



Characteristics and Ongoing Autoimmunity of Patients With Long-standing Type 1 Diabetes Living in China

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No study to date has established the clinical features of long-duration type 1 diabetes in a non-Caucasian population. We identified people who survived ≥ 30 years with type 1 diabetes across China through a national program and performed the current study to establish the profile of this population.

Between 2015 and 2016, all of the registered subjects ($n = 105$) were contacted, and 95 of them completed the study visit. Demographic and socioeconomic data, body weight, height, and blood pressure were collected by study physicians, and blood and urine samples were collected locally and transported to a central laboratory.

Clinical characteristics were consistent with type 1 diabetes: mean (\pm SD) age at onset was 17.1 (\pm 8.6) years, and mean BMI was 22.48 (\pm 2.75) kg/m². Mean LDL level was 2.87 (\pm 1.02) mg/dL, with only 12.6% of participants using statins (Table 1). Meanwhile, 42.9% of participants reported hypertension and 14.3% had cardiovascular disease. A high proportion of the participants remained free from diabetic nephropathy (65.9%), while the proportions reporting retinopathy and neuropathy were 67.9% and 60.7%, respectively. Among those with retinopathy, 50.0% had received laser therapy. Autoantibodies against GAD, IA-2, and zinc transporter 8 were detected in 17.1%, 5.7%, and 1.4% of the participants,

respectively. BMI was significantly higher in the antibody-positive group.

One interesting observation in this population is the favorable lipid profile associated with longevity, which was also observed in the Golden Years Cohort and the Joslin 50-Year Medalist cohort (1,2). Relatively low BMI was consistent with the observation found in the Swedish National Diabetes Register (3). As in previous research (4), islet autoantibodies were still detectable in a large proportion of participants. The positive association between BMI and autoantibody status that was found for the first time might be partially explained by studies showing that higher BMI is associated with more residual β -cell function (5). Future mechanistic study will be needed for better understanding the reason for long-term survival in this population.

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Table 1—Sociodemographic and clinical characteristics of participants with long-term type 1 diabetes in China

	All (n = 95)	Plasma antibody negative (n = 56)*	Plasma antibody positive (n = 13)*
Age, years	55.2 (10.4)	55.3 (10.9)	57.8 (9.7)
Age at diagnosis, years	17.1 (8.6)	16.9 (8.9)	18.9 (8.0)
Diabetes duration, years	37.3 (6.8)	37.4 (6.9)	37.9 (7.9)
Highest level of education, n (%)*			
< University	56 (57.1)	24 (51.1)	8 (64.0)
Junior university	12 (12.2)	6 (12.8)	3 (12.0)
≥ University	16 (16.3)	7 (14.9)	2 (18.0)
Occupation, n (%)*			
Nongovernment worker	13 (13.3)	7 (14.9)	2 (12.0)
Government worker	10 (10.2)	3 (6.4)	2 (14.0)
Student	0 (0.0)	0 (0.0)	0 (0.0)
Farmer	4 (4.1)	3 (6.4)	0 (0.0)
Retired/unemployed/never worked	56 (84.7)	24 (51.1)	8 (64.0)
Marital status, n (%)*			
Married/cohabitating	62 (63.3)	29 (61.7)	6 (66.0)
Single/never married/widowed	22 (21.4)	8 (17.0)	2 (28.0)
Medical insurance, n (%)*			
Urban employee	5 (5.1)	3 (6.4)	2 (4.0)
Urban resident	59 (60.2)	24 (51.1)	35 (70.0)
New cooperative	17 (17.3)	9 (19.1)	8 (16.0)
Other	2 (2.0)	0 (0.0)	2 (4.0)
None	1 (1.0)	1 (2.1)	0 (0.0)
Residency status, n (%)*			
Urban	67 (68.4)	36 (61.7)	9 (76.0)
Rural	17 (17.3)	11 (17.0)	4 (18.0)
Daily insulin dosage, units*	41.3 (14.7)	40.3 (14.9)	42.2 (14.6)
Statin usage, n (%)	12 (12.6)	7 (14.9)	5 (10.9)
BMI, kg/m ² *	22.48 (2.75)	21.86 (2.35)	24.49 (3.50)†
SBP, mmHg*	126.3 (18.7)	124.9 (25.7)	126.3 (18.7)
DBP, mmHg*	72.6 (9.0)	72.1 (13.2)	72.6 (9.0)
HbA _{1c} %*	6.87 (1.15)	6.94 (1.14)	6.87 (1.15)
Total cholesterol, mg/dL*	5.16 (1.19)	4.84 (1.35)	5.16 (1.19)
HDL, mg/dL*	1.56 (0.33)	1.63 (0.49)	1.56 (0.33)
LDL, mg/dL*	2.87 (1.02)	2.65 (1.12)	2.87 (1.02)
Triglyceride, mg/dL*	1.08 (0.50)	1.11 (0.59)	1.08 (0.50)
Creatinine, μmol/L*	87.4 (3.2)	89.6 (4.3)	81.1 (5.6)
C-peptide ≥0.075 nmol/L, n (%)*	14 (14.7)	11 (19.6)	3 (21.4)
Urinary Alb/Cr, mg/g, median (minimum, maximum)*	9.88 (0.35, 5,557.8)	8.29 (0.06, 8,759.4)	9.88 (0.35, 5,557.8)

Data are mean (SD) unless otherwise indicated. Alb/Cr, albumin/creatinine; DBP, diastolic blood pressure; SBP, systolic blood pressure. *Eleven were missing for highest education level; 12 were missing for occupation; 11 were missing for marital status; 11 were missing for medical insurance; 11 were missing for residency status; 2 were missing for daily insulin dosage; 14 were missing for weight, height, and BMI; 17 were missing for SBP and DBP; 1 was missing for HbA_{1c}; 1 was missing for total cholesterol, HDL, LDL, and triglyceride; 5 were missing for creatinine; 4 were missing for C-peptide; 11 were missing for urinary Alb/Cr; 26 were missing antibody status. †P < 0.05 from χ^2 test and ANOVA test comparing antibody-positive and -negative groups.

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