

understand how a decision may be influenced by the patient's particular circumstances and personality.

It might be thought that the large quantity of testosterone given with the thiotepa played a part in producing the responses observed. The possibility cannot be excluded, and it is probable that this substance was partly responsible for the subjective benefit so often seen. If, however, testosterone was also responsible for the objective remissions produced, one would expect some relationship to exist between response to it at a previous stage and subsequent benefit from thiotepa (Table IV): this was not found. On the other hand, the fact that hypophysectomy and thiotepa were effective in similar types of disease suggested an endocrine basis for its action.

We have been unable to note any relationship between the clinical outcome of treatment and the dose of drug administered or the marrow depression produced. This may mean either that similar clinical results could be obtained by a reduced dosage, with possibly a smaller mortality, or that our data are inadequate because of the small number of patients. Improved results might be obtained by increasing the maximum dose (285 mg.) of thiotepa in patients who at that level of dosage did not show a serious depression of their blood counts. This would certainly increase the lethal effect of the drug, and in view of the alternative and, as it seems to us, superior methods of treatment, could not be justified.

Can the treatment be made safer? Table III shows that a rapid fall in the blood count to levels necessitating cessation of therapy did not give much information about the ultimate depth of marrow depression. Thus 13 (56%) out of 23 patients able to tolerate doses between 166 and 225 mg. showed eventual severe depression, while those given 226 to 285 mg. showed a similar result. It must be concluded that about half the cases treated will suffer a dangerous degree of marrow depression, and it is difficult either to prevent it or to predict when it will occur. The only way to make treatment safer would be to raise the white-cell and platelet levels at which treatment is stopped. It is likely that this would reduce the number of remissions.

We cannot recommend second courses of treatment. The mortality produced (5 deaths out of 13 cases) was high, though it must be admitted that these cases had very advanced disease and were in poor general condition.

Summary

The results of treatment with thiotepa and testosterone in 46 patients suffering from advanced breast cancer have been presented. The mortality rate was 11%, and an overall remission rate of 37%, lasting an average of 7.5 months, was obtained. It appeared that premenopausal women with a slowly evolving disease and metastases in bone were more likely to respond to this form of therapy. The hazards and protracted nature of treatment were comparable to those from hypophysectomy, but it was concluded that the results were inferior to those of the operation.

We wish to thank Dr. G. A. Lynch for his co-operation in producing the series; Dr. A. T. Barker, whose supervision of in-patients was invaluable; and Dr. G. F. Tinsdale and his staff, who performed many clinico-pathological studies, without which the investigation would have been impossible. We also thank the nursing staffs of the Northern Ireland Radiotherapy Centre and Ward 22 of the Royal Victoria Hospital, Belfast, for carrying out the large amount of work

the treatment placed on them. Our appreciation also goes to Mrs. Convey for secretarial help.

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DIET, SERUM CHOLESTEROL, PROTEIN, BLOOD HAEMOGLOBIN, AND GLYCOSURIA IN A WEST INDIAN COMMUNITY (ST. KITTS, W.I.) WITH OBSERVATIONS ON ISCHAEMIC HEART DISEASE

BY

KENNETH L. STUART, M.D., F.R.C.P.Ed.
M.R.C.P., D.T.M.&H.

*Senior Lecturer in Medicine, University College of
the West Indies, Jamaica*

ROLAND E. SCHNECKLOTH, M.D.
Assistant Medical Director, American Heart Association

LENA A. LEWIS, Ph.D.
*Member of Staff, Research Division, Cleveland Clinic
Foundation*

FELIX E. MOORE, B.A.
*Professor of Biostatistics, School of Public Health,
University of Michigan*

AND

A. C. CORCORAN, M.D., C.M.
*Head of Department of Clinical Investigation, St. Vincent
Charity Hospital, Cleveland*

During the spring of 1958 a representative sample of the rural population of St. Kitts, W.I., aged 20-49 years was studied with reference to cardiovascular disease, and with special reference to distribution of blood pressure, prevalence, and severity of hypertension. Findings in this negro group were that means of arterial pressure and prevalences of hypertension were greater than in white populations of like age; associated hypertensive disease was not regarded as severe. Supporting data, including detailed descriptions of the population sample, are published elsewhere (Schneckloth *et al.*, 1962). The present report describes aspects of this survey listed above.

