

SUPPLEMENTARY DATA

**Supplementary Table S1.** Table of phenotypic characteristics

www.well.ox.ac.uk/~nvanzuy/Onlinesupp.S1Table1.xlsx

**Supplementary Table S2.** Narrow sense ('chip') heritability of diabetic kidney disease phenotypes in subjects with type 2 diabetes estimated in the GoDARTS study

Phenotype*	Cases	Controls	h <sup>2</sup>	SE	pval
Chronic kidney disease	1,997	2,066	0.12	0.05	8.2×10 <sup>-3</sup>
All diabetic kidney disease	1,744	1,496	0.08	0.07	0.12
Estimated glomerular filtration rate		6,335	0.07	0.03	9.8×10 <sup>-3</sup>

\*All cases are compared to subjects with type 2 diabetes and normoalbuminuria or an estimated glomerular filtration rate >60 mL/min/1.73m<sup>2</sup> unless otherwise stated.

**Supplementary Table S3.** Study characteristics for studies included in the discovery meta-analysis of the primary 'all diabetic kidney disease' phenotype

Diabetes	Cohort	Cases/controls	Age of onset of diabetes (cases/controls)	Age (cases/controls)	%Males (cases/controls)	BMI (cases/controls)	HbA1c (cases/controls)	Duration of diabetes (cases/controls)
2	SDR	1,250/580	54.5(12.6)/51.7(10.8)	65.5(11.7)/67.8(10.5)	65/52	30.2(5.3)/28.9(5.1)	7.2(1.2)/6.9(1.0)	10.9(8.70)/16.1(6.0)
2	BENEDICT study phase A and B	188/165	53.4(8.6)/49.3(8.4)	66.3(11.0)/70.1(7.3)	177/58	29.38(4.8)/27.8(4.1)	6.0(1.4)/5.8(1.4)	12.(9.5)/20.8(6.0)
2	STENO	163/131	46.1(9.2)/45.9(8.9)	61.2(7.5)/63.0(8.3)	60/62	29.8(5.2)/27.3(4.5)	9.1(1.7)/8.8(1.3)	15.3(7.1)/17.1(5.9)
2	GoDARTS 1*	885/816	68.6(9.1)/66.2(8.8)	58.9(12.3)/54.0(12.1)	53/52	31.0(5.5)/31.0(5.4)	7.6(1.4)/7.5(1.3)	14.1(8.1)/16.5(6.8)
2	GoDARTS 2*	859/680	67.9(11.6)/66.2(10.8)	72.1(11.2)/70.1(10.7)	60/60	31.5(6.1)/31.2(6.1)	7.5(1.5)/7.5(1.3)	11.4(6.9)/15.5(5.5)

\*GoDARTS was typed on two genotyping arrays

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**Supplementary Table S4.** Table of genotypic characteristics:

[www.well.ox.ac.uk/~nvanzuy/Onlinesupp.S1Table4.xlsx](http://www.well.ox.ac.uk/~nvanzuy/Onlinesupp.S1Table4.xlsx)

**Supplementary Table S5.** Replication was sought for 164 variants and results were returned for 108 of these variants for six dichotomous phenotypes and estimated glomerular filtration rate (eGFR, mL/min/1.73m<sup>2</sup>) in subjects with type 2 diabetes.

[www.well.ox.ac.uk/~nvanzuy/Onlinesupp.S1Table5.xlsx](http://www.well.ox.ac.uk/~nvanzuy/Onlinesupp.S1Table5.xlsx)

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**Supplementary Table S6.** Rs9942471 was associated ( $p \leq 5 \times 10^{-8}$ ) with microalbuminuria in subjects with T2D of European descent and was not associated with any other dichotomous diabetic kidney disease phenotype.

