Supplementary Table 1. Study sample characteristics, genotyping, quality control and association analysis.

Study	Ethnic group (origin)	Disease status	Sample size (males/females)	Age (years) mean (SD)	Age at onset (years) mean (SD)	Fasting glucose (mmol/l) mean (SD)	BMI (kg/m2) mean (SD)	Genotyping platform	Sample QC Call rate	Sample QC Exclusion criteria	SNP QC Call rate	SNP QC HWE	SNP QC MAF	SNP QC Imputation	SNPs	Analysis software	Covariates	Genomic control
Stage 1																		
ARIC	European	Cases	775 (416/359)	56.1 (5.6)	50.9 (10.4)	9.3 (3.6)	30.4 (5.4)	Affymetrix Human SNP Array 6.0	≥0.95	Relatedness and duplicates	≥0.90	$p>10^{-6}$	≥0.01	$r^2>0.3$	2,443,161	ProbABEL	Age, sex, and study centre	1.01 (G)
		Controls	7,159 (3,167/3,992)	54.0 (5.7)	-	5.4 (0.4)	26.4 (4.5)											1.01 (I)
deCODE	European (Iceland)	Cases	1,465 (868/597)	68.4 (10.1)	55.1 (12.7)	8.5 (2.7)	30.1 (5.4)	Illumina HumanHap 300/370	≥0.98	Duplicates	≥0.96	$p>10^{-6}$	≥0.01	proper-info>0.5	2,338,113	SNPTEST	-	1.31 (G)
		Controls	23,194 (7,316/15,878)	59.7 (18.1)	-	5.3 (0.7)	26.8 (5.0)											1.31 (I)
DGDG	European (France)	Cases	679 (413/266)	59.5 (10.1)	45.1 (8.4)	9.2 (3.1)	25.9 (2.8)	Illumina HumanHap 300	≥0.95	Duplicates	≥0.95	$p>10^{-4}$	≥0.01	proper-info>0.5	2,051,387	SNPTEST	-	1.10 (G)
		Controls	697 (281/416)	53.9 (5.6)	-	5.1 (0.4)	23.2 (1.8)											1.10 (I)
DGI	European (Sweden/Finland)	Cases	1,022 (529/493)	65.9 (10.0)	58.0 (10.0)	9.5 (3.1)	28.1 (4.1)	Affymetrix GeneChip 500K	≥0.95	Duplicates	≥0.95	$p>10^{-6}$	≥0.01	proper-info>0.5	2,230,032	PLINK and SNPTEST	Age, sex, BMI, and study centre	1.05 (G)
		Controls	1,075 (540/535)	58.0 (10.0)	-	5.3 (0.5)	27.6 (3.7)											1.06 (I)
EUROSPAN	European	Cases	269 (127/142)	62.9	-	8.0	29.8	Illumina HumanHap 300/370	≥0.98	Duplicates	≥0.98	$p>10^{-6}$	≥0.01	$r^2>0.5$	2,359,525	GenABEL and SNPTEST	Age and sex	0.97 (G)
		Controls	3,710 (1,557/2,153)	49.9	-	4.8	26.5											0.98 (I)
FHS	European (USA)	Cases	674 (386/288)	63.7 (12.4)	-	8.6 (2.8)	31.4 (6.5)	Affymetrix GeneChip 500K & MIPS 50K	≥0.95	Duplicates	≥0.95	$p>10^{-6}$	≥0.01	$r^2>0.3$	2,389,929	R (GEE correction for relatedness)	Age, sex, and cohort	1.02 (G)
		Controls	7,664 (3,443/4,221)	52.3 (16.0)	-	5.3 (0.5)	27.0 (5.1)											1.02 (I)
FUSION	European (Finland)	Cases	1,161 (653/508)	62.9 (7.6)	53.7 (9.1)	9.4 (3.1)	30.2 (4.7)	Illumina HumanHap 300	≥0.975	Duplicates	≥0.90	$p>10^{-6}$	≥0.01	$r^2>0.3$	2,413,085	MACH2DAT	Age, sex, and birth province	1.03 (G)
		Controls	1,174 (574/600)	63.6 (7.4)	-	5.3 (0.5)	27.1 (3.9)											1.04 (I)
HPFS	European (USA)	Cases	1,124 (1,124/0)	55.0 (8.6)	64.0 (8.4)	-	27.8 (4.0)	Affymetrix Human SNP Array 6.0	≥0.95	Relatedness and duplicates	≥0.95	$p>10^{-6}$	≥0.01	-	622,575	PLINK	Age and BMI	1.03 (G)