Observations

Diet

Four families in each of three villages served and kept uneaten total single adult servings at each meal during two week-days and one Sunday. Accumulated samples were collected daily and constituents listed by the district public health nurse. Daily portions from each family were combined and homogenized with water in a Waring blender, the mixture was weighed, and an

aliquot was frozen for analysis. Analyses were done by the United States Army Medical Nutrition Laboratory, Fitzsimmons Army Hospital, Denver, Colorado, by arrangement with Lieutenant-Colonel L. M. Hirsch, M.C., U.S.A., and Mr. C. F. Consolazio. Moisture, fat, protein, and, by difference, carbohydrate were determined by methods of Crowley *et al.* (1956). Factors of 4, 9, and 4 were used in calculating respective protein, fat, and carbohydrate caloric equivalents.

Table I summarizes results and includes data on the family groups. An average group consisted of six, two of whom were more than 19 years of age, with a combined income of about £4 weekly at a time of maximum employment. Calories consumed were substantially less than estimates of daily requirements (2,135) and available food (2,785) made in St. Kitts in 1954 (Applied Nutrition Unit Report, 1955), exemplifying Trulson's finding that direct analyses yield the lowest values among modes of estimating food consumption (Epidemiology of Cardiovascular Diseases, Proceedings of Conference, 1960a).

Since labouring families usually have no table waste and no second servings, the data represent all food intake at meals. Snacks—namely bread, sometimes with a morsel of fish, sweets, carbonated beverages, and rum—were available but somewhat costly. On the other hand, sugar-cane could be had for the cutting; a peeled stick can provide about 50 calories per 200 g., and is chewed by most villagers. This may contribute to the almost uniform adult anterior edentulousness and supplements caloric intake. To the extent that it does, our estimates from meals may be somewhat low regarding total calories and high regarding proportions of fat and protein calories consumed, but absolute amounts of fat and protein listed probably represent total consumption.

Staple items of diet are rice, bread, yams, plantain, banana, peas, and beans, most of which are imported. Other vegetables serve to vary rather than enrich the diet. Salt pork and fish and fresh chicken are often reserved for week-ends. A unique local dish, monkey stew, is rarely available. Fresh citrus fruit is not easily obtained. Butter is in very sparing use as a spread compared with lard. The fat most used in cooking is local Sea-Island cottonseed oil. Table II lists an analysis of a sample of this oil by Dr. F. M. Mattson, Research Division, Proctor and Gamble Co., Cincinnati, Ohio. It had a slightly higher linoleic and a considerably higher unsaponifiable content than most North American oils.

During the dietary survey of 1954 (Applied Nutrition Unit Report, 1955), infants and children were often

TABLE II.—Analysis of Cooking Oil Used in St. Kitts

Saponification value	194.00
Iodine value	112.90
Hydroxyl value	4.20
Tocopherol, %	0.04
Unsaponifiable, %	1.15
Fatty-acid composition, spectrophotometric:		
Saturated fatty acids, %	27.3
Oleic acid, %	15.1
Linoleic acid, %	57.2
Linolenic acid, %	0.1
Conjugated diene, %	0.3

found to be undernourished. Their diet and that of pregnant women has since been supplemented by skim-milk powder provided by Unicef and distributed by the Government Health Service. The benefit was so obvious that many adults now purchase milk powder and add it to food. The cost of an adequate diet for two adults and two children was estimated in 1954 as some £1 13s. weekly and labourer's wages for men as £1 1s. to £5 2s. and for women 12s. to 20s. weekly. The report noted that "the cheapest sources of calories (sugar, wheat flour, and cooking oil) provide a diet which could satisfy appetite, but which would be deficient in proteins, vitamins, and minerals." This seems still to be the case, although wages and, of course, prices are higher. No gross signs of deficiency were seen in the adults examined in 1958. Young children seemed well nourished on casual inspection. Allowing for differences in methods, St. Kitts diets correspond with estimates from the Netherland Antilles (Luyken *et al.*, 1959); they may contain less fat than calculated diets of Haitian labourers; West Indian diets in general provide less calories and animal fat than diets of North Carolina negroes (Groom *et al.*, 1959).