Phenotype	CHR	BP	SNP	Discovery			Ancestry	Replication			Joint		
				EA/NEA EAF	OR (95%CI)	P		EAF	OR (95%CI)	P	OR (95%CI)	P	N
Chronic kidney disease (CKD)	6	8994823 2	rs9942471	A/C 0.63	0.98 (0.89,1.07)	0.50	European	0.62	1.10 (0.98,1.23)	0.10	1.02 (0.95,1.10)	0.41	11,897
							Asian and European	0.75	1.04 (0.96,1.13)	0.31	1.01 (0.95,1.08)	0.60	19,236
CKD and diabetic kidney disease (DKD)	6	8994823 2	rs9942471	A/C 0.63	1.06 (0.93,1.22)	0.32	European	0.59	1.20 (0.88,1.64)	0.45	1.07 (0.95,1.22)	0.22	2,834
							Asian and European	0.79	1.10 (0.88,1.37)	0.50	1.07 (0.95,1.21)	0.23	3,928
All DKD	6	8994823 2	rs9942471	A/C 0.64	1.20 (1.12,1.29)	$4.8 \times 10^{-7}$	European	0.62	1.12 (0.98,1.27)	0.14	1.18 (1.11,1.25)	$3.8 \times 10^{-7}$	7,053
							Asian and European	0.87	1.06 (0.98,1.15)	0.18	1.13 (1.07,1.19)	$1.7 \times 10^{-4}$	19,253
End-stage renal disease (ESRD) vs non ESRD	6	8994823 2	rs9942471	A/C 0.64	0.85 (0.71,1.05)	0.07	European	0.63	1.09 (0.88,1.36)	0.42	0.94 (0.83,1.08)	0.30	6,455
							Asian and European	0.82	1.16 (1.00,1.36)	0.02	1.03 (0.93,1.13)	0.46	12,260

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Phenotype	CHR	BP	SNP	Discovery			Replication				Joint		
				EA/ NE A EAF	OR (95%CI)	P	Ancestr y	EAF	OR (95%CI)	P	OR (95%CI)	P	N
Late DKD	6	8994823 2	rs9942471	A/C 0.63	1.14 (1.04,1.25)	0.01	Europea n	0.62	1.02 (0.86,1.2 0)	0.32	1.11 (1.02,1.20 )	0.05	5,128
							Asian and Europea n	0.88	1.01 (0.93,1.1 0)	0.85	1.06 (0.99,1.13 )	0.22	19,578
Microalbuminur ia	6	8994823 2	rs9942471	A/C 0.64	1.24 (1.15,1.34)	2.1x10 <sup>-7</sup>	Europea n	0.59	1.32 (1.09,1.5 9)	0.06	1.25 (1.16,1.34 )	4.5x10 <sup>-8</sup>	4,801
							Asian and Europea n	0.85	1.11 (0.99- 1.23)	0.91	1.15 (1.08,1.23 )	1.2x10 <sup>-5</sup>	5,652

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**Supplementary Table S7.** A cross comparison of top variants associated with diabetic kidney disease phenotypes in subjects with type 2 diabetes in subjects with type 1 diabetes (Shaded) (Sandholm et al, 2017).

