A 32-year-old woman admitted in the emergency room presented with severe headache for 5 days and vomiting in the last 48 h. In addition to diabetes diagnosed when she was 18 years old, she had type II dyslipemia, idiopathic hirsutism, and hypertension, which was treated with enalapril and spironolactone. She had no diabetic complications and had received insulin since diagnosis of her diabetes. In March 1996, C-peptide was 1,009 pmol/l when measured 6 min after administration of 1 mg glucagon. β-cell function was considered to be acceptable, insulin therapy was withdrawn, and a follow-up visit was scheduled in 3 weeks. The patient did not perform regular blood glucose monitoring, did not show up at the scheduled visit, and presented with DKA 4 months later. On arrival, she was dehydrated and had nuchal rigidity and no fever. Biochemical workup revealed a blood glucose level of 15.5 mmol/l, strong ketonuria, pH 7.17, plasma bicarbonate level of 12.5 mmol/l, osmolality of 340 mOsm/kg, cholesterol level of 53.77 mmol/l, and triglyceride level of 38.1 mmol/l. Normal results were found on urine culture and thorax X-ray examination. Lumbar puncture was performed, and colorless fluid was obtained (2 cells per milliliter, 12.1 mmol/l glucose, 800 mg/l protein, 0.4 U/l adenosine deaminase). The DKA was treated with intravenous fluids and regular insulin infusion, and metabolic improvement ensued. Blood glucose was <12 mmol/l from 24 h onward, venous plasma had pH 7.31 and normal osmolality at 48 h; cholesterol level was 32.64 mmol/l, and triglyceride level was 13.98 mmol/l by the 6th day. Nuchal rigidity was absent by the 3rd day, and headache had resolved by the 7th day. Results of cerebrospinal fluid (CSF) Gram staining, bacterial and viral cultures, and polymerase chain reaction for herpesvirus were negative.

This patient's diabetes was NIDDM in origin (hyperlipidemia, hypertension, significant β-cell function, DKA development 4 months after stopping insulin). She presented with DKA and meningeal syndrome, which resolved after improvement of glycemia, acidosis, and lipid profile. Headache, neck stiffness, and high CSF protein indicate meningeal irritation, although diabetes with (and occasionally without) polyneuropathy can be associated with high CSF protein (3). No cause of meningeal syndrome could be found, and the temporal association with DKA suggests that the DKA was responsible. Improvement of several parameters (pH, plasma bicarbonate, plasma glucose, osmolality, lipids) antedated or coincided with the resolution of meningeal syndrome. We have not found a similar case in a MEDLINE search (DM + meningeal syndrome/ acidosis/ CSF/ aseptic meningitis and meningeal syndrome + acidosis/ chylomicronemia). Acidosis, dehydration, and chylomicronemia syndrome can produce neurologic disturbances, but none of these conditions has been associated with meningeal syndrome (4–6). Pericarditis and pleuritis have been reported in patients with hyperglycemic decompensations, and they have been associated with dehydration, acidosis, and biochemical disturbances (7–9), but no single abnormality was common to all cases.

We suggest that DKA and meningeal syndrome were causally related in this patient, although we cannot specify the metabolic abnormality that was responsible.

Mª Mercè Albareda, MD
Ana Wägner, MD
Mireia Puig, MD
Rosa Corcoy, MD, PhD

From the Departments of Endocrinology (M.M.A., A.W., R.C.) and Internal Medicine (M.P.), Hospital de Sant Pau, Barcelona, Spain.

Address correspondence to Dra. Rosa Corcoy, Department of Endocrinology, Hospital de Sant Pau, Sant Antoni Ma Claret, 167, 08025 Barcelona, Spain. E-mail: rcorcoy@santpau.es.

References

1. Marinac JS: Drug- and chemical-induced aseptic meningitis: a review of the literature. *Ann Pharmacother* 26:813–822, 1992
2. Peterslund NA, Pedersen B: Liquor: serum quotients of IgG and albumin in patients with meningism, meningitis and multiple sclerosis. *Acta Neurol Scand* 66:25–33, 1982
3. Haerer AF: *Examination of the Cerebrospinal Fluid*. 5th ed. Philadelphia, JB Lippincott, 1992
4. Posner JB, Plum F: Spinal-fluid pH and neurologic symptoms in systemic acidosis. *N Engl J Med* 277:605–613, 1967
5. Chait A, Brunzell JD: Chylomicronemia syndrome. *Adv Intern Med* 37:249–273, 1991
6. Flügel KA: Metabolically induced focal seizures: hyperosmolar non-ketoacidotic hyperglycemia. *Schweiz Arch Neurol Neurochir Psychiatr* 120:3–10, 1977
7. Armanino LP, Ory EM: Acute pleurisy as a dehydration phenomenon in diabetic precoma. *Am J Med Sci* 211:597–601, 1946
8. Roger D, Rolle F, Teissier MP, Mausset J, Archambeaud-Mouveroux F, Laubie B: Péricardite aiguë survenant au cours des décompensations métaboliques aiguës diabétiques. *Presse Med* 23:299, 1994
9. Campbell IW, Duncan LJP, Clarke BF: Pericarditis in diabetic ketoacidosis. *Br Heart J* 39:110–112, 1977