Serum Cholesterol

Duplicate analyses were done on sera from 445 subjects. Samples were preserved by the air-dried filter-paper method of Anderson and Keys (1956) and determinations done by adapting the method of Abell *et al.* (1952). Although samples were obtained an hour or more after meals, none of the sera was lipaemic.

Results are summarized in Table III as means of concentrations, and distributions are graphed in Figs. 1, 2, and 3 from data of Table IV. Mean concentrations in men were lower than in North America (Lewis *et al.*, 1957) by about 50 mg. per 100 ml. in each age-class; they were lower in women aged 20–39 by some 15 mg. and by 40 mg. at ages 40–49. This last difference reflects

TABLE I.—Estimated Food Consumption of Twelve Families in St. Kitts*

Village	Family	Average Weekly Wage	No. in Family		Protein		Fat		Carbohydrate		Total Calories
			Total	Adults	g.	cal.	g.	cal.	g.	cal.	
Cayon ..	1	£ 5 12	9	2	81	324	39	351	368	1,472	2,147
	2†	11 4	6	4	53	212	46	414	305	1,220	1,846
	3†	3 17	9	4	49	160	20	180	323	1,292	1,632
	4	1 2	4	1	75	300	35	315	365	1,460	2,075
Sandy Point	1†	4 11	7	2	30	120	23	207	166	664	991
	2	4 5	2	2	76	304	31	279	373	1,492	2,075
	3	2 0	6	1	33	132	23	207	160	640	979
	4	3 3	5	2	35	140	25	225	180	720	1,085
Old Road ..	1	4 4	4	2	61	244	37	333	284	1,136	1,713
	2	3 10	10	2	72	288	48	432	409	1,636	2,356
	3	2 10	7	2	47	188	24	216	208	832	1,236
	4†	2 4	8	2	43	172	21	189	285	1,140	1,501
Average		4	6.4	2.17	54	216	31	279	286	1,144	1,639
Average % of total ..						13.2		17.0		69.8	100.0

* Food consumption estimated by average of analyses of two week-days multiplied by 6, plus Sunday analyses, divided by 7.

† Provisions from garden, and husband fishes twice a week.

a "menopausal" rise that occurs in North American, but not Kittitian, women and corresponds to difference in low-density lipoprotein contents noted below (Table V). Among Kittitian men cholesterol concentrations tended to increase with age, but were lower by age-classes than in women. It appears that at low subsistence levels serum cholesterol tends to be lower in men than in women, as for example among immigrant Yemenite Jews (Toor *et al.*, 1957); at high subsistence levels the reverse is true (Katz *et al.*, 1958).

TABLE III.—Mean Serum Cholesterol Level by Age and Sex

Sex	Age		
	20-29	30-39	40-49
Mean serum cholesterol (mg./100 ml.)			
Males	161.0	182.5	190.5
Females	180.0	192.0	195.9
Number of persons :			
Males	53	52	58
Females	94	95	93

TABLE IV.—Sex and Age Distribution of Persons by Serum Cholesterol Level

Cholesterol level (mg./100 ml.)	Males			Females		
	20-29	30-39	40-49	20-29	30-39	40-49
All levels :	53	52	58	94	95	93
100-109	3	1	—	—	1	—
110-119	1	1	—	—	—	2
120-129	5	1	1	7	2	—
130-139	4	3	2	7	—	3
140-149	6	3	4	9	6	3
150-159	10	6	3	7	8	3
160-169	5	9	13	11	6	5
170-179	6	2	4	9	8	10
180-189	6	4	4	14	13	8
190-199	1	5	5	5	12	7
200-209	2	6	5	2	8	14
210-219	1	4	3	6	10	12
220-229	1	2	4	5	6	4
230-239	—	2	3	2	6	6
240-249	—	—	3	4	3	5
250-259	1	1	2	1	1	3
260-269	1	1	1	—	3	1
270-279	—	—	—	2	1	1
280-289	—	1	1	1	—	1
290-299	—	—	—	—	—	—
300-309	—	—	—	2	—	—
Mean*	161.0	182.5	190.2	181.9	192.1	196.0
Stand. dev.*	33.60	36.64	36.39	41.50	34.42	35.17

* Computed from ungrouped data.

TABLE V.—Serum Lipoproteins (—S 1.21) and Cholesterol in Women mg./100 ml.

Group	Lipoprotein Classes					Cholesterol	No. of Subjects
	—S 70-400	—S 40-70	—S 25-40	—S 20-25	—S 1-10		
Kittitians:							
Age 20-34	28 ± 4.3	39 ± 5.3	220 ± 9.9	27 ± 4.0	233 ± 25.7		8
Age 35-59	28 ± 5.0	44 ± 5.3	237 ± 6.8	16 ± 1.6	224 ± 18.0	209 ± 9.6	22
Clevelanders:							
Age 18-34	23 ± 4.1	19 ± 2	199 ± 10	13 ± 1	214 ± 9	192 ± 6	63
Age 35-59	25 ± 4	32 ± 4	296 ± 16	16 ± 2	244 ± 14	242 ± 10	42

Means and standard errors of means in 8 Kittitian women aged 20-34 and 22 aged 35-59 of whom 12 had diastolic arterial pressures of 100 mm. Hg or more, and of normal Cleveland subjects. Data from Kittitian women include sera of three subjects aged 50 to 59 years.

Serum Lipoproteins

Sera of 41 subjects were refrigerated at 4° C. and lipoprotein contents determined by ultracentrifugation at density 1.21 (Green *et al.*, 1951). Data from 11 men of various ages were not distinctive and are not presented. Table V lists mean concentrations found in 30 women and in normal Cleveland women.

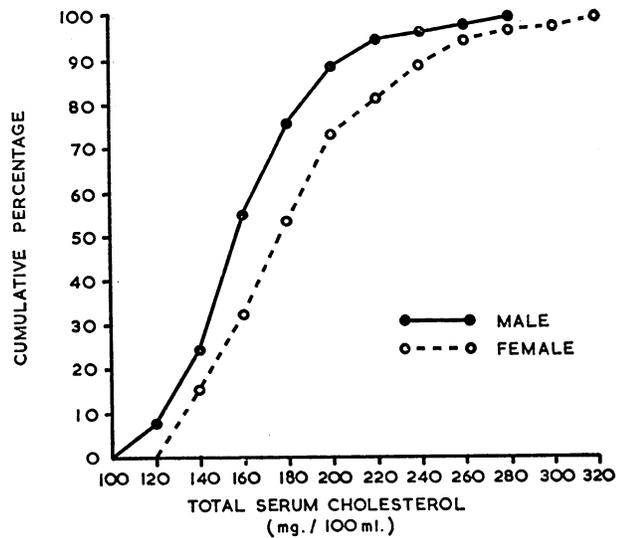


FIG. 1.—Cumulative frequency distributions total serum cholesterol. Males and females aged 20-29.

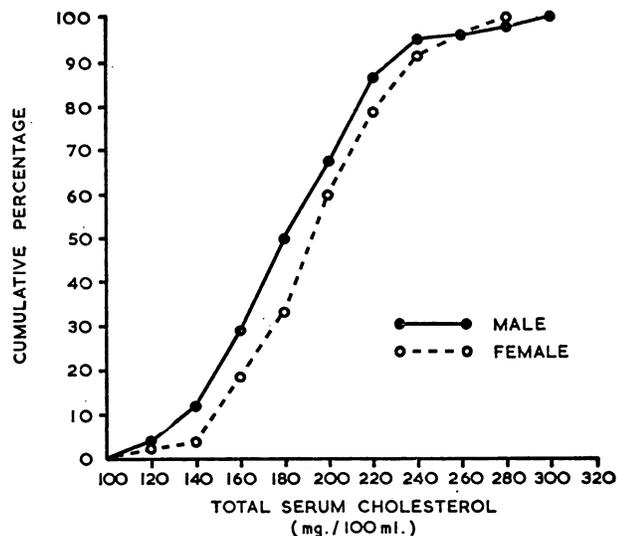


FIG. 2.—Cumulative frequency distributions total serum cholesterol. Males and females aged 30-39.