Phenotype	SNP	EA/NEA	EAF	In subjects with type 2 diabetes		In subjects with type 1 diabetes	
				OR/Beta (95%CI)	<i>p</i>	OR/Beta (95%CI)	<i>p</i>
‘CKD’	rs2206136 ( <i>PLCB4</i> )	A/T	0.42	1.13 (1.05,1.21)	$9.0 \times 10^{-5}$	0.94 (0.85,1.04)	0.23
‘microalbuminuria’	rs9942471 ( <i>GABRR1</i> )	A/C	0.64	1.25 (1.16,1.34)	$4.50 \times 10^{-8}$	0.93 (0.82,1.05)	0.26
‘eGFR’	rs11864909 ( <i>UMOD</i> )	T/C	0.28	2.31 (1.54,3.09)	$4.60 \times 10^{-9}$	1.22 (-0.06,2.50)	0.07
‘ESRD vs no ESRD’	rs61277444 ( <i>PTPN13</i> )	G/A	0.09	Not available		1.41 (1.21,1.65)	$1.90 \times 10^{-6}$
‘ESRD vs controls’	rs61277444 ( <i>PTPN13</i> )	G/A	0.09			1.42 (1.02,1.67)	$6.00 \times 10^{-6}$
‘ESRD vs no ESRD’	rs7562121 ( <i>AFF3</i> )	C/G	0.23	1.12 (0.97,1.30)	0.21	1.27 (1.17,1.39)	$3.50 \times 10^{-7}$
‘CKD+DKD’	rs1989248 ( <i>CNTNAP2</i> )	C/A	0.28	0.73 (0.61,0.87)	$6.14 \times 10^{-4}$	1.26 (1.15,1.38)	$6.00 \times 10^{-7}$
‘ESRD vs controls’	rs1989248 ( <i>CNTNAP2</i> )	C/A	0.28	0.71 (0.57,0.88)	0.51	1.29 (1.17,1.43)	$1.80 \times 10^{-6}$
‘All DKD’	rs72809865 ( <i>NRG3</i> )	T/C	0.16	1.11 (0.99,1.75)	0.05	1.17 (1.09,1.26)	$7.40 \times 10^{-6}$

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**Supplementary Table S8.** Phenotype definitions used in the combined analysis of diabetic kidney disease in subjects with type 1 diabetes or type 2 diabetes (T1D+T2D)

Analysis	Case definition	Control definition	Type 1 and 2 diabetes	
			#Cases	#Controls
All Diabetic kidney disease (DKD)	<b>All DKD:</b> Microalbuminuria OR OR Late DKD OR end-stage renal disease (ESRD)	Normoalbuminuria (Albumin excretion rate [AER] <20 µg/min OR AER <30 mg/24 h OR ACR <2.5/3.5 mg/mmol for men/women AND duration of T2D >10 years or duration of T1D >15 years	5,908	4,965
Microalbuminuria	<b>Microalbuminuria:</b> At least 2 out of 3 consecutive measurements with albumin excretion rate (AER) ≥20 AND <200 µg/min OR AER ≥30 AND <300 mg/24 hr OR albumin to creatinine ratio (ACR) ≥2.5/3.5 AND <25/35 mg/mmol for men/women	Normoalbuminuria AND duration of T2D >10 years or duration of T1D >15 years	2,795	4,831
Late DKD	<b>Late DKD:</b> At least one measurement with AER ≥200 µg/min OR AER ≥300 mg/24 h OR ACR ≥25/35 mg/mmol for men/women) or end-stage renal disease (ESRD, eGFR < 15 mL/min/1.73m <sup>2</sup> OR kidney transplantation OR dialysis)	Normoalbuminuria AND duration of T2D >10 years or duration of T1D >15 years	3,096	4,965
ESRD vs. controls	<b>ESRD:</b> eGFR < 15 mL/min/1.73m <sup>2</sup> OR kidney transplantation OR dialysis	No DKD AND duration of T2D >10 years or duration of T1D >15 years	1,184	4,474
ESRD vs. no ESRD	ESRD (see above)	No ESRD AND duration of T2D >10 years or duration of T1D >15 years	1,184	8,466
Chronic Kidney Disease (CKD)	<b>CKD:</b> eGFR < 60 mL/min/1.73m <sup>2</sup>	No CKD AND duration of T2D >10 years or duration of T1D >15 years	5,554	3,680

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Analysis	Case definition	Control definition	Type 1 and 2 diabetes	
			#Cases	#Controls
CKD and DKD	<b>CKD and DKD:</b> eGFR < 60 mL/min/1.73m <sup>2</sup> AND DKD	No CKD AND no ESRD AND normoalbuminuria AND duration of T2D >10 years or duration of T1D >15 years	2,647	2,995
eGFR	<b>eGFR:</b> eGFR=32788 x Serum Creatinine(μmol/L) <sup>-1.154</sup> x Agx10 <sup>-203</sup> x [0.742 if female] (mL/min/1.73m <sup>2</sup> )		13,158	eGFR