Organospecific Lymph Node Enlargement in Autoimmune Polyglandular Syndrome

We describe here the enlargement of lymph nodes around the pancreas and thyroid gland in two sisters who were followed for 8 years during childhood and who had developed overt type 1 diabetes, vitiligo, hypothyroidism (polyendocrine syndrome type III [1]), and multiple autoantibodies against endocrine organs. Two daughters of a mother with type 1 diabetes were tested for autoantibodies to islet cells in the context of a German family screening program for prediction of type 1 diabetes in relatives (2). Offspring C1 developed antibodies to insulin (IAA) at 9 months of age, followed by antibodies to GAD65 (GADA) at 22 months and antibodies to the protein tyrosine phosphatase IA-2 (IA2A) and islet cells (ICA) by 3 years of age (Table 1). At the age of 7 years, she developed clinical type 1 diabetes, and 4 months later, being positive for peroxidase (TPO) and thyroglobulin (TG) antibodies, she required thyroxin substitution. Adrenal antibodies (AA) were negative. Her older sister (C2) presented with IAA, GADA, and ICA at 2 years of age, and overt type 1 diabetes was diagnosed at the age of 4 years. Shortly after diabetes manifestation, she developed vitiligo and was found to have TPO, TG, and anti-parietal cell antibodies (PCA). Overt hypothyroidism was diagnosed at the age of 8 years. The HLA type of offspring C1 was uncommon for polyendocrine diseases, whereas offspring C2 exhibited the characteristic susceptibility haplotype (C1: A2/26, B39/60, DR11/2, DQA1*0501/0102, DQB1*0301/0502; C2: A1/1, B8/14, DR3/3, DQA1*0501/0501, DQB1*0201/ 0201) (3). Figure 1 shows an ultrasound examination of the pancreas of offspring C1 at 7 years of age, when type 1 diabetes and hypothyroidism were diag-

Table 1—*Organ-specific autoantibodies in two sisters with autoimmune polyglandular syndrome*

	Age (years)	ICA	IAA	GADA	IA2A	TPO	TG	AA	PCA	Clinical disease onset
C1										
	0.8	−	+	−	−					
	1.8	−	+	+	−					
	2.9	+	+	+	+					
	4.0	+	+	+	+					
	5.0	+	+	+	+	+	+			
	6.1	+	+	+	+	+	+			
	7.1	+	+	+	+	+	+	−	−	Type 1 diabetes
	7.3									Hypothyroidism
C2										
	2.3	+	+	+	−					
	3.0	+	+	+	−					
	3.8	+	+	+	−					Type 1 diabetes
	5.2	+				+	+	−	+	Vitiligo
	6.0	+				+	+			
	6.9					+	+	−	+	
	7.9									Hypothyroidism

ICA, AA, and PCA by immunofluorescence; IAA, TPO, and TG by radioimmunoassay; and GADA and IA2A by radiobinding assay.

nosed. Five enlarged, oval, and hypoechoic lymph nodes are visible around the pancreas. The pancreas itself presents as normal in size, form, and echogenicity. Similar results were observed in offspring C2. In both, the thyroid gland was enlarged (11 and 17 ml) and had an irregular surface, an inhomogenous structure, and decreased echogenicity, consistent with the characteristic signs of autoimmune thyroiditis in the ultrasound scan. Chains of tender and painless lymph nodes were located next to the vessels on both sides of the neck. They showed a reduction in echogenicity and were oval, 1–3 cm in diameter. The spleen, as well as axillary and inguinal nodes, was normal. Lymph nodes around other organs were not detectable. Lymph node enlargements have occasionally been reported around the thyroid gland in patients with autoimmune thyroiditis (4) but have never been described around the pancreas in patients with type 1 diabetes. They indicate a strong organ-specific activation of the immune system during autoimmune destruction in polyglandular syndrome type III. These observations suggest that with the increasing quality of imaging, future studies are warranted to examine whether lymph node enlargements around the pancreas are also a common finding in patients with type 1 diabetes in the absence of other endocrine diseases. Ultrasound examination may then become a useful additional tool for diagnosis of autoimmune diabetes.