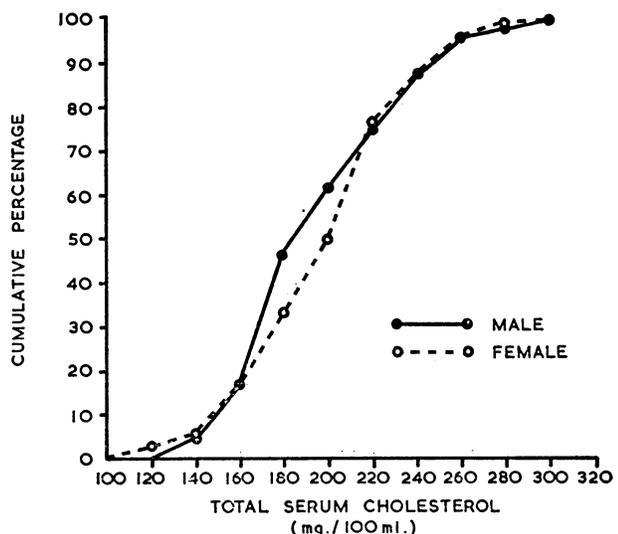


FIG. 3.—Cumulative frequency distributions total serum cholesterol. Males and females aged 40-49.

Cholesterol contents in the older Kittitian subgroup corresponds with that of the larger group (Table III), suggesting that the lipoprotein data were representative. The subgroup aged 35-59 combines data from normotensive and hypertensive women, since patterns of both groups were alike. As noted above, low-density lipoprotein concentrations of Kittitian women do not increase significantly with age.

Serum Protein

Total Protein.—This was estimated by the copper sulphate method (Van Slyke *et al.*, 1950) in 484 serum samples. Means of concentrations are listed by sex and diastolic pressure in Table VI. Concentrations are

TABLE VI.—Mean Serum Protein Level by Sex and Diastolic Blood Pressure Levels*

Diastolic Blood Pressure (mm. Hg)	Sex	
	Male	Female
Mean serum protein level (mg./100 ml.):		
Diastolic less than 100	7.66	7.66
Diastolic 100 or more	8.12	8.03
Number of persons:		
Diastolic less than 100	149	206
Diastolic 100 or more	37	92

* Data for persons aged 20-49 combined.

TABLE VII.—Paper Electrophoresis of Serum Proteins in Kittitian and Cleveland Subjects (Means and Standard Deviations)

Fraction	Kittitians		Clevelanders	
	g./100 ml.		g./100 ml.	
	Mean ± S.D.	% of Total	Mean ± S.D.	% of total
Total	8.28 1.00	100.0	7.52 0.23	100.0
Albumin	3.45 0.42	41.9	3.71 0.34	49.1
Alpha ₁ -globulin	0.42 0.10	5.0	0.43 0.10	5.7
Alpha ₂ -globulin	0.75 0.21	9.0	0.90 0.19	11.9
Beta-globulin	1.27 0.33	15.1	1.19 0.21	15.7
Gamma-globulin	2.39 0.42	29.0	1.32 0.17	17.5

Distributions of serum protein fractions in 38 Kittitian subjects, 20 of whom had diastolic arterial pressures of 100 mm. Hg or more, and in a group of healthy Cleveland subjects. Kittitian data for persons aged 20-49.

similar between subgroups; they are higher than North American means (Albritton, 1954) and levels found by another method in the Netherland Antilles (Luyken *et al.*, 1959). The estimates correspond with those by a biuret method (Sols, 1947) in a smaller group of Kittitians (Table VII).

Paper Electrophoresis.—Protein fractions were separated from 38 sera by Durrum's procedure (Block *et al.*, 1955), using a barbitone buffer at pH 8.6 and staining with bromphenol blue. Means and standard deviations, together with data from healthy Cleveland subjects, are listed in Table VII. Relative concentrations of albumin were lower among Kittitians than Clevelanders and gamma-globulin content nearly twice as high. Distributions correspond in general with observations in the Netherland Antilles (Luyken *et al.*, 1959).

The data extend previous observations (Stainer, 1953; Comens, 1957) that show serum total protein contents of negro adults to be higher than those of white populations because of increased amounts of gamma-globulin. Preliminary separate tabulation of protein fractions from 18 Kittitian normotensives and 20 with diastolic hypertension did not show an increase in beta-globulin such as has been described in severe hypertensive disease (Corcoran *et al.*, 1956), and accords with the finding that hypertension was not severe in the subjects studied. Correspondingly, data from normotensives and hypertensives are combined in the tabulation.