		Controls	1,298 (1,298/0)	55.0 (8.4)	-	-	25.0 (2.9)											
KORAGen	European (Germany)	Cases	433 (255/178)	65.2 (8.3)	58.2 (10.3)	-	30.9 (5.0)	Affymetrix GeneChip 500K	≥0.93	Duplicates	≥0.95	$p>10^{-6}$	≥0.01	proper-info>0.5	2,325,232	SNPTEST	Age and sex	1.04 (G)
		Controls	1,438 (693/745)	61.9 (7.4)	-	-	27.7 (4.3)											1.04 (I)
NHS	European (USA)	Cases	1,467 (0/1,467)	43.5 (6.7)	58.7 (10.6)	-	27.4 (0.1)	Affymetrix Human SNP Array 6.0	≥0.98	Relatedness and duplicates	≥0.98	$p>10^{-6}$	≥0.02	-	615,391	PLINK	Age and BMI	0.98 (G)
		Controls	1,754 (0/1,754)	43.1 (6.8)	-	-	23.5 (0.1)											
RS1	European (Netherlands)	Cases	1,178 (488/690)	71.7 (8.9)	71.5 (8.9)	-	27.4 (4.0)	Illumina HumanHap 550	≥0.975	Duplicates	≥0.98	$p>10^{-6}$	≥0.01	$r^2>0.5$	2,439,672	GenABEL and SNPTEST	-	1.01 (G)
		Controls	4,761 (1,928/2,833)	69.0 (9.1)	-	-	26.0 (3.6)											1.01 (I)
WTCCC	European (UK)	Cases	1,924 (1,118/806)	58.6 (9.2)	50.3 (9.2)	-	30.7 (6.1)	Affymetrix GeneChip 500K	≥0.97	Duplicates	≥0.95 (≥0.99 for MAF<0.05)	$p>10^{-3}$	≥0.01	proper-info>0.5	2,308,535	PLINK and SNPTEST	-	1.06 (G)
		Controls	2,938 (1,446/1,492)	-	-	-	-											1.08 (I)
Stage 2																		
AMC-PAS	European (Netherlands)	Cases	48 (35/13)	44.0 (4.7)	-	8.6 (3.2)	29.3 (4.4)	Metabochip	≥0.95	Duplicates and non-European descent	≥0.98	$p>10^{-4}$	≥0.01	-	109,525	PLINK	Age and sex	1.00 (QT)
		Controls	442 (333/109)	43.2 (5.3)	-	5.3 (0.6)	26.6 (4.1)											
BHS	European	Cases	51 (38/13)	72.3 (7.8)	-	7.8 (4.0)	27.2 (3.9)	Metabochip	≥0.95	Ambiguous sex and relatedness	≥0.95	$p>10^{-6}$	≥0.01	-	119,893	PLINK	Age and sex	0.96 (QT)
		Controls	359 (224/135)	70.0 (9.6)	-	5.1 (0.9)	26.6 (3.9)											
deCODE-Stage2	European (Iceland)	Cases	722 (433/289)	67.3 (13.6)	-	-	31.2 (6.3)	Metabochip	-	-	-	-	≥0.01	-	125,236	SNPTEST	Sex	0.95 (QT)
		Controls	10,153 (6,604/3,549)	44.3 (26.5)	-	-	-											
DILGOM	European (Finland)	Cases	541 (298/243)	60.5 (10.3)	-	-	30.1 (5.6)	Metabochip	≥0.95	Ambiguous sex and relatedness	≥0.95	$p>10^{-6}$	≥0.01	-	116,634	PLINK	Age, sex, and population structure	0.93 (QT)
		Controls	3,357 (1,480/1,877)	50.9 (13.5)	-	-	26.5 (4.5)											
DUNDEE	European (UK)	Cases	3,298 (1,940/1,358)	63.5 (9.6)	55.9 (8.9)	-	31.9 (6.3)	Metabochip	≥0.95	Duplicates, ambiguous sex, and non-European descent	≥0.95 (≥0.99 for MAF<0.05)	$p>5.7×10^{-7}$ ($p>10^{-4}$ for MAF<0.05)	≥0.01	-	121,365	PLINK	Population structure	1.07 (QT)
		Controls	3,708 (1,918/1,790)	59.1 (11.3)	-	4.9 (0.5)	27.0 (4.5)											
EAS	European	Cases	110 (64/46)	64.0 (5.6)	-	-	25.9 (3.3)	Metabochip	≥0.95	Gender check and ambiguous sex	≥0.95	$p>10^{-6}$	≥0.01	-	119,523	PLINK	Age and sex	1.00 (QT)
