



## THE SERUM LIPIDS III. IN DIABETES MELLITUS

Muni Keoplung, M.D. \*

Jit Jirratsatit, M.D. \*

Nantaya Waiwatana, B.Sc. (Med. Tech.) \*\*

Uncontrolled diabetes mellitus represents all types of secondary lipoproteinemias, although some may not mimic the primary pattern. The plasma is often the only window from which one can see the state of intracellular metabolism. The plasma lipoproteins usually serve this purpose better than chemical determinations of the plasma total lipid concentration. The lipoprotein patterns during the course of the disease should reflex effectiveness of therapeutic measures. These are particular views to be studied by the authors.

### METHODS AND MATERIAL :

Both ambulatory and hospitalized diabetic patients totaling 50 were studied. None of them had hypertension or abnormal urinalysis besides some degree of glycosuria by Tes - Tape. (R) Fasting blood sugar between 80 - 100 mg% and negative or trace glycosuria (fasting) was classified as "excellent" ; fasting blood sugar between 110 - 130 mg% with + or ++ of glycosuria (fasting urine) was classified as "good". There were 16 patients (male = 12, female = 4 ) with age range of 17 - 66 years in the "excellent" group and 19

patients (male = 7, female = 12) with age range of 16 - 63 years in the "good" group.

The serum lipids and lipoproteins were analyzed by the methods previously used.(1) The Technicon Autoanalyzer was used for the determination of serum glucose. All serum samples were obtained in approximately 6 - 12 hours postabsorptive period.

### RESULTS :

In the "excellent" group alpha lipoprotein ranged from 6.8 - 31.0% with the mean of 20.5% ; pre-beta lipoprotein range

\* Department of Medicine, Faculty of Medicine, Chiang Mai University.

\*\* Department of Clinical Chemistry, Faculty of Associated Medical Sciences Project.

from 8.6 - 38.2% with the mean of 23.4%; beta lipoprotein ranged from 21.9 - 44.0% with the mean of 33.8%. Albumin-bound free fatty acid ranged from 11.0 - 32.3% with mean of 20.4%.

The cholesterol level ranged from 110.0 - 275mg% with the mean of 173.50-mg%; 50.0 - 306.0 mg% with the mean of 161.7 mg% for triglyceride and 548.0 - 1565.0 with the mean of 966.6 mg% for total lipid.

In the "good" group the results were as follows :-

alpha lp.	— 9.6 — 31.7%,	mean — 21.9%
pre - beta lp.	— 19.6 — 32.6%,	mean — 24.4%
beta lp.	— 22.4 — 43.8%,	mean — 31.5%
AFA	— 16.2 — 30.1%,	mean — 23.2%
Cholesterol	— 133.0 — 370.0 mg%,	mean 215.9 mg%
triglyceride	— 30.0 — 464.0,	mean 170.0 mg%
total lipid	— 645.0 — 1555.0,	mean 1066.3 mg%

All data were summarized in tables I and II.

In tables III ; IV, the data were obtained from 2 more groups consisting of 9 patients (41 - 74 years, 6 males and 3 females) in the "excellent" and 3 patients (51, 51, 60 years, 2 males and 1 female) in the "good" groups in whom hypolipidemic agents (Lipogeron; Lipostabil) were prescribed in addition to the hypoglycemic drugs. Only 3 new diabetic cases were studied. The result was shown in table V, VI. However, the severity of the disease amongst these cases was rather far different, therefore more studies should be done before one can jump to the conclusion.

#### COMMENTS

Even no serum lipid control of the

patients had been performed, yet from several investigators conclusion, we can assume that usually diabetes, especially, uncontrolled case has hypercholesterolemia, hyperglyceridemia and hyperphospholipidemia belonging to secondary lipoproteinemias almost all types (I, IV, V, (II, III)). (2, 3, 4, 5) After a successful management, all lipid levels will fall to normal. Some patients may have continued elevation of serum cholesterol concentration even after diet and insulin treatment. This phenomenon is more often seen in the juvenile diabetic though not rare in the older patients. The inability to restore the cholesterol level to normal is regarded as an unfavorable sign and complication risk.

The changes in free fatty acid are very labile but are good indicators of glucose utilizations; its level parallels the blood glucose level in diabetes, and in some ways, is better indication of the severity of the diabetic stage. The pre-beta, beta lipoproteins, albumin-bound free fatty acid, cholesterol and triglyceride in our "excellent" group get along well with "Reference values" (1) and in the "good" group, the cholesterol shows higher level (215.0: 173.50 mg%), the triglyceride, pre-beta lipoprotein and albumin-bound free fatty acid are somewhat different from the

"excellent" group but the averages are still considered in the ranges of the "Reference values".

This confirms the finding that patient, with well - controlled diabetes, usually shows no disturbance in lipid metabolism or alternation in the concentration of the serum lipid constituents. There has been no proof, so far, that hypolipidemic substances are beneficial or necessary in the treatment of secondary hyperlipoproteinemias. Further studies, with a good control group, must be done before the resolution can be made.