Blood Haemoglobin

Estimates were made by copper sulphate (Van Slyke *et al.*, 1950). Data are summarized in Table VIII. Mean concentration in 178 men was 13.2 and in 281 women 11.8 g./100 ml., and contents were uniform among age-groups. Concentrations less than 10 g./100 ml. were found in one man and 21 women. Among the women, three had menorrhagia and three diastolic

TABLE VIII.—Mean Haemoglobin Content by Sex and Age

Sex	Age		
	20-29	30-39	40-49
Mean haemoglobin (g./100 ml.):			
Male	13.66	13.57	13.38
Female	11.84	11.78	12.31
Number of persons:			
Male	54	57	67
Female	83	97	101

hypertension which in one was severe, with weight loss, proteinuria, grade III (Keith-Wagener-Barker) retinopathy and cardiac hypertrophy. No cause for anaemia was discerned in the remaining 13 women or the one man; however, other causes, such as sicklaemia, schistosomiasis, etc., were not evaluated.

In brief, haemoglobin contents of Kittitians are lower than North American averages and correspond to those found in children in the Netherland Antilles (Luyken *et al.*, 1959). The low levels found in West Indians probably reflect moderate protein undernutrition.

Glycosuria

Although it has been believed by some that the high carbohydrate diet of the West Indies might contribute to a high prevalence of diabetes mellitus, our data suggest that this is not the case. Urine samples of 1,662 persons aged 20-49 years, representing 98% of the group examined, were tested by a glucose oxidase method ("uristix"). Glycosuria was found in 24 instances. This group of 9 men (13 per 1,000) and 15 women (15 per 1,000) included five persons who knew they had diabetes; among the 24, 10 had hypertension (defined as systolic 160 mm. Hg or more and/or diastolic 95 mm. or more) and three had proteinuria greater than 75 mg. 100 ml.

Ischaemic Heart Disease

Screening was done by asking subjects of 35 years or more regarding symptoms of angina pectoris and by electrocardiographic examinations of men aged 35-49 years and women aged 45-49. Records were obtained in 243 of 271 (86%) of the men and 131 of 143 women (93%). Recordings were done with the subjects supine, using three standard and three unipolar limb and six precordial leads. Presumptive diagnoses of coronary insufficiency or remote myocardial infarction were based on considerations similar to those recommended at the Epidemiology of Cardiovascular Diseases Conference (1960b). Table IX lists distributions of those giving a history of angina and/or presenting stated electrocardio-

TABLE IX.—Prevalence of Suspect Ischaemic Heart Disease by Age and Sex

Age and Sex	Number Examined	Number with I.H.D.	Per cent with I.H.D.
Total, both sexes	374	7	1.9
Males: { 35-39	70	0	0.0
{ 40-44	87	2	2.3
{ 45-49	86	3	3.5
Females: 45-49	131	2	1.5

graphic abnormalities. These were five men and two women, so that this screening indicates minimum prevalences of 2.3 per 100 in men aged 40-49 and 1.5 in women aged 45-49.

However, ischaemic heart disease has been defined (Atherosclerosis and Ischaemic Heart Disease Report, 1957a) as "the cardiac disability arising from reduction of blood supply to the myocardium in association with disease processes in the coronary arterial system," mainly "atherosclerosis of and thrombosis in these vessels"; the definition tends to exclude coronary insufficiency from other causes such as hypertensive heart disease, and the report urges close definition of equivocal cases. Accordingly, Table X lists findings

TABLE X.—Findings in Subjects with Suspect Ischaemic Heart Disease

Age :	Men		Women
	40-44	45-49	45-49
Angina pectoris only		200/130*	200/115*
Electrocardiogram only	125/75 150/100	130/60	190/130
Angina and electrocardiogram ..		200/60*	

* Probable non-atherosclerotic coronary insufficiency.

in the seven subjects indicated in Table IX. It appears that three of these may not have primary coronary arterial disease. These are two persons with diastolic hypertension (one man with angina and a normal electrocardiogram, one woman with angina and signs of left ventricular hypertrophy) and one man with angina, signs of left ventricular hypertrophy, and changes consistent with remote myocardial infarction but whose illness seemed attributable to severe aortic insufficiency. By the restricted definition, minimum prevalences of ischaemic heart disease might then be 1.2 per 100 in men aged 40-49 and 0.75 in women aged 45-49, although the one woman with electrocardiographic signs of coronary insufficiency also had definite diastolic hypertension.