**Supplementary Table S9.** The discovery, replication and joint analysis of the 47 lead variants selected for replication from seven dichotomous diabetic kidney disease and a continuous eGFR phenotype (mL/min/1.73m<sup>2</sup>) in the combined analysis of subjects with either type 1 or type 2 diabetes

[www.well.ox.ac.uk/~nvanzuy/Onlinesupp.S1Table8.xlsx](http://www.well.ox.ac.uk/~nvanzuy/Onlinesupp.S1Table8.xlsx)

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**Supplementary Table S10.** We report associations of reported diabetic kidney disease (DKD) variants with corresponding DKD phenotypes in this study at a  $p < 0.05$  irrespective of type of diabetes. In supplementary Figure 5 we show z scores for all DKD phenotypes from subjects with T2D and the combined analysis of subjects with T1D or T2D.

PMID	SNP (Gene)	Phenotype	Diabetes	Published				Current study			
				E A	EA F	Effect (95%CI)	P	trait	Diabetes	Effect (95%CI)	P
15793268	rs1800764 ( <i>ACE</i> )	Microalbuminuria	T1D	C	0.46	1.11 (1.01,1.22)	0.04	'Microalbuminuria'	T2D	0.87 (0.78,0.97)	0.02
19430482	rs12917707 ( <i>UMOD</i> )	CKD	-	G	0.80	1.32 (1.24,1.4)	$5.2 \times 10^{-16}$	'CKD'	T1D+T2D	1.06 (0.99,1.14)	0.02
									T2D	1.08 (0.99,1.18)	0.02
									T1D+T2D	1.93 (1.25,2.61)	$2.9 \times 10^{-6}$
	rs12917707 ( <i>UMOD</i> )	eGFR	-	T	0.20	0.02 (0.02,0.03)	$2.3 \times 10^{-12}$	'eGFR'	T1D+T2D	0.02 (0.01,0.03)	$6.2 \times 10^{-6}$
									T2D	1.96 (1.20,2.73)	0.05
	rs17319721 ( <i>SHROOM3</i> )	eGFR	-	A	0.44	0.01 (0.01,0.02)	$1.0 \times 10^{-12}$	'eGFR'	T1D+T2D	-1.11 (-1.88,-0.34)	$4.9 \times 10^{-3}$
rs2467853 ( <i>SPATAGL1</i> )	eGFR	-	G	0.39	0.01 (0.01,0.02)	$6.0 \times 10^{-14}$	'eGFR'	T1D+T2D	-0.95 (-1.75,-0.149)	0.02	
20383146	rs7805747 ( <i>PRKGA2</i> )	CKD	-	A	0.24	1.18 (1.11,1.25)	$4.0 \times 10^{-12}$	'CKD'	T1D+T2D	1.09 (1,1.18)	0.01
									T2D	1.10 (0.99,1.22)	0.03