		Controls	641 (301/340)	64.5 (5.6)	-	-	25.5 (3.9)											
EGCUT	European (Estonia)	Cases	938 (342/596)	64.1 (10.5)	-	-	33.4 (5.4)	Metabochip	≥0.95	Ambiguous sex, relatedness, and non-European descent	≥0.95	$p>10^{-6}$	≥0.01	-	120,720	SNPTEST	Age, sex, and population structure	1.00 (QT)
		Controls	915 (326/589)	51.7 (10.7)	-	-	22.3 (2.5)											
EMIL-ULM	European	Cases	755 (510/245)	48.7 (12.0)	45.5 (10.8)	-	28.6 (7.1)	Metabochip	≥0.95	Ambiguous sex and cryptic relatedness	≥0.95	$p>10^{-6}$	≥0.01	-	121,684	PLINK	Age and sex	1.14 (QT)
		Controls	1,632 (765/867)	45.1 (10.9)	-	-	26.7 (5.0)											
EPIC	European (UK)	Cases	727 (432/295)	61.8 (8.2)	-	-	29.5 (4.4)	Metabochip	≥0.95	Gender check and duplicates	≥0.90	$p>10^{-6}$	≥0.01	-	120,527	PLINK	Age and sex	0.97 (QT)
		Controls	927 (393/534)	58.8 (9.4)	-	-	26.1 (3.7)											
FUSION-Stage2	European (Finland)	Cases	1,037 (584/453)	59.7 (8.4)	-	7.7 (2.3)	30.8 (5.4)	Metabochip	≥0.98	Relatedness and ambiguous sex	≥0.98	$p>10^{-5}$	≥0.01	-	123,853	PLINK	Age and sex	0.97 (QT)
		Controls	1,157 (691/466)	59.0 (7.6)	-	5.4 (0.4)	26.9 (3.9)											
FUSION-D2D2007	European (Finland)	Cases	454 (269/185)	63.4 (7.6)	-	7.7 (1.8)	30.6 (5.6)	Metabochip	≥0.98	Relatedness and ambiguous sex	≥0.98	$p>10^{-5}$	≥0.01	-	123,461	PLINK	Age and sex	0.96 (QT)
		Controls	1,229 (455/774)	58.1 (8.2)	-	5.6 (0.3)	26.2 (4.3)											
FUSION-DRExtra	European (Finland)	Cases	110 (53/57)	68.4 (5.8)	-	6.6 (0.8)	30.9 (5.6)	Metabochip	≥0.98	Relatedness and ambiguous sex	≥0.98	$p>10^{-5}$	≥0.01	-	120,746	PLINK	Age and sex	0.94 (QT)
		Controls	785 (341/444)	66.0 (5.3)	-	5.4 (0.3)	26.7 (4.0)											
FUSION-HUNT	European (Norway)	Cases	1,239 (628/611)	64.0 (12.9)	61.9 (11.9)	-	29.2 (4.8)	Metabochip	≥0.98	Relatedness and ambiguous sex	≥0.98	$p>10^{-5}$	≥0.01	-	125,644	PLINK	Age, sex and collection site	1.10 (QT)
		Controls	1,375 (691/684)	63.5 (13.9)	-	-	26.5 (4.0)											
FUSION-METSIM	European (Finland)	Cases	1,169 (1,169/0)	60.5 (6.6)	57.0 (8.0)	7.5 (2.0)	30.2 (5.2)	Metabochip	≥0.98	Relatedness and ambiguous sex	≥0.98	$p>10^{-5}$	≥0.01	-	122,600	PLINK	Age and sex	1.01 (QT)
		Controls	651 (651/0)	53.8 (5.0)	-	5.5 (0.3)	25.9 (3.1)											
GMetS	European (France)	Cases	507 (334/173)	55.9 (9.9)	-	-	28.5 (3.9)	Metabochip	≥0.95	Gender check, duplicates, and ambiguous sex	≥0.95	$p>10^{-4}$	≥0.01	-	123,359	PLINK	Age, sex, and BMI	1.11 (QT)
		Controls	2,553 (1,134/1,419)	47.3 (11.1)	-	-	24.8 (3.8)											
HNR	European	Cases	520 (315/205)	62.6 (7.2)	-	-	30.4 (5.2)	Metabochip	≥0.97	Ambiguous sex, relatedness, and non-European descent	≥0.95	$p>10^{-6}$	≥0.01	-	126,675	PLINK	Age and sex	1.00 (QT)