This estimate corresponds well with data from necropsies in Jamaican negroes (Robertson, 1959)—namely 1.5/100—and with rates described from electrocardiograms of South African Bantus (Vogelpeol and Schrire, 1955). Prevalence among Bantu is less than among Cape coloured, and the latter less than in Europeans. Similarly, necropsies indicate a lower prevalence among negroes than among whites in the United States (Thomas *et al.*, 1957). Comparisons of hearts and aortas of North Carolina with those of Haitian negroes (Groom *et al.*, 1959) suggests that this is not a difference in racial susceptibility to atherosclerosis generally, since rates of aortic atherosclerosis are similar. Hence it has been suggested that coronary atherogenesis may be a distinct although related process, associated perhaps with susceptibility to thrombosis and fibrin deposition, and that diets rich in animal fat and other factors are contributory thereto. Among contributory factors one—namely, hypertension—is common in St. Kitts; however, as among negro men in the United States (Berkson *et al.*, 1960), its influence on coronary atherogenesis seems to be counteracted by other influences, such as low prevalence of hypercholesterolaemia and, possibly, heavy muscular work.

The absence of lipaemia might suggest that the trait for familial hyperlipaemia, which occurs in 2-3% of a student population in Sweden (Hirschhorn *et al.*, 1959) is rare among Kittitian negroes. It seems more likely

that the trait does not become manifest in persons doing hard physical work and consuming a low-calorie low-fat diet.

In brief, Kittitians are another population "characterized by subsistence on a low-fat diet that appear to suffer a relatively low incidence of coronary heart disease" (Atherosclerosis and Ischaemic Heart Disease Report, 1957b). The diversity of these groups suggests that influences such as diet and muscular work (Morris, 1960, 1961) outweigh possible racial factors.

Summary and Conclusions

Analyses of diets of St. Kitts negro labourers indicate that they are low in calories, protein, and especially fat, and resemble estimates from other West Indian groups.

Serum cholesterol concentrations are lower in men than in women of like age, and those of women do not show a "menopausal" rise. Serum lipoprotein analyses in women yield similar information.

Serum total protein is higher than in North Americans because of high concentrations of gamma-globulin.

Blood haemoglobin concentrations are lower than in North Americans, possibly as a result of a marginally adequate protein intake.

Prevalence of glycosuria is about 14 per 1,000 at ages 20-49.

Ischaemic heart disease attributable to coronary atherosclerosis, or thrombosis, was found in about 1% of men aged 40-49 and women aged 45-49. The data again exemplify the concurrence of low subsistence diets, largely of vegetable origin, and of hard work with a low prevalence of ischaemic heart disease.

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Requests for reprints should be addressed to Dr. Kenneth L. Stuart or Dr. A. C. Corcoran.

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EFFECT OF ALIMENTARY LIPAEMIA ON PLASMA FIBRINOLYTIC ACTIVITY

BY

D. OGSTON, M.A., Ph.D., M.B.*Lecturer in Medicine, University of Aberdeen*

AND

**H. W. FULLERTON, M.A., M.D., F.R.C.P.
F.R.C.P.Ed.***Regius Professor of Medicine, University of Aberdeen*

In view of the abundant epidemiological evidence that dietary lipids play a major part in the pathogenesis of ischaemic heart disease, several studies of the effect of dietary fat on fibrinolytic activity have been made. These studies have produced conflicting conclusions.

Using the lysis of clots made from diluted plasma or whole blood as an index of fibrinolytic activity, Greig (1956), Buckell and Elliott (1959), and Billimoria *et al.* (1959) concluded that alimentary lipaemia resulting from the ingestion of animal fat was inhibitory to fibrinolysis. Neither Nitzberg *et al.* (1959) nor Hougie and Ayers (1960) were able to confirm this finding.

