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A Case of Acute Pancreatitis with Hyperlipemia and Hyperglycemia Induced by Alcohol Abuse

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ABSTRACT

A case of acute pancreatitis with hyperlipemia and hyperglycemia induced by alcohol abuse is reported. The case is a 34-year-old man who was admitted to our hospital with a complaint of severe abdominal pain. He had been drinking 700ml～1400ml of whisky daily prior to admission. At the time of admission, his serum amylase was elevated to 1833 U. Abdominal computerized tomography revealed edematous swelling of the pancreas. His serum glucose level was 926 mg/dl, cholesterol 754 mg/dl and triglyceride 3,530 mg/dl. Following successful treatment of acute pancreatitis and hyperglycemia with gabexate mesilate and insulin, his serum glucose, lipid and pancreatic enzyme levels decreased to the normal range.

This case is considered to be one of acute pancreatitis with diabetic lipemia induced by alcohol abuse.

***Key words**: Acute pancreatitis, Diabetic lipemia, Alcohol abuse*

Acute pancreatitis can be classified by etiology into 1) alcoholic pancreatitis, 2) biliary lithiasis pancreatitis, and 3) idiopathic pancreatitis. Various theories have been presented as to its cause. Some have postulated that hyperlipemia can be a cause of pancreatitis, but others have reported that pancreatitis itself gives rise to hyperlipemia.

We have recently experienced a case of acute pancreatitis with hyperlipemia and hyperglycemia induced by massive intake of alcohol. A report of this case is presented together with a discussion of other cases of acute pancreatitis.

CASE

Patient: A 34-year-old male.
Chief complaint: Abdominal pain.
Family and past history: Not remarkable.
Alcohol and smoking history: 20 go (Japanese sake) of alcohol per day and 60 cigarettes per day.
Present history: From January 1, 1993, the patient began to take a massive intake of alcohol, that is, 1～2 bottles of whisky per day. From the morning of January 5, severe epigastric pain developed with excessive thirst and he therefore visited our hospital.
Physical findings on admission: His height was 182cm, weight 86 kg, consciousness clear, nutrition satisfactory, skin dry and xanthoma negative. There were no positive findings except for tenderness over the epigastric region.
Laboratory findings on admission (Table 1): Elevated WBC was observed in the peripheral blood, and urinalysis revealed strong positive urine sugar and positive ketone. Blood biochemistry showed slightly elevated GOT, GPT, and LDH, remarkably high TTT and ZTT values, and elevated FBS (926 mg/dl).

In serum pancreatic enzyme tests, both serum amylase and urinary amylase, pancreatic trypsin inhibitor (PSTI), trypsin, phospholipaseA_2 (PLA_2), Lipase, and elastase I were all elevated.

In lipid related tests, total cholesterol (TC) was 754 mg/dl, triglyceride (TG) 3,530 mg/dl, LDL 759 mg/dl, and VLDL 945 mg/dl, all showing a remarkable increase. In apolipoprotein tests, Apo-B was 334 mg/dl, Apo-CII 13.6 mg/dl, and Apo-CIII 29.0 mg/dl, all presenting remarkable elevation.

Fig. 1 shows the electrophoretic pattern of lipoproteins. Near the origin, a lipoprotein considered to be chylomicron was detected and β + pre β lipoprotein also showed an elevation of 58%. In the serum left standing for one day, lactescence and cloudy serum could be observed.

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Table 1. Laboratory data on admission