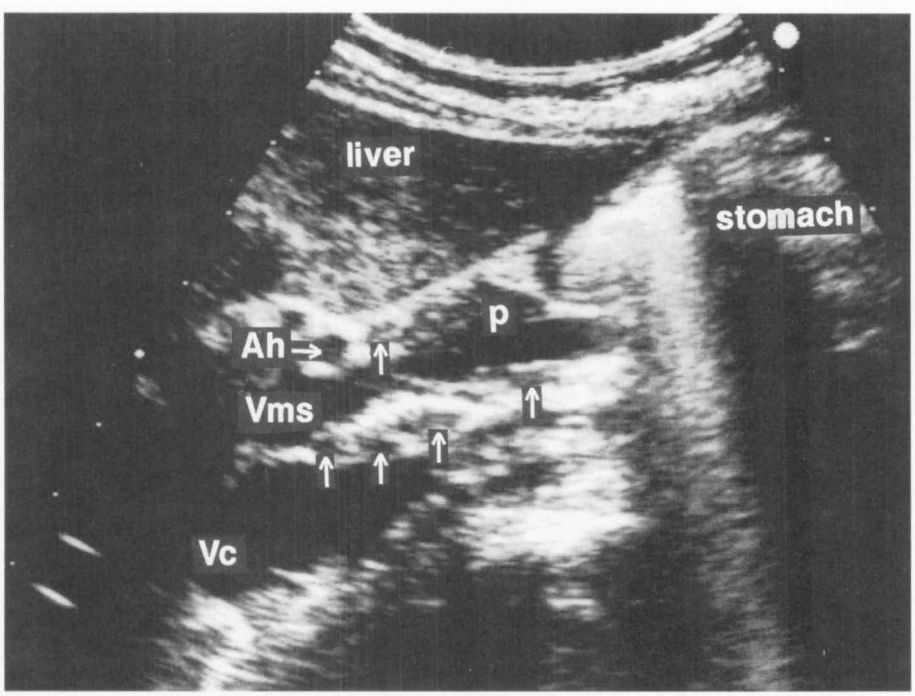

Figure 1—*Transverse scan of the upper abdomen in a 7-year-old child with newly diagnosed type 1 diabetes and Hashimoto thyroiditis. Five hypoechoic oval lymph nodes of 0.5–1 cm in diameter are shown around the pancreas. The pancreas is of normal echogenicity and size. Lymph nodes are marked by arrows. Ah, Ateria hepatica; p, pancreas; Vc, Vena cava; Vms, Vena mesenterica superior (Hitachi EcoScan 525 [Hitachi, Tokyo]; 3.5 MHz transducer).*

MICHAEL HUMMEL, MD
PETER BANHOLZER, MD
WOLFGANG RABL, MD
ANETTE-G. ZIEGLER, MD

From the Diabetes Research Institute and the Third Medical Department (M.H., P.B., A.-G.Z.), Academic Hospital München-Schwabing; and the Children's Hospital (W.R.), Technical University, Munich, Germany.

Address correspondence to Dr. Anette-G. Ziegler, Diabetes Research Institute, Kölner Platz 1, D-80804 München, Germany. E-mail: anziegler@lrz.uni-muenchen.de.

References

1. Song Y-H, Li YL, MacLaren NK: The nature of autoantigens targeted in autoimmune endocrine diseases. *Immunol Today* 17:232–238, 1996
2. Roll U, Christie MR, Fuchtenbusch M, Payton MA, Hawkes CJ, Ziegler AG: Perinatal autoimmunity in offspring of diabetic parents: the German Multicenter BABY-DIAB Study: detection of humoral immune responses to islet antigens in early childhood. *Diabetes* 45:967–973, 1996
3. Eisenbarth G, Wilson P, Ward F, Lebovitz HE: HLA type and occurrence of disease in familial polyglandular failure. *N Engl J Med* 298:92–94, 1978
4. Ingbar SH: Thyroid diseases. In *Williams Textbook of Endocrinology*. 7th ed. Wilson JD, Foster DW, Eds. Philadelphia, WB Saunders, 1985, p. 808