With the euglobulin lysis-time method Buckell and Elliott (1959) found no significant difference in lysis-times after fatty or non-fatty meals, while Gajewski (1961) obtained significant inhibition in patients with coronary artery disease after feeding cream and soya-bean oil.

Contradictory results have also been obtained in the comparison of the effects of animal and vegetable fat on fibrinolysis. Greig (1956) obtained no inhibition with maize oil or safflower oil, whereas Farquhar *et al.* (1961) found that washed chylomicrons, produced by both butter and safflower oil meals, were inhibitory to fibrinolysis.

In view of the differing conclusions reached by previous investigators a study of the effect of high-fat meals on fibrinolysis has been undertaken.

Methods

Plasma fibrinolytic activity was determined by a modification of the method of Bidwell (1953). The

modifications introduced have been described (Ogston and Fullerton, 1961). Estimations of the residual fibrin were made after incubation for 4, 8, and 24 hours.

Lipaemia was estimated by measuring the optical density of the serum, using a modification of the method described by Schwartz *et al.* (1952). The optical density of the serum was read in a Spekker photoelectric absorptiometer using glass cuvettes with a 2-cm. light path and an Ilford Filter 602, maximum transmission 470 millimicrons. In the Tables the results are expressed as the direct reading of the optical density (O.D.).

The following meals were used in this study:

1. Animal-fat breakfast: 2 eggs, 2½ oz. (70 g.) bacon, 1-1½ oz. (28-42 g.) butter, toast, and tea with milk and sugar. Fat content approximately 85 g.
2. Vegetable-fat breakfast: 2½ oz. (70 g.) "alfonal" margarine, 2½ oz. (70 g.) alfonal cheese, 1½ pints (750 ml.) alfonal milk, toast, tea with milk and sugar. Fat content approximately 85 g.
3. Butter-fat breakfast: 1½ oz. (50 g.) butter, toast, tea with milk and sugar. Fat content approximately 50 g.
4. Low-fat breakfast: toast with marmalade, tea with milk and sugar.

All subjects were fasted for 10 hours before the fasting sample of blood was obtained about 8.30 a.m., and they were confined to bed for the duration of the experiment.

The subjects used in these experiments were male patients convalescent from a number of conditions, including pneumonia, untreated essential hypertension, myocardial infarction, and patients in whom no organic disease could be found.

Results

Most previous studies have compared fibrinolytic activity after a low-fat meal with that after a high-fat meal in the same subject on different days. This was thought to be necessary because of the diurnal increase in fibrinolysis which occurs in most subjects. For the purposes of the first part of this study it was considered that if alimentary lipaemia did not abolish this normal diurnal increase of fibrinolysis it was unlikely to exert a significant inhibitory effect on fibrinolysis. Accordingly the diurnal increase in fibrinolytic activity in a 3½-hour period was determined in a group of subjects after a low-fat breakfast, and this change was compared with that found in the 3½-hour period after meals of 85 g. of animal fat and 85 g. of vegetable fat in different groups of subjects.

The plasma fibrinolytic activities before and 3½ hours after the three meals are shown in Tables I-III and the mean differences in Table IV. It can be seen that there is little difference in the mean increase in fibrinolysis

TABLE I.—*Plasma Fibrinolytic Activity Before and 3½ Hours After a Low-fat Breakfast*

Subject	Fasting				After Low-fat Meal			
	O.D. Serum	% Lysis After			O.D. Serum	% Lysis After		
		4 hrs.	8 hrs.	24 hrs.		4 hrs.	8 hrs.	24 hrs.
1	0.155	88.5	100	100	0.156	47	100	100
2	0.152	0	0	0	0.143	0	5	65
3	0.167	80	100	100	0.174	77.5	100	100
4	0.135	0	10.5	92.5	0.129	12.5	34.5	100
5	0.144	0	12	100	0.180	0	20	100
6	0.194	6.5	19.5	100	0.164	5.5	51	100
7	0.177	10	64	100	0.162	96	100	100
8	0.111	6	69.5	100	0.110	8	25.5	100
9	0.131	6.5	49	100	0.142	24	98.5	100
Means	0.152	21.9	47.2	88.1	0.151	28.9	59.4	96.1