A) Urinalysis: Protein (–) Glucose (+) Ketone (+)			
B) Stool: Human occ. bl. (–)			
C) Haematology:			
Rbc	462×10^4 /mm^3	Hb.	18.3 g/dl
Ht	47.7%	WBC	17,700 /mm^3
Pl.	12.8×10^4 /mm^3		
D) Blood chemistry:			
T.Bil.	1.9 mg/dl	D.Bil.	0.1 mg/dl
GOT	45 K-U	GPT	60 K-U
LDH	654 U (n. 100–400)	ALP	9.2 KA-U
γ-GTP	68 mU/ml		
TTT	75.2 U (n. 4>)	ZTT	26.2 U (n. 4–12)
chE	1,780 U	T.Pr.	11.8 g/dl
A/G	0.6	FBS	926 mg/dl (n. 65–110)
BUN	14.4 mg/dl	CRE	0.6 mg/dl
E) Serum pancreatic enzyme:			
S-Amylase	1,833 U (n. 130–400)	U-Amylase	8165 (n. 1,200–1,500)
Amylase isozyme	P. 58.1% S. 41.9%		
PSTI	110 ng/ml (n. 6.1–14.7)	Trypsin	900 ng/ml (n. 50–190)
PLA_2	1,840 ng/dl (n. 130–400)	Lipase	11.4 IU/liter (n. 0–1.5)
Elastase I	3,400 ng/dl (n. 100–400)		
F) Lipid, Lipoprotein & Apoprotein:			
TC	754 mg/dl (n. 140–220)	TG	3,530 mg/dl (n. 60–120)
HDL-C	16 mg/dl (n. 40–66)		
LDL	759 mg/dl (n. 190–580)	VLDL	945 mg/dl (n. 210>)
Apo-AI	156 mg/dl (95–180)	Apo-AII	29 mg/dl (n. 20–40)
Apo-B	334 mg/dl (n. 45–125)	Apo-CII	13.6 mg/dl (n. 1.1–5.0)
Apo-CIII	29.0 mg/dl (n. 4.0–14.0)	Apo-E	6.2 mg/dl (n. 2.2–6.4)

Other tests: In the ultrasound scanning of the abdominal region conducted on January 6, no finding except for fatty liver could be detected. The findings of the gastrofiber examination performed on January 6 were normal. Abdominal computerized tomography conducted on January 7 revealed edematous swelling of the pancreas (Fig. 2).

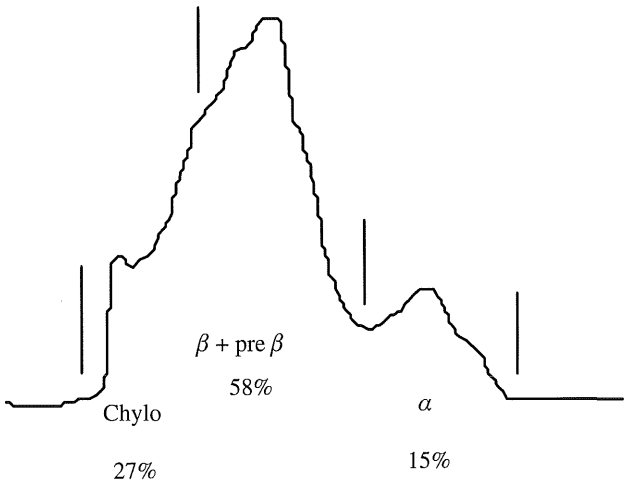

Fig. 1. Electrophoretic pattern of lipoproteins.

Clinical course (Figs. 3 and 4):

In view of the foregoing findings, a diagnosis of acute pancreatitis with hyperlipemia and hyper-

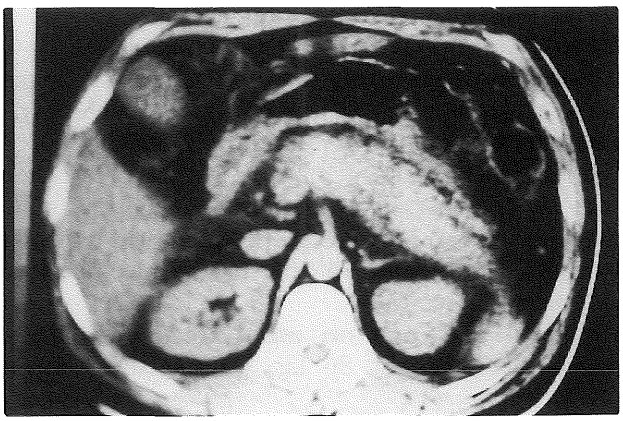

Fig. 2. Computerized tomography. Swelling of pancreas and loss of clarity of the gland margin is detected.

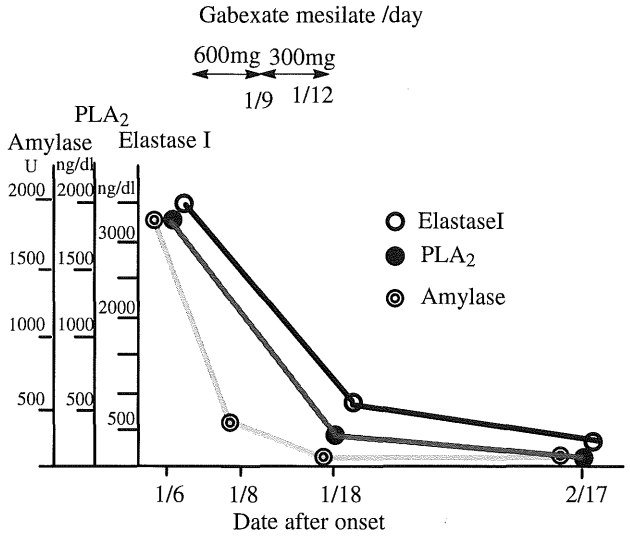

Fig. 3. Change in serum pancreatic enzymes during recovery from acute pancreatitis.