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PMID	SNP (Gene)	Phenotype	Diabetes	Published				Current study					
				E A	EA F	Effect (95%CI)	P	trait	Diabetes	Effect (95%CI)	P		
20962522	rs1800783 ( <i>NOS3</i> )	DKD	T1D	T	0.63	1.26 (1.1,1.45)	6.0×10 <sup>-4</sup>	‘all DKD’	T1D+T2D	1.06 (0.99,1.13)	0.03		
				A	0.74	1.01 (0.93,1.10)		0.10	‘all DKD’	T1D+T2D		0.90 (0.84,0.97)	5.8×10 <sup>-3</sup>
	rs5186 ( <i>AGTR1</i> )	DKD	T1D+T2D	A	0.74	1.01 (0.93,1.10)	0.10	‘all DKD’	T2D	0.90 (0.81,0.99)	0.02		
23028342	rs833061 ( <i>VEGFA</i> )	DKD	T1D+T2D	T	0.5	2.08 (1.64,2.65)	0.32	‘all DKD’	T2D	0.91 (0.84,0.98)	0.03		
				G	0.06	1.72 (1.36,2.18)		2.0×10 <sup>-9</sup>	‘ESRD vs controls’	T1D+T2D		1.30 (0.99,1.71)	3.6×10 <sup>-3</sup>
				C	0.31	1.34 (1.21,1.48)		1.2×10 <sup>-8</sup>	‘ESRD vs non ESRD’	T1D+T2D		1.40 (1.06,1.85)	1.2×10 <sup>-3</sup>
24871321	rs12137135 ( <i>WNT4-ZBTB40</i> )	ESRD	T1D	G	0.16	Bayesian Analysis		‘ESRD vs controls’	T1D+T2D	1.20 (1.02,1.40)	0.02		
				T	0.12			‘ESRD vs non ESRD’	T1D+T2D	1.22 (1.13,1.32)		4.8×10 <sup>-4</sup>	
				T	0.12			ESRD vs non ESRD	T1D+T2D	1.23 (1.06,1.43)		8.1×10 <sup>-3</sup>	
	rs12917114 ( <i>SEMA6D-SLC24A5</i> )	ESRD	T1D	T	0.12			ESRD vs non ESRD	T1D+T2D	1.24 (1.05,1.46)	7.9×10 <sup>-3</sup>		

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PMID	SNP (Gene)	Phenotype	Diabetes	Published			Current study					
				E A	EA F	Effect (95%CI)	P	trait	Diabetes	Effect (95%CI)	P	
	rs1670754 (4p15)	ESRD	T1D	A	0.19				'ESRD vs non ESRD'	T1D+T2D	1.16 (1.02,1.32)	0.04
	rs2838302 ( <i>SIK1</i> )	ESRD	T1D	G	0.08				'ESRD vs controls'	T1D+T2D	1.28 (1.03,1.58)	$4.7 \times 10^{-3}$
									'ESRD vs non ESRD'	T1D+T2D	1.39 (1.12,1.74)	$3.9 \times 10^{-4}$

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**Supplementary Table S11.** Results of a genetic risk score analysis of diabetic kidney disease (DKD) related risk factors and different DKD phenotypes ( $p < 2.3 \times 10^{-3}$ )

<b>DKD PHENOTYPE</b>	<b>GENETIC RISK SCORE</b>	<b>OR(95%CI)</b>	<b>PVAL</b>
T1D and T2D Late DKD	Body mass index (BMI)	2.12 (1.55,2.90)	$2.3 \times 10^{-6}$
T1D and T2D Late DKD	Body mass index (z transformed)	2.04 (1.48,2.82)	$1.6 \times 10^{-5}$
T1D and T2D All DKD	Body mass index (BMI)	1.75 (1.35,2.27)	$2.4 \times 10^{-5}$
T1D and T2D All DKD	Body mass index (z transformed)	1.68 (1.28,2.19)	$1.5 \times 10^{-4}$
T2D All DKD	Body mass index (BMI)	2.02 (1.40,2.92)	$1.8 \times 10^{-4}$
T1D and T2D CKD	Body mass index (z transformed)	1.73 (1.29,2.32)	$2.7 \times 10^{-4}$
T2D ESRD vs no ESRD	Waist-Hip Ratio (BMI adj.)	4.19 (1.87,9.36)	$4.8 \times 10^{-4}$
T1D and T2D CKD	Body mass index (BMI)	1.62 (1.21,2.17)	$1.3 \times 10^{-3}$
T2D ESRD vs no ESRD	Insulin resistance (N SNPs = 10)	1.09 (1.03,1.14)	$1.6 \times 10^{-3}$
T2D ESRD vs controls	Insulin resistance (N SNPs = 10)	1.09 (1.03,1.15)	$1.7 \times 10^{-3}$
T2D ESRD vs controls	Waist-Hip Ratio (BMI adj.)	4.04 (1.69,9.66)	$1.7 \times 10^{-3}$
T2D Late DKD	Body mass index (BMI)	2.12 (1.32,3.40)	$1.8 \times 10^{-3}$
T1D and T2D CKD and DKD	Body mass index (BMI)	1.84 (1.25,2.70)	$1.8 \times 10^{-3}$

