



UNIVERSITY OF MINNESOTA
TWIN CITIES

Laboratory of Physiological Hygiene
School of Public Health
Stadium Gate 27
Minneapolis, Minnesota 55455

January 17, 1974

?

Donald T. Fredrickson, M.D.
Inter-Society Commission for
Heart Disease Resources
44 East 23rd Street, Suite 316
New York, New York 10010

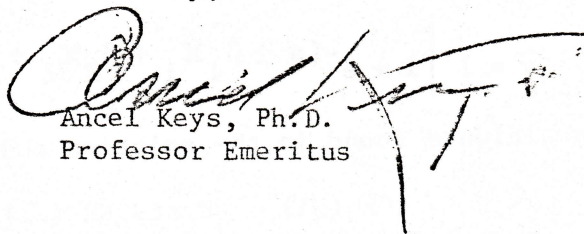
Dear Doctor Fredrickson:

The enclosed sheet is a result of the visit of the lawyers re the egg ads. The question was raised as to what might be the difference in the incidence of coronary heart disease associated with a small serum cholesterol difference.

We have consistently found that the addition of an egg yolk daily to an ordinary U.S. diet is to raise the serum cholesterol level by an average of some 4 or 5 mg/dl. Added to a cholesterol-free diet, such as the formula diets used by Bill Connor, the egg yolk a day addition will be larger, perhaps 10 mg/dl. Added to a 3-egg a day diet, the effect of one more egg will be very small.

I enclose a supply of these sheets for Drs. Moses, Wright and Ross and Mr. Banzhaf, whose addresses are not immediately at hand in our newly-moved office. I am sending copies direct to Drs. Mayer, Stamler, Stare and Kannel and, of course, to Dr. Blackburn here.

Sincerely,



Ancel Keys, Ph.D.
Professor Emeritus

AK:mh

enclosures

cc: Dr. Jean Mayer
Dr. Jeremiah Stamler
Dr. Fredrick Stare
Dr. William Kannel
Dr. Henry Blackburn



UNIVERSITY OF MINNESOTA
TWIN CITIES
Ancel Keys
16 January 1974

Laboratory of Physiological Hygiene
School of Public Health
Stadium Gate 27
Minneapolis, Minnesota 55455

EFFECT ON INCIDENCE OF CORONARY HEART DISEASE (CHD) OF A DIFFERENCE OF
FIVE MILLIGRAMS OF CHOLESTEROL PER 100 ML. OF BLOOD SERUM

Number of men, out of 10,000 free of CHD at the start, who will die from CHD or suffer myocardial infarction in five years. Numbers below were calculated from the solution to the multiple logistic equation with the 5-year experience of 6,221 men 40-59 at entry at Framingham, Albany, N.Y., and Chicago (studies of Drs. Stamler and Paul).

CHARACTERISTICS AT ENTRY

AGE	BLOOD PRESSURE	CIGARETTES/DAY	CHOLESTEROL. mg/dl SERUM		
			245	250	255
40	130/80	none	81	84	88
"	"	20	212	222	232
"	180/100	none	184	192	201
"	"	20	475	497	519
50	130/80	none	167	175	183
"	"	20	433	453	473
"	180/100	none	377	394	412
"	"	20	945	985	1027
60	130/80	none	343	359	375
"	"	20	866	903	941
"	180/100	non	758	790	825
"	"	20	1792	1861	1931

The multiple logistic equation is (y = probability of CHD in 5 years):

$$\hat{y} = 1 \left[1 + e^{-(\alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5)} \right]$$

Coefficients found in the solution and used for the above calculations:

α	AGE (β_1)	Syst. BP (β_2)	Diast. BP (β_3)	Chol (β_4)	Smoking (β_5)
-13.8904	.0738	.0126	.0175	.0092	.2781*

* Non-smoker = 3×20 cigarettes per day = $6 \times .2781$

The above calculations were made to give an indication of the difference in CHD incidence associated with serum cholesterol level differences that are found when the diet is changed by one egg yolk a day in "normal" men. One egg yolk a day added to a cholesterol-free diet will produce a greater serum difference; added to a diet already providing two eggs a day the one yolk added will have a smaller effect.

CHD INCIDENCE AND SERUM CHOLESTEROL

Five-year incidence, per 10,000 men, of coronary death or myocardial infarction associated with 5 mg/dl difference in serum cholesterol. Estimated from the solution of the multiple logistic equation with data from the follow-up of 2,404 white men employed by U.S. railroads. The constant, $\alpha = -13.6427$, β_1 , age = .06368, β_2 , syst. B.P. = .02419, β_3 , cholesterol = .00912, β_4 , smoking = .2368, non-smoking score = 3, 20 cig./d score = 6

AGE	B.P.	SMOKING	CHOLESTEROL, mg/dl		
			245	250	255
40	130	none	67	70	73
"	"	20/day	134	141	147
"	180	none	220	230	240
"	"	20/day	437	456	477
50	130	none	125	130	137
"	"	20/day	251	263	274
"	180	none	407	425	444
"	"	20/day	795	829	864
60	130	none	234	244	256
"	"	20/day	464	485	507
"	180	none	743	775	808
"	"	20/day	1403	1459	1517

1/22/74 Minneapolis A.K.

January 22, 1974

Donald T. Fredrickson, M.D.
Inter-Society Commission for Heart
Disease Resources, Suite 316
American Heart Association
44 East 23rd Street
New York, New York 10010

Dear Doctor Fredrickson:

Herewith are copies of a table similar to that sent you recently, but this is based on the 5-year experience of U.S. railroad employees. You will note the close similarity to the findings in the 4-Pool men.

Roughly, a 5 mg/dl difference corresponds to a 4 per cent difference in the incidence of myocardial infarction or coronary death. Not much, but a 4 per cent difference in the 600,000-plus CHD deaths per year in the United States means over 24,000 deaths.

Sincerely,

Ancel Keys, Ph.D.
Professor Emeritus

AK:rh
enclosures

over