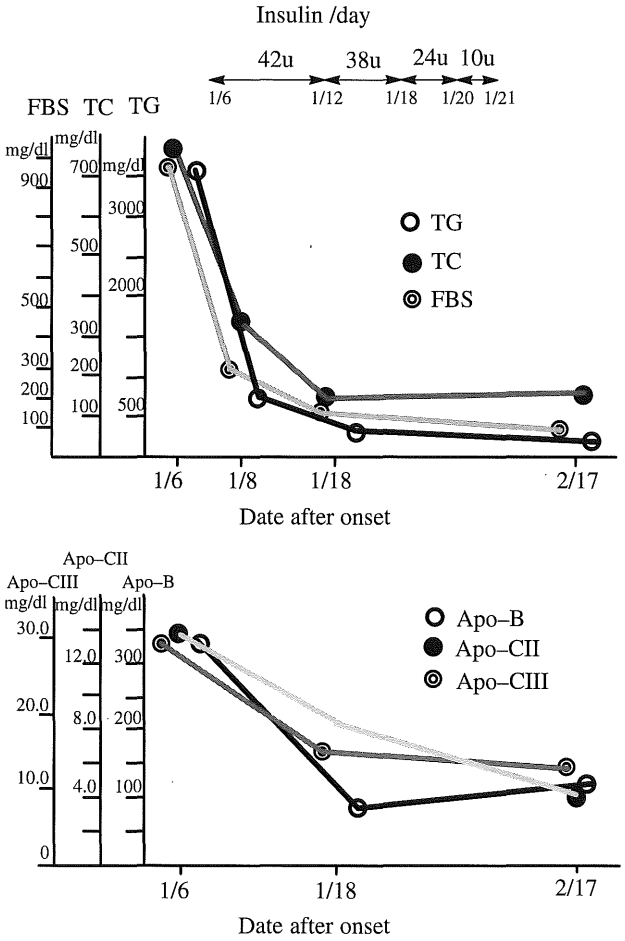

Fig. 4. Change in serum glucose, lipid and apolipoprotein fractions during recovery from acute pancreatitis.

glycemia was made. Treatment with Gabexate mesilate and insulin was commenced and on January 8 serum amylase had decreased to 359 U and urinary amylase to 836 U, while TC was 321 mg/dl, TG 815 mg/dl, and FBS 321 mg/dl, and his thirst had abated. On January 18, serum amylase decreased to 140 U, urinary amylase to 374 U, PLA_2 to 413 ng/dl, elastase I to 890 ng/dl, and lipase to 1.4 IU, while TC was 148 mg/dl and FBS 173 mg/dl. On February 17, following hospital discharge, all pancreatic enzymes and lipids became normal in value. In the meantime, on January 22, no abnormality was observed by ERCP (Fig. 5) in the common bile duct, gall bladder, and pancreatic duct. 75g OGTT conducted on January 24 showed a borderline value, and LPL activity was within the normal range.

Other cases of acute pancreatitis

The cases of acute pancreatitis observed at our hospital during the past one year are shown in Table 2. They consist of 2 cases of biliary lithiasis pancreatitis and 5 cases of alcoholic pancreatitis in 5 males and 2 females. No remarkable abnormality was observed in TC or in TG in any of these cases.

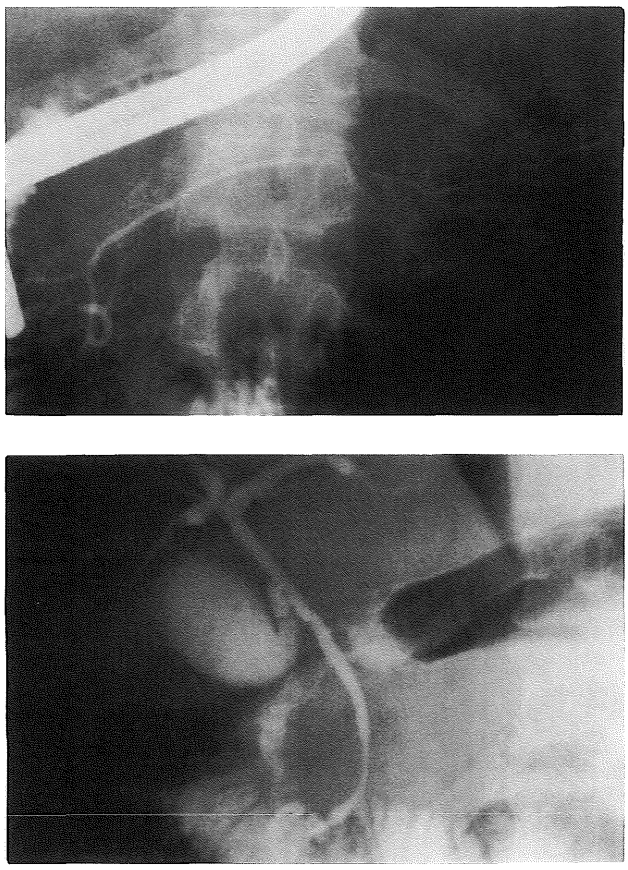

Fig. 5. ERCP findings (17 days after onset). No abnormal findings are detected.

Table 2. Clinical and laboratory characteristics of patients with acute pancreatitis during the past one year at our hospital

Age y.o.	Sex	Cause	S-Amylase U	U-Amylase U	PLA_2 ng/dl	Elastase I ng/dl	Lipase IU/liter	FBS mg/dl	TC mg/dl	TG mg/dl	HDL-C mg/dl	Ascites	ERP
33	Male	Gall stone	721	4596	1850	3000	2.1	114	111	35	47	Positive	FMIP*
61	Male	Alcohol	948	8067	—	2100	4.3	160	151	84	29	Positive	Normal
42	Male	Alcohol	349	810	—	1300	—	141	94	216	21	Positive	Normal
34	Male	Alcohol	314	2204	—	1100	—	123	163	37	97	Negative	Normal
38	Male	Alcohol	650	9307	1470	2500	6	131	128	72	22	Negative	Normal
73	Female	Gall stone	6794	47200	14600	4200	20.2	119	181	78	40	Positive	Pseudocyst**
36	Female	Alcohol	267	6806	795	5000	—	131	181	59	81	Negative	Normal

*: Focal minimum pancreatitis
**: Pancreatic pseudocyst caused by acute pancreatitis

DISCUSSION

It is well known from the past studies that acute pancreatitis is complicated by hyperlipemia with the complication rate reported to range from 4.5% to 37.5% in western countries[3,4,6,9]. In particular, Dominquez-Munoz et al[8] have reported that hyperlipemia was observed in 23 (47%) out of 49 cases of acute pancreatitis, with alcoholic pancreatitis being observed in 9 out of 19 cases, lithiasis pancreatitis in 5 out of 18 cases, and idiopathic pancreatitis in 9 out of 12 cases. However, in Japan the frequency with which acute pancreatitis is complicated by hyperlipemia is low, and among the cases of acute pancreatitis observed during the past one year in our hospital complication was seen in only the present case (with other cases not being associated with hyperlipemia). According to Fredrickson's classification of hyperlipemia, type V predominates, with types IV and I being observed in acute pancreatitis with hyperlipemia occasionally[4]. It has been reported that cases of type I transform to type V and that cases of type V to type IV[4,6]. In the present case, considered to be type V, not only chylomicron and VLDL but also LDL were elevated, and thus hypercholesteremia was detected. There is a possibility that differences in the type of hyperlipemia developing in acute pancreatitis reflect differences in time when the blood sample is drawn.

It is said that in acute pancreatitis accompanied by hyperlipemia, the elevation of serum amylase and urinary amylase is inhibited at a high frequency[6,14]. However, the clearance of amylase from the blood and urine is rapid, and it is commonly experienced clinically that if there is a delay in the time when blood and urine are collected, the value of serum amylase, in particular, is often found to be normal. Moreover in cases of acute pancreatitis not accompanied by hyperlipemia that we observed during the past one year, the serum amylase value was normal (less than 400 U) in 3 out of 7 cases and the urinary amylase value was normal (less than 1,500 U) in one case. In the case having a normal urinary amylase value, from the physical findings, imaging diagnosis, and elevation of elastase I, a pancreas specific enzyme, a definite diagnosis of acute pancreatitis could be made. Furthermore, there are also cases like the present case with a remarkable elevation of urinary and serum amylase. The reason why only amylase is inhibited in pancreatitis accompanied by hyperlipemia is not known.

The relation of an excessive intake of alcohol to the development of acute pancreatitis, the complication of hyperlipemia, and the complication of hyperglycemia can be explained as follows (Fig. 6). Through the excessive intake of alcohol, secretion of gastric juice is promoted, secretion of pan-

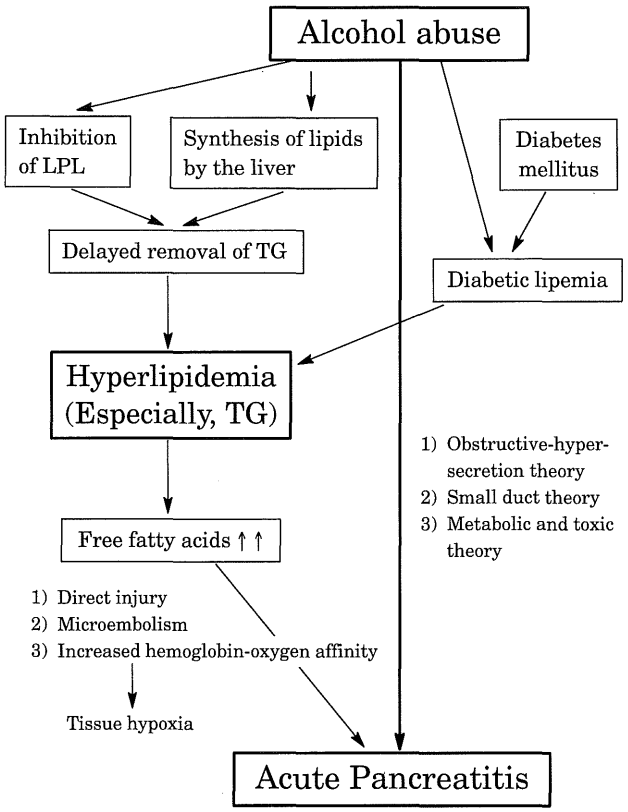

Fig. 6. Pathophysiology of acute pancreatitis due to alcohol abuse.

creatic juice is accelerated through the gut hormones, and papillary edema and spasm of sphincter of Oddi develop. As a result, internal pressure of the pancreatic duct elevates and gives rise to rupture of the pancreatic duct and to the development of acute alcoholic pancreatitis. Thus, obstructive-hypersecretion has been valid. However, in recent years it has been explained by the small duct theory, that is, that the primary factors involved are changes in pancreatic juice composition and formation of a protein plug, and by the metabolic and toxic theory, that is, that the pancreatic acinar cells are directly damaged by alcohol or by metabolites.

As for the relationship to hyperlipemia, according to Albrink et al[1] in view of the clinical course of hyperlipemia showing improvement with satisfactory progress of pancreatitis, hyperlipemia is regarded as a consequence of pancreatitis, but the developmental mechanism of hyperlipemia due to acute pancreatitis has not yet been elucidated. At present it is apparent that pancreatitis develops from hyperlipemia. It is considered that as a result of a decrease in LPL activity[11] from an excessive intake of alcohol and of the promotion of lipid synthesis in the liver, triglyceride increases giving rise to hyperlipemia[5,11,12]. Three theories have been reported. In the first theory, as a result of hyperlipemia, particularly the elevation of triglyceride, free fatty acid in the blood increases and this causes direct damage to the pancreatic acinar cells[15]. In the second theory, with hydrolysis of triglyceride by pancreatic lipase, binding of free fatty acid with Ca^{2+}, and formation of microthrombi, capillary damage develops and induces pancreatitis[10]. In the third theory, alteration of the red cell membrane develops in familial hyperlipoproteinemia of types I and V, and as a result of an increase in the hemoglobin-oxygen affinity, oxygen supply to the peripheral organs becomes poor and dyspnea together with ischemic changes in the pancreas develop to give rise to pancreatitis[7]. In each of these theories, it is evident that hyperlipemia brings about pancreatitis. Miller et al [13] have reported that when triglyceride ranges from 2,000 mg/dl to 5,000 mg/dl, slight abdominal pain is likely to develop, whereas when triglyceride exceeds 6,000 mg/dl, an attack of pancreatitis is liable to occur.