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**Supplementary Table S12.** The Finnish Diabetic Nephropathy Study Centres

Centre	Members
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SUPPLEMENTARY DATA

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City of Vantaa Health Center:	
Korso	R.Toivonen, H.Virtanen
Länsimäki	R.Ahonen, M.Ivaska-Suomela, A.Jauhiainen
Martinlaakso	M.Laine, T.Pellonpää, R.Puranen
Myyrmäki	A.Airas, J.Laakso, K.Rautavaara
Rekola	M.Erola, E.Jatkola
Tikkurila	R.Lönnblad, A.Malm, J.Mäkelä, E.Rautamo
Heinola Health Center	P.Hentunen, J.Lagerstam
Helsinki University Central Hospital, Department of Medicine, Division of Nephrology	M.Feodoroff, D.Gordin, O.Heikkilä, K.Hietala, J.Fagerudd, M.Korolainen, L.Kyllönen, J.Kytö, S.Lindh, K.Pettersson-Fernholm, M.Rosengård- Bärlund, A.Sandelin, L.Thorn, J.Tuomikangas, T.Vesisenaho, J.Wadén
Herttoniemi Hospital, Helsinki	V.Sipilä
Hospital of Lounais-Häme, Forssa	T.Kalliomäki, J.Koskelainen, R.Nikkanen, N.Savolainen, H.Sulonen, E.Valtonen

SUPPLEMENTARY DATA

Centre	Members
Hyvinkää Hospital	L. Norvio, A.Hämäläinen
Iisalmi Hospital	E.Toivanen
Jokilaakso Hospital, Jämsä	A.Parta, I.Pirttiniemi
Jorvi Hospital, Helsinki University Central Hospital	S.Aranko, S.Ervasti, R.Kauppinen-Mäkelin, A.Kuusisto, T.Leppälä, K.Nikkilä, L.Pekkonen
Jyväskylä Health Center, Kyllö	K.Nuorva, M.Tiihonen
Kainuu Central Hospital, Kajaani	S.Jokelainen, K.Kananen, M.Karjalainen, P.Kemppainen, A-M.Mankinen, A.Reponen, M.Sankari
Kerava Health Center	H.Stuckey, P.Suominen
Kirkkonummi Health Center	A.Lappalainen, M.Liimatainen, J.Santaholma
Kivelä Hospital, Helsinki	A.Aimolahti, E.Huovinen
Koskela Hospital, Helsinki	V.Ilkka, M.Lehtimäki
Kotka Health Center	E.Pälikkö-Kontinen, A.Vanhanen
Kouvola Health Center	E.Koskinen, T.Siitonen
Kuopio University Hospital	E.Huttunen, R.Ikäheimo, P.Karhapää, P.Kekäläinen, M.Laakso, T.Lakka, E.Lampainen, L.Moilanen, S. Tanskanen, L.Niskanen, U.Tuovinen, I.Vauhkonen, E.Voutilainen

**Supplementary Table S13.** Hong Kong Diabetes Registry TRS Project Group members.

Group Members
Ronald C.W. Ma <sup>1,2,3,4</sup>
Juliana C.N. Chan <sup>1,2,3</sup>
Yu Huang <sup>5</sup>
Hui-yao Lan <sup>1,3</sup>
Si Lok <sup>3</sup>
Brian Tomlinson <sup>1</sup>
Stephen K.W. Tsui <sup>5</sup>
Weichuