

RESEARCH PROPOSAL

November 30, 1965

Sponsorship: The project will be jointly sponsored by the Faribault State School and Hospital and by the Laboratory of Physiological Hygiene, University of Minn.

Title: The effects of four staple carbohydrate foodstuffs on serum lipid concentrations in man. (Experiment FG)

Responsible Investigators: Dr. Joseph T. Anderson, Dr. Francisco Grande, and Dr. Ancel Keys, Laboratory of Physiological Hygiene, University of Minn.

Location and Dates of Research Project: Springdale Metabolic Unit, Faribault State School and Hospital*. The special diets will be fed for 33 weeks beginning in January and ending in August 1966.

Research Objectives: Dietary fatty acids and dietary cholesterol have been shown to produce known effects on serum cholesterol concentration in man and algebraic equations have been derived which predict these effects with good precision. The corresponding effects on serum phospholipids and serum triglycerides are also known with less precision.

The object of this research program is to extend the knowledge of dietary control of serum lipid concentrations to include the carbohydrate and protein components of the most important food products used in human feeding. Cereal grain products will be used including those of wheat, rice and corn. One tuber, potatoes, will be studied. In one series of diets the purified starches of wheat, rice, corn and potatoes will be fed. This will show whether these 4 starches when fed give rise to different concentrations of blood lipids. In another series of diets the corresponding food products in less purified form will be fed (patent wheat flour, powdered white rice, degerminated corn flour and dried potato flakes,

Each of these products contains between 7 and 11 percent of its own specific protein in addition to its own type of starch. By comparing the serum lipid responses to the second set of diets with the responses to the corresponding pure starches it will be possible to determine whether the protein components of the food products have any effect on serum lipid concentrations.

Food Service Management: All the patients who live in the Springdale Unit except these who have work assignments in other areas will be included in the diet group. This number at present is about 72 men. When men with work assignments have a day off they will be accommodated.

The food will be cooked and served in the Springdale Metabolic Unit by a staff including one food service employee on the Faribault State School payroll plus several others employed by the University of Minnesota and volunteers assigned by the Brethren Volunteer Service agency of the Church of the Brethren. Supervision will be exercised by the responsible investigators, by Mrs. Carol Thera, dietitian, who will be in the unit 2 days weekly and by Mrs. Florence DeCoux, senior food service supervisor, who will work in the unit 5 days per week. All the employees and volunteers including the food service person employed by the Faribault State School will be expected to work as an integrated team under these supervisors

The cooperation of the psychiatric technicians of the Springdale Unit and of everyone associated with the Springdale patients is requested in helping them to adhere to the diet. The patients are allowed to buy treats from the store once a month as usual but the scheduling of the store order day is to be at least 7 days before a blood sample day. When relatives visit a patient they are to be given special directions about giving him foods.

Outline of Procedures The patients will be divided into four groups matched as well as possible in age, serum cholesterol level and relative obesity,. The basic diet will be the same for all the men in all periods. Nine different supplements will be provided each containing a different kind of starch or flour. These supplements will each contain the same amount of carbohydrate, protein and fat. The equilization of protein will be accomplished by adding soybean protein (Promine D) as needed to the low protein substances. Each supplement will be a certain kind of bread containing 200 grams of carbohydrate from one of the following food products: wheat starch, corn starch, rice starch, potato starch, patent wheat flour, degerminated corn flour, rice flour (made from polished white rice) and dehydrated potato flakes. The whole diet will contain liberal amounts of vitamins, minerals and all the nutrients required for good health.

The program will consist of 11 periods of 3 weeks each in which the diets will be fed according to the schedule in the table following.

Schedule of Diets, Experiment FG

Weeks	Group W	Group X	Group Y	Group Z
1-3	Ref	Ref	Ref	Ret
4-6	WS	RS	CS	FS
7-9	RS	WS	PS	CS
10-12	PS		RS	WS
13-15		PS	WS	RS
16-18	Ref	Ref	Ref	Ref
19-21	WF	RF	CF	PF
22-24	RF	WF	PF	CF
25-27	PF	CF	RF	WF
28-30	CF	PF	WF	RF
31-33	Ref	Ref	Ref	Ref

Key to dietary supplements: Each contains 200 grams of carbohydrate. Soybean protein will be added to equalize protein.

WS = Wheat Starch	WF = Wheat Flour
RS = Rice Starch	RF = Rice Flour
CS = Corn Starch	CF = Corn Flour
PS = Potato Starch	PF = Potato Flakes
Ref = Reference Supplement	

Blood samples will be taken from each man in the fasting state at the end of each dietary period and the serum will be analyzed for cholesterol, phospholipids and triglycerides.

The food consumed by each man each day will be recorded and calculations of the supplements eaten and of the important nutrients eaten will be made by electronic computer assisted methods which have been used previously in this program. The serum lipid data will be evaluated in such a way as to reveal the differences caused by the nine different food products introduced into the supplements.

The subjects will be weighed weekly early in the morning, clothed in night clothing, after urinating and before breakfast. The food for each man will be adjusted to maintain constant body weight for most individuals. For those persons who are grossly overweight or underweight dietary adjustments will be made to correct the abnormal condition.