

Kap

Roche

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1000 cal per day per cent wt
cholesterol goes down, in first week
then returns to original level.

Change in serum lipoprotein level and
distribution. By the end of
4 weeks 18 out of 24 subjects reduced
SF 12-20 lipoprotein an average
of 50% . —

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CITY OF NEW YORK
DEPARTMENT OF HEALTH

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PROPOSED NEW YORK CITY
SANITARY CODE REGULATIONS
ON RADIATION HAZARDS

Section 107. Registration of sources of ionizing radiation required: ionizing radiation hazards regulated. 1. The term "radiation " as used in this section shall mean and include alpha and beta particles, electrons, protons, neutrons, gamma and x-rays and all other radiations which produce ionizations directly or indirectly but not electro-magnetic radiations other than gamma and x-rays.

2. It shall be unlawful for any person to own, possess or operate any source of ionizing radiation unless such source has been registered or exempted in accordance with the provisions of this section.

3. All sources of ionizing radiation registered with the Department of Health shall be constructed, handled, used, transported, stored and/or disposed of in such manner as to prevent all users thereof and all persons within range of the radiations thereof from being exposed to radiation in excess of the maximum permissible weekly dose specified by the National Committee on Radiation Protection or by the regulations of the Board of Health.

4. Every source of ionizing radiation, unless registered with the New York State Department of Labor or exempted as prescribed by regulations of the Board of Health, shall be registered by the owner with the Department of Health on forms furnished by said Department on or before or within forty-eight (48) hours of its acquisition.

5. Supervision. All radiation installations shall be operated by or under the direction of a person who shall be responsible for all necessary safety precautions.

The operator of a radiation installation shall be responsible for:

- a) Insuring beyond reasonable doubt that all persons working with radiation equipment or radioactive materials are properly and adequately instructed in the hazards associated with and the safe methods of handling or operation and use of the radiation equipment or radioactive materials.
- b) Insuring beyond reasonable doubt that all persons working with radiation equipment or radioactive materials are properly and adequately instructed in the purpose and proper use of any protective and monitoring equipment provided. This shall also apply to visitors to areas under his control.
- c) Controlling the discharge of radioactive wastes so that any person outside the installation is not subjected to hazardous radiation levels.

good orthogonal components of cardiac voltages, the speaker believes that a great deal of the vector cardiographic literature is of doubtful value. Suggestions relative to better leads for vector cardiography and more rational use for records of the vector type will be made.

MANAGEMENT OF THE CARDIAC ARRHYTHMIAS

The cardiac arrhythmias will be briefly outlined and treatment for the common types will be discussed. A rational use of drugs particularly digitalis and guinidine will be emphasized.

KEYS, ANCEL

11-8-56

EXPERIMENTS ON MAN RELATED TO CORONARY HEART DISEASE

Coronary heart disease is the end result of interference to the blood supply to the heart muscle by the coronary arteries. The basic cause is atherosclerosis and/or thrombosis, the latter rarely occurring except in the presence of a major degree of atherosclerosis. Atherosclerosis involves deposition of Cholesterol, derived from the blood, in the arterial intima and the concentration of cholesterol, chiefly in beta lipoprotein, in the blood is a major factor in this deposition.

Atherosclerosis can be induced in animals by any means that produces elevated beta lipoprotein cholesterol in the blood. But true coronary heart disease is a human phenomenon and animal species differ in cholesterol metabolism so the human problem must be studied mainly in man. In human experiments major reliance must be placed on indirect indicators of the forces that may lead to the development of coronary heart disease.

The concentration interest is on measurements of the blood serum cholesterol lipoprotein system as the indicator of the atherogenic potential. In addition, the blood coagulation system as a possible indicator of the thrombogenic potential, is just beginning to be studied.

Experimentally, the serum cholesterol, particularly that in the beta lipoprotein falls in man when the fat in the ordinary American diet is reduced without changing the diet calories or the composition of the fats. An effect occurs in a few days and persists or becomes more marked as the altered diet is continued.

When the total diet is reduced so as to produce a negative calorie balance, serum cholesterol falls and stays at a reduced level so long as the calorie balance is negative (i.e., weight loss is continuing). The reverse effect, that is a rise in serum cholesterol, results from an increase in dietary fats (composition as in the usual U. S. diet) at constant calories, or from increased calories to produce progressive weight gain. At calorie equilibrium (weight constant), there is no significant difference between fat and thin people in respect to serum cholesterol level, provided they have diets of the same general composition, regardless of the actual calorie intake.

Experiments on Man Related to Coronary Heart Disease - cont'd:

Different foods are not equivalent in their effect on the cholesterol lipoprotein system. Highly saturated fats, such as beef fat, butterfat, and coconut oil have great cholesterologenic effect. Highly unsaturated fats, such as corn oil, soy bean oil and fish oils, tend, when ingested in large amounts, to counteract the effect of the saturated fats on the cholesterol system. Whether this is due to the content of "essential" fatty acids (linoleic and arachidonic acids) or to the total number of double bonds in the fatty acids is not known.

Dietary fats also affect the tendency of the blood to clot, though the effect seems to be limited to a period of from 1 to 6 hours after a fatty meal. Fats which differ greatly in degree of saturation have similar effects in this regard. Hypercoagulability of about the same degree follows ingestion of a couple of ounces of butterfat, of corn oil and of coconut oil.

Experiments on man with other dietary items fail to show significant effects within a month or so on the serum cholesterol system. Doubling or halving the protein intake (calories constant) has no effect. Changing dietary cholesterol far beyond the range of natural human diets is without effect. The upshot of all these dietary experiments is, 1) The fat content and kinds of fat in the diet is of great importance in controlling the serum cholesterol-lipoprotein system and this should be highly significant for the atherosclerosis problem. 2) Fatty meals produce temporary hyper-coagulability and this may be relevant to the thrombosis problem.

Experiments on man with grossly excessive loading of the diet with cholesterol (10 times that obtainable with natural human diets) produce extremely little response in the blood serum. Such response as does occur is abolished by exercise after the cholesterol meal.

An important finding of these experimental studies is the demonstration that individuals have their own characteristic serum cholesterol levels so there are considerable differences between individuals on the same diet and living the same way. But practically all men show the same type of response to alteration in the amount or kind of fat in the diet.

STUDIES ON POPULATIONS

Hopes for the eventual possibility of prevention of coronary heart disease are firmly based on the evidence that there are great differences between populations in the frequency of the disease. In the middle age, the relative frequency of the disease in Italy is perhaps a fourth that among U.S. Whites and in Japan the incidence is only a tenth or less of our own. That these differences are not basically dependent on race or genetic endowment is shown by such comparisons as between different economic classes in Spain, between Japanese living in Japan and in Hawaii, and between negroes in Africa and in the U.S.A.

Differences in the mode of life are obviously involved, and it is necessary to ask what aspects of the mode of life are most important. Climate is easily ruled out and the main factors for present consideration are the habitual diet and the average level of physical activity.

The argument that simple calorie over-eating and resulting over-weight accounts for the excessive incidence of coronary heart disease in the U.S.A. is refuted by the following facts, among others:

Studies on Populations - cont'd:

- 1) The frequency of overweight among coronary patients is very little different from that in the healthy population. The majority of such patients are of normal weight or underweight.
- 2) Insurance company data on excess frequency of coronary disease among over-weight policy holders also indicate that elimination of all overweight in the U.S. would still leave a grossly excessive incidence of coronary disease compared with many other populations.
- 3) There is no close correlation between serum cholesterol and relative body weight in the U.S. population.
- 4) Overweight and obesity are common in many populations in which coronary disease is relatively rare.

Studies on many population samples in England, Sweden, Spain, Italy, South Africa, Hawaii and Japan, and by other workers in Nigeria, Israel, Guatemala and Korea have shown so far complete consistency:

- 1) Populations that have a high incidence of coronary heart disease are characterized by average high serum cholesterol levels and subsist on diets that are high in fats (over 30 per cent of calories from fats.)
- 2) All populations that subsist on low-fat diets (20 per cent or less of the total calories from fats) are characterized by average low serum cholesterol levels and relatively low incidence of coronary heart disease. The population also seem to be relatively free from thrombo-embolic disorders in general but they are by no means free of hypertensive heart disease.
- 3) Populations that have changed from a high-fat to a low-fat diet (as during war time) experienced, within a few years, a sharp decline in coronary heart disease but returned to a high coronary disease incidence not long after restoration of a high-fat diet.
- 4) Populations subsisting on intermediate levels of diet fat (25 to 30 per cent of calories) are intermediate in serum cholesterol and in coronary disease frequency.
- 5) The low serum cholesterol levels in populations on low-fat diets are not dependent on differences in race, physical activity, alcohol or smoking habits.
- 6) Substantially all high-fat diet populations consume a large part of their diet fat in the form of relatively saturated fats. Among low-fat populations a large proportion of the diet fat is composed of relatively unsaturated fatty acids.

Field studies in Hawaii and Japan, just completed, show a perfect parallelism between the character of the diet and the blood cholesterol and beta lipoprotein concentrations in 5 samples of Japanese men and 2 samples of Caucasians. These studies cover the range from 9 to 42 per cent of dietary calories from fats, with corresponding average total cholesterol values, for men aged 40-49, from 141 to 245 milligrams per 100 ml. of serum.

The analysis of autopsy materials showed severe atherosclerosis, at equal age, about 10 times more frequent among the high-fat diet, caucasians in Hawaii than among the low-fat Japanese in Japan. The autopsy material on the Japanese in Hawaii, with a diet intermediate in fats, was intermediate in regard to atherosclerosis.

Studies on Population - cont'd:

The essential similarity of the cholesterol-lipoprotein metabolism of men in these various populations is shown by dietary experiments on Bantu in Cape Town, on Japanese in Fukuoka, Japan, and in white men in Minneapolis.

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ASPECTS OF ALTITUDE AND AIR TRAVEL IN CARDIAC FUNCTION AND DISEASE

Comparisons are made of the altitude factors for residents on Morococha Peru, Denver and at sea level.

The acclimatized man, living at high altitude has an increased ventilation of air, changes in the circulating blood and perhaps changes in tissue utilization of oxygen that enables him to function quite differently from his sea level counterpart. The changes occurring in the cardiovascular system may be beneficial rather than harmful. The circulatory response is similar to that of a well trained athlete. The altitude man has an increase in physical endurance.

As one ascends at altitude the respiration is stimulated at the altitude of Denver and at cabin pressure. At 12,000 - 14,000 feet, pulse rate and cardiac output increases. Beyond 18,000 feet circulatory collapse may occur.

The commercial aircraft has a pressurized cabin of 8,000 feet altitude. Administration of O₂ at this level is sufficient to reproduce an environment comparable to sea level. For this reason, with proper oxygen administration, a cardiac patient capable of ground transport can fly. The greatest flying hazard is the patient with cor pulmonale, as mild increase in hypoxia may precipitate acute right heart failure.

Individuals with cardiac disorders may have a lower altitude threshold, similar to a lower exercise threshold. The best adjustment to altitude is made by younger people. Acclimatization requires about a year under the most favorable circumstances. An acclimatized individual, especially older individuals, should avoid additional stress in the form of exercise or heavy meals.