		Controls	3,932 (1,911/2,021)	59.2 (7.8)	-	-	27.5 (4.4)											
IMPROVE	European	Cases	898 (513/385)	64.3 (5.6)	-	7.7 (2.2)	29.2 (4.6)	Metabochip	≥0.95	Ambiguous sex, cryptic relatedness, non-European descent	≥0.95	$p>10^{-6}$	≥0.01	-	122,320	PLINK	Age, sex and population structure	1.13 (QT)
		Controls	2,521 (1,134/1,387)	64.2 (5.3)	-	5.3 (0.7)	26.5 (3.9)											
KORAGen-Stage2	European (Germany)	Cases	940 (504/436)	61.6 (10.0)	-	-	30.8 (5.4)	Metabochip	≥0.95	Ambiguous sex and relatedness	≥0.95	$p>10^{-6}$	≥0.01	-	120,547	PLINK	Age and sex	1.02 (QT)
		Controls	4,209 (2,000/2,209)	53.8 (13.2)	-	-	27.2 (4.6)											
PIVUS	European (Sweden)	Cases	113 (70/43)	70.2 (0.2)	-	-	29.5 (5.1)	Metabochip	≥0.95	Relatedness and ambiguous sex	≥0.95	$p>10^{-6}$	≥0.01	-	120,892	PLINK	Age and sex	0.97 (QT)
		Controls	864 (419/445)	70.2 (0.2)	-	-	26.8 (4.2)											
PMB	European (Sweden/Finland)	Cases	4,976 (2,911/2,065)	58.8 (12.5)	-	-	28.2 (8.7)	Metabochip	≥0.95	Outlying heterozygosity, relatedness and non-European descent	≥0.95	$p>10^{-6}$	≥0.01	-	119,674	PLINK	Population structure	1.05 (QT)
		Controls	3,500 (1,700/1,800)	58.3 (8.4)	-	-	26.4 (4.4)											
PROMIS	South Asian (Pakistan)	Cases	1,178 (904/274)	53.5 (9.1)	-	-	-	Metabochip	≥0.95	Ambiguous sex and relatedness	≥0.95	$p>10^{-6}$	≥0.01	-	121,792	PLINK	Age, sex, population structure and MI status	1.00 (QT)
		Controls	2,472 (2,088/384)	52.1 (10.2)	-	-	-											
SCARFSHEEP	European (Sweden)	Cases	341 (246/95)	59.6 (7.0)	-	8.12(5.4)	27.4 (8.4)	Metabochip	≥0.95	Ambiguous sex and relatedness	≥0.95	$p>10^{-6}$	≥0.01	-	119,375	PLINK	Age, sex, population structure and CAD status	0.98 (QT)
		Controls	3,073 (2,211/862)	57.9 (7.3)	-	4.0 (3.8)	25.4 (6.1)											
STR	European (Sweden)	Cases	320 (141/179)	71.5 (9.3)	-	-	27.0 (4.1)	Metabochip	≥0.95	-	≥0.95	$p>10^{-6}$	≥0.01	-	120,509	PLINK	Age and sex	0.99 (QT)
		Controls	1,318 (612/706)	74.3 (10.5)	-	-	24.9 (3.8)											
THISEAS	European (Greece)	Cases	327 (229/98)	63.6 (10.6)	-	8.0 (2.6)	29.4 (4.8)	Metabochip	≥0.95	Duplicates, ambiguous sex, and non-European descent	≥0.98	$p>10^{-4}$	≥0.01	-	108,868	PLINK	Age and sex	1.00 (QT)
		Controls	1,180 (643/537)	58.2 (13.6)	-	5.3 (0.6)	28.3 (5.0)											
ULSAM	European (Sweden)	Cases	233 (233/0)	71.0 (0.6)	-	-	27.7 (3.8)	Metabochip	≥0.95	Relatedness	≥0.95	$p>10^{-6}$	≥0.01	-	119,018	PLINK	Age and sex	0.95 (QT)
		Controls	942 (942/0)	71.0 (0.6)	-	-	25.9 (3.2)											
WARREN2	European (UK)	Cases	1,117 (647/470)	-	45.5 (11.0)	-	32.2 (6.6)	Metabochip	≥0.95	Duplicates, ambiguous sex, and non-European descent	≥0.95 (≥0.99 for MAF<0.05)	$p>10^{-6}$	≥0.01	-	120,521	PLINK	-	1.07 (QT)
		Controls	4,224 (2,394/1,830)	-	-	-	-											