In the development of diabetes mellitus, with excessive intake of alcohol and fat as inductive factors, triglyceride remarkably increases to present a state of diabetic lipemia[2]. In this pathologic state, LPL activity decreases due to insulin insufficiency giving rise to a decrease of triglyceride in the blood.

In the present case of acute pancreatitis with hyperlipemia and hyperglycemia it is considered that hyperlipemia developed in the state of diabetic lipemia, and the possibility is high that this brought about acute pancreatitis. LDL activity was within the normal range because the time when the drawing of blood sample for LDL activity was too late.

CONCLUSION

A case of acute pancreatitis with type V hyperlipoproteinemia and hyperglycemia following an excessive intake of alcohol was experienced. Comparison and discussion of this case were made with other cases of acute pancreatitis seen at this hospital during the past year.

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REFERENCES

1. **Albrink, M.J. and Klatskin, G.** 1957. Lactescence of serum following episodes of acute alcoholism and its probable relationship to acute pancreatitis. Am. J. Med. **23:** 26–33.
2. **Bagdade, J.D., Porte, D.J. and Bierman, E.L.** 1967. Diabetic lipemia. a form of acquired fat-induced lipemia. New Engl. J. Med. **276:** 427–433.
3. **Buch, A., Buch, J., Carlsen, A. and Schmidt, A.** 1980. Hyperlipidemia and pancreatitis. World J. Surg. **4:** 307–314.
4. **Cameron, J.L., Capuzzi, D.M., Zuidema, G.D.**

and Margolis, S. 1973. Acute pancreatitis with hyperlipemia. the incidence of lipid abnormality in acute pancreatitis. Ann. Surg. **177:** 483–489.

5. **Cameron, J.L., Zuidema, G.D. and Margolis, S.** 1975. A pathogenesis for alcoholic pancreatitis. Surgery **77:** 754–763.
6. **Dickson, A.P. and Neill, J.O. and Imrie, C.W.** 1984. Hyperlipidaemia, alcohol abuse and acute pancreatitis. Br. J. Surg. **71:** 685–688.
7. **Ditzel, J. and Thaysen, E.H.** 1977. Increased hemoglobin-oxygen affinity in patients with pancreatitis associated with type I and V hyperlipoproteinemia. Adv. Exp. Med. Biol. **94:** 423–428.
8. **Dominguez-Munoz, J.E., Malfertheiner, P., Ditschuneit, H.H., Blanco-Chavez, J., Uhl, W., Bucher, M. and Ditschuneit, H.** 1991. Hyperlipidemia in acute pancreatitis. Relationship with etiology, onset, and severity of the disease. Int. J. Pancreatol. **10:** 261–267.
9. **Greenberger, N.J., Hatch, P.T., Drummey, G.D. and Isselbacher, K.J.** 1966. Pancreatitis and hyperlipemia. A study of serum lipid alterations in 25 patients with acute pancreatitis. Medicine **46:** 161–174.
10. **Havel, R.J.** 1969. Pathogenesis, differentiation and management of hypertriglyceridemia. Adv. Intern. Med. **15:** 117–154.
11. **Kessler, J.I., Kniffen, J.C. and Janowitz, H.D.** 1963. Lipoprotein lipase inhibition in the hyperlipemia of acute alcoholic pancreatitis. New. Engl. J. Med. **269:** 943–948.
12. **Losowsky, M.S., Jones, D.J., Davidson, C.S. and Lieber, C.S.** 1963. Studies of alcoholic hyperlipemia and its mechanism. Am. J. MED. **35:** 794–803.
13. **Miller, A., Lees, R.S., McCluskey, M.A. and Warshaw, A.L.** 1979. The natural history and surgical significance of hyperlipemic abdominal crisis. Ann. Surg. **190:** 401–408.
14. **Pallot, J.L., Casciani, D., Volochine, L., Chauveau, P., Merrer, J., Outin, H.D., Kleinknecht, D. and Nouailhat, F.** 1989. Diabetic lipemia with and without acute pancreatitis in chronic alcoholism. A report of 4 cases. Rev. Med. Interne. **10:** 155–162.
15. **Saharia, P., Margolis, S., Zuidema, G.D. and Cameron, J.L.** 1977. Acute pancreatitis with hyperlipemia: Studies with an isolated perfused canine pancreas. Surgery **82:** 60–67.