It is a very expensive testing. This thing could run a couple of hundred dollars and the persons end up paying it themselves and the discount is large enough to pay for the exam. One of the interesting things is they have to requalify every five years under the Five Year Renewable Term contract with a higher guaranteed rate but with a reduction if you pass this test.

I think part of the problems we all face are that it is not enough to get a person qualified initially but you want to make sure he stays one. I am not aware of the sales success of this. I am not even certain that they are selling, but I know it has been filed.

I have a second question for the doctor. I notice one factor you left out of pretty well all your discussion was cholesterol. You made absolutely no mention of it whatsoever and, of course, in Framingham studies, and many others, this has been shown to be a fairly large factor even though we do not know the relationship to diet. There are a lot of unproven things about it. Nevertheless, high cholesterol and mortality seem to be related and I just wonder where you fit this in to the total pattern?

DR. WALKER: That is a very hard question. I do cholesterol on many of my patients and I have to say our knowledge of this is still in its infancy. We believe there is some evidence that high cholesterol, high triglycerides, so called, "type two", or, "type four", have an adverse bearing but the extent of this is not too certain. A very curious thing though, seen in some executives I have had, who have very high readings and have had great difficulty getting the triglyceride down, I have put them on a carbohydrate-restricted diet, which is the diet we use, but still cannot get their triglyceride down. However, there is a little tip - the executive whose triglyceride will not fall down, is probably using more alcohol than he realizes. It turns out that the maximum amount of alcohol that a person can consume and not push their triglyceride up in a real way, if they have this tendency, is ten ounces per week. That is one and one-half ounces a day. And, now many of my executives are, in fact, having two or three times that amount before supper and two or three times that after supper and these people are not drunk. These are people who enjoy the relaxation that they get after a terrible day at work, by having a few drinks before supper and perhaps after supper a couple more. Add all that up, though, and six or seven ounces a day, which is not too much, they think, times seven is 40 ounces a week. That is literally two-fifths a week and people who do this cannot get their triglycerides down if they have the tendency to high triglycerides. The next thing I do is have a little discussion on how much alcohol he is really using and this is when I find out he is putting down 40 or 50 ounces a week. This is considered to be fairly normal for the social context in which this man functions.

One of the things we do find distressing is the tendency of some employers to use this kind of information for making decisions about this man's further employability or promotion. For example, a candidate for promotion is found on his company medical to have a high cholesterol. Do you refuse him promotion because he has high cholesterol? I think most doctors feel this is an unwarranted extension of our knowledge to deny a promotion because the man has an abnormal blood chemistry test.

MR. A. P. MORTON: I have been interested in underwriting for a few years and have always understood that hypertension is a symptom of disease rather than an entity in itself and that you only label somebody as having essential hypertension as an admission that you do not know what his problem really is. My question - Do you have any guidelines as to what extent you investigate a man before you call it essential hypertension?

DR. WALKER: Yes, that is a tough question. That is a whole hour lecture in itself. Who do you push on to major investigation? I have just today admitted a young woman, I guess around 40, who has severe and uncontrolled hypertension, who, finally after some months, I decided to, "go the distance." And going the distance means putting them in hospital and doing intravenous pyelogram, kidney x-rays and if there is a difference in size of kidneys or if listening with the stethoscope you hear a little hiss over one or other kidney artery, you wonder if this person may have renal disease. She came up to full investigation and we found, indeed, she has a tightness or pinching of the artery to one kidney. Tomorrow our vascular surgeon is going to put in a shunt to that kidney to bring the proper amount of blood flow. If this is successful, it will cure this woman's hypertension.

The fact is that probably less than five percent of all hypertensives have some fixable cause like this. There are a few hypertensives who have a congenital heart abnormality in which there is a narrowing of the aorta and they get hypertension. There is the odd one who has a glandular disturbance with a tumor in the adrenal, and so on. But doctors think that if you very carefully study large numbers of hypertensives, you will only find about 5 percent of them are in a potentially curable area like this. The other 90 to 95 percent of hypertensives are what we call idiopathic or essential hypertensives, and it appears that what has happened is that they have inherited a tendency to have tighter than normal arteries with high resistance and, consequently, the heart has to pump harder to push the blood through. This is a hereditary thing, and there are certain guidelines that we use. People who develop too much blood pressure too young, too rapidly or have some other little finding, a disturbed blood chemistry and so on, will often be pushed through this more extensive investigation and, in fact, a simple screening set of tests are done to see if they might fit into that small group. In the background, you have to bear in mind that no matter how carefully you investigate, you are only going to find a small number. It is important, therefore, to look at history, physical examination and few simple tests for some clue that this person ought to be pushed further. If there is something of this sort, I am quite prepared to, "go the distance", because a small number of patients can be rather dramatically helped, but the discouraging thing is how small that number is.

Now there is one new little breakthrough that has come in the last several years and that is the realization that maybe 20 or 30 percent of hypertensives may have something wrong in their adrenal gland so they produce too much of a hormone that causes the retention of salt and water. There is a hormone that the adrenals produce called aldosterone. This particular hormone that 20 or 30 percent of hypertensives produce is not aldosterone but it is believed to be one very like it. These people are helped by the use of a specific diuretic and, curiously, it also results in a lowering of their blood pressure. This is a little breakthrough. It has not been completely worked out yet, but we think we are on to something here and maybe a third of hypertensives have this mechanism. This is one of the promises of the next few years and it should be all worked out within another two or three years, I would think.

There are quite a number of people who are dedicated to, "knocking themselves out." Sometimes the price of this is rather higher than I think these people should be asked to pay. In discussing it with these patients I am dismayed at how ready they are to reject this opinion but to carry right on. There is something that compels many of us to have to succeed in our chosen line. They do include getting into the situation of using too much alcohol, of taking too little vacation, of working too long hours, of having too many wives or having too little interest in our children's success and so on. It is very frustrating to sit and listen to these people and try and counsel them and realize that there is something in them that is impelling them ahead. The example that I used of the chap whose triglyceride would not come down is running a much higher than normal likelihood of having an early coronary attack.

As pointed out from the Framingham study, one of the things that upsets us as physicians more than anything else, is the poor compliance we get with our advice. It is a free country and I give advice and my patient is free to accept it, or not. That is a good way for things to be as far as I am concerned. I may not know more than he does at all. He may know more than I do in the final analysis, but it is disheartening as I said, that the heavy smoker still smokes, the drinker still drinks and the obese do not take off weight. I keep plugging away and some of them take the advice and I am grateful that they do. At first I was pretty upset when they did not but am trying to admit that I cannot modify everything. At least, I can say what I think and he can listen to it and if he wants to accept it, fine.

MR. W. D. SMITH: Doctor Walker I am sure I am speaking for all of us in thanking you for taking the time for such an interesting talk. The subject of alcohol is an interesting one. I myself would consider 10 ounces a day rather excessive and would reorder my life if I found myself using that much. Do you know of any evidence which would indicate that there is a difference between not using alcohol at all and using perhaps an ounce or two a day?

DR. WALKER: I am glad you asked the question because I will tell you a very interesting study that I thought was really cleverly thought out. Lieber and Leevy in New York State who are doing some of the most basic work on how alcohol damages the liver which is the target organ that alcohol hits. It does hit the brain, nerves, heart and so on, but the liver is what we see mostly. Liver cells, like any other body cells, require to burn a certain fuel. The fuel that liver cells burn is a particular fatty acid called triglyceride which is something like cholesterol, one of the fats we find in the blood. If the liver cell instead is presented with ethyl alcohol it will stop burning triglyceride and it will burn the alcohol in preference. The triglycerides then accumulate within the liver cell causing it to swell and it becomes more and more swollen with this fat inside of it. Finally, the liver cell will swell to the point it will burst and self-destruct and liberate the triglyceride into the blood stream. If this happens over a long enough period of time, the end result of this is a disease called cirrhosis of the liver.

The study mentioned above attempted to determine how much alcohol the human body could tolerate before one began to get fatty degeneration or fatty accumulation within the cells. At the beginning of the study, volunteers would have a biopsy of the liver. Then they drink measured amounts of alcohol, and at suitable intervals, like every three or four weeks, they would be studied microscopically and looked at for evidence of fat accumulation within the cells. Now they found several things. One of these was that there was a marked variation in alcohol tolerance. Some of the volunteers had enormous tolerance for alcohol before they got real meaningful fat changes. Others were highly susceptible and even small amounts of alcohol would very quickly induce marked fatty changes and there was a wide variation in sensitivity. The minimum amounts given were as little as 2 or 3 ounces a week and it extended right up to as much as 20 or 30 ounces a day. The final workout of this was that the maximum of alcohol which could be tolerated safely without fatty breakdown in their livers was 10 ounces per week and there is where I got that figure. Above that, some patients will begin to have fatty degeneration of the liver. The trouble is you do not know whether you have a high tolerance or a low tolerance when you embark upon alcohol use. There is no way of telling whether you have a high or low tolerance. Almost all people, even those with a tendency to high triglyceride, can tolerate 10 ounces a week with safety. So, I think it is merely deciding where your priorities are. If you have to have alcohol, you can have that much safely and if you want all ten ounces on Saturday, fine. If you want to have an ounce and a half a day, every day, fine, but you cannot do that every day and every weekend have 10 - 12 ounces more. Over the weeks and months, and years, this excess cumulative effect does take its toll.

MR. S. L. TUCKER: I would like to leave the alcohol for a minute and express a negative reaction to your earlier subject, The Executive Annual Examinations. Although I was aware of the Time article and the New York Times magazine article and your appraisals, sir, I feel compelled to continue as my company advises with the annual health examinations. Is it possible that your interest in hypertension led you to think of that as a valid indication from an annual examination but the rest of it, blood chemistry, x-rays, etc., would not be of as great interest to you?

DR. WALKER: Your point is very well taken. I have tried to make the point there is, in fact, wide division of opinion. And, in reading for this talk I have found very strong opinion expressed either way. All I am trying to say is that I do think we have to look at the cost effectiveness of these things because if we offered this type of examination for everybody, it will, in fact, completely tie up the entire medical force in the country. I do annual examinations and I am asked repeatedly by many companies if I will do annual exams and I do take them on. I do not refuse them. The thing that I try to put across to the patients who come to me through this route is that we have to put this into some kind of reasonable perspective and I cannot see the point of doing exhaustive annual examinations on 30-year olds. In fact, if I see them every three or four years or less, I think this would be more than adequate. The time spread decreases as these people get older and I have 60-65 year olds who come and see me once or twice a year. If I find something wrong with them that needs monitoring, such as hypertension, in which I have a particular interest, I have them back three or four times a year so I can keep a

watch on this. I try to tailor this to what I perceive to be in the best interest of the patients.

What I am doing is, I am afraid, imposing my own particular judgment on that. I am against doing extensive routine examinations for the sheer sake of doing them, because I do not think the payoff is enough. What I really want people to do is to come to me as soon as they perceive something is going wrong and I will get at that. I will likely do a very complete history and examination at that time. I want these people to leave my office with the knowledge that they are to come back at once if they develop some untoward symptom about which they are concerned. I think this offers the greatest productivity and the greatest cost effectiveness is to deal with it at that time. Failing that, I would like to see them again at an appropriate interval, depending on age. Obviously, in a younger age group you have to do a great number of examinations to find anything.

We have to work examinations at intervals and that is much greater than annually in the younger age group. As one nears the upper 50's and 60's I think it does become annual because, at that point, these people are beginning to develop conditions that are susceptible to being spotted at the annual exams - the development of angina pectoris, the development of diabetes, the development of hypertension. So, I have hedged on your question but that is how I have had to resolve this problem in my own mind and try to keep peace in the type of work that I, and many colleagues like me, am doing.

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TEACHING SESSION

Calorie cost* cal/kg/min	Occupational	Oxygen cost ml/kg/min	Leisure
25	Standing at ease desk work driving car	5	Flying motorcycling (pleasure) walking (1 mph)
45	Bartending mechanical work on car hunting (sitting) crane operating (sitting) typing	9	Mowing lawn (riding mower) power boating shooting shuffleboard woodworking washing car fishing (from boat, bank or ice) walking (2 mph)
50	Janitorial work light welding housework (scrubbing, waxing) chopping wood - power saw driving heavy truck or trailer rig	10	Billiards bowling canoeing (2.5 mph) horseshoe pitching cycling (5 mph) golf (power cart) horseback riding (walk) walking (3 mph)
60	Stocking shelves assembly line with some lifting wheelbarrow (200 lbs)	12	Iceboating sailing (handling boat) archery
70	Painting masonry paperhanging carrying trays, dishes gas station mechanical work (changing tires, wrecker work) farm work	14	Table tennis mowing lawn (power mower) golf (no cart) baseball volleyball softball cycling (6.5 mph) canoeing (3 mph) waltzing walking (3.5 mph)

*For this table 1,000 Cal equals 1 k cal.

Food references in text are in k cal.

Calorie cost* cal/kg/min	Occupational	Oxygen cost ml/kg/min	Leisure
90	Carpentry handyman work carrying 30-50 lbs.	18	Gardening lawn work cross-country skiing on level (3 mph) cycling (8 mph) walking (4 mph)
105	Pneumatic tools chopping wood (hand axe or saw) carrying 50-60 lbs. shovelling light earth (10/min. 9 lbs)	21	Cycling (6 mph) fishing (wading in a stream) hiking (cross-country) hunting water skiing snowshoeing (2.5 mph) mowing lawn (punch- mower) skating (9 mph) square dancing dancing dancing (rhumba) horseback riding (trot)
125	Carrying 60-70 lbs.	25	Badminton tobogganing scuba diving running or walking (5 mph) 5 BX (level 1A) cross-country skiing on level (4 mph) canoeing (4 mph)
140	Carrying 70-90 lbs.	28	Basketball (non-game) tennis cycling (12 mph) swimming breaststroke 40 yds/min. touch football ice hockey (non- game)

*For this table 1,000 Cal equals 1 k cal.
Food references in text are in k cal.

Calorie cost* cal/kg/min	Occupational	Oxygen cost ml/kg/min	Leisure
160	Shovelling (10/min. 14 lbs)	32	Cycling (13 mph) snow skiing running (6 mph) horseback riding (gallop) 5 BK (level 2A)
175	-	35	Running (7 mph) swimming (crawl 50 yds/min or back- stroke 45 yds/min) mountain climbing squash fencing gymnastics cross-country skiing on level (5 mph) snowshoeing (3.5 mph)
210	Shovelling (10/min. 18 lbs)	42	Handball hockey soccer basketball (competition) wrestling 5 BX (level 3A-4A)
225	-	45	Running (8 mph)
245	-	49	5BX (level 5A-6A)
265	Shovelling (10/min. 23 lbs)	53	Running 9 mph)

*For this table 1,000 Cal equals 1 k cal.
Food references in text are in k cal.