TABLE I.

## SERUM LIPOPROTEINS IN CONTROLLED DIABETES MELLITUS

Age-yr. No.	Lipoproteins expressed in per cent						Albumin-bound free fatty acids in per cent	
	alpha		beta		pre-beta		Range	Mean
Excellent 16 group 17-66	6.8-31	20.5	8.6-38.2	23.4	21.9-44.0	33.8	11.0-32.3	20.4
Good gr. 19 16-63	9.6-31.7	21.9	19.6-32.6	24.4	22.4-43.8	31.5	16.2-30.1	23.2

TABLE II.

SERUM CHOLESTEROL, TRIGLYCERIDE AND TOTAL LIPIDS IN CONTROLLED D.M.

Age-yr.	No.	Cholesterol mg%		Triglyceride mg%		Total lipids mg%	
		Range	Mean	Range	Mean	Range	Mean
Excellent group 17-66	16	110-275	173.50	50-306	161.7	548-1565	966.6
Good gr. 16-63	19	133-370	215.9	30-464	170	645-1555	1066.3

TABLE III.

SERUM LIPOPROTEINS IN D.M. ON HYPOLIPIDEMIC AGENT IN ADDITION TO HYPOGLYCEMIC DRUGS

Age-yr. No.	Lipoproteins expressed in per cent						albumin-bound		
	alpha		beta		pre-beta		free fatty acids		
	Range	Mean	Range	Mean	Range	Mean	Range	Mean	
Excellent 41-74	9	12.7-26.5	19.7	20.1-40.5	31.1	20.4-49.1	30.6	5.7-35.2	18.2
Good	3	12.3-26.8-21.8	24.7-25.5-21.4	22.2-18.8-29.4				40.8-28.9-27.3	

TABLE IV.

SERUM CHOLESTEROL, TRIGLYCERIDE AND TOTAL LIPIDS IN D.M. ON HYPOLIPIDEMIC AGENTS IN ADDITION TO HYPOGLYCEMIC DRUGS:

Age-yr.	No.	Cholesterol mg %		Triglyceride mg%		Total lipids mg%	
		Range	Mean	Range	Mean	Range	Mean
Excellent 41-74	9	118.0-268.0	188.5	36.0-174.0	106.0	514.0-1221.0	859.0
Good	3	166-240-214		50-86-158		697-1060-1155	

TABLE V.

## SERUM LIPOPROTEINS IN 3 NEW DIABITICS

Age-yr.	No.	Lipoprotein expressed in Percent			Albumin-bound free fatty acids in percent
		alpha	beta	pre-beta	
37, 35, 22	3	17.7, 16.0, 21.4	40.6, 28.6, 21.4	36.4, 42.8, 35.8	5.2, 12.6, 21.4

TABLE VI

## SERUM CHOLESTEROL, TRIGLYCERIDE AND TOTAL LIPIDS IN 3 NEW DIABITICS.

Age-yr	No.	Cholesterol mg%	Triglyceride mg%	Total lipids mg%
37, 35, 22	3	139, 112, 256	146, 101, 140	759, 512, 100

## REFERENCES

1. Keoplung, M., Jirratsatit, J., Waiwattana, N. : The serum lipids II. Reference values in Chiang Mai. Bull. Chiang Mai Med. Tech., 6:195-200-1973.
2. Beaumont, J.L. et al: Classification of hyperlipidemias and hyperlipoproteinemias. Bull. Wld. Hlth. Org., 43:891-908, 1970.
3. Fredrickson, D.S. ; Levy, R.I. : Fat transport in Lipoprotein in an integrated approach to mechanism and disorders. New Eng. J. Med., 267, 1967.
4. Hoffman, W.S. : Diabetes mellitus. The Biochemistry of Clinical Medicine, 177-207, Chicago, 1970, Year Book Medical Publishers, Inc.
5. Williams, R.H. : Lipid metabolism and lipopathies, the pancreas in diabetes. Textbook of Endocrinology, 1039-1110 658—749. Philadelphia. London. Toronto, 1968, W.B. Saunders Company.

## ย่อความภาษาไทย

โรคเบาหวานทำให้เกิด Lipoproteinaemia แบบ secondary ได้ทุกชนิด แต่ถ้าสามารถควบคุมระดับน้ำตาลในเลือดได้ดีจนเป็นปกติแล้ว ไขมันทุกชนิดที่เพิ่มขึ้นจะลดลงสู่ระดับปกติ จากการวิจัยผู้ป่วยโรคเบาหวาน

ที่สามารถควบคุมระดับน้ำตาลในเลือดได้ดีมาก และได้ดีในโรงพยาบาลนครเชียงใหม่ พบว่า ไขมันทุกชนิดในซีรัม อยู่ในระดับเดียวกับของคนปกติที่ได้รายงานไว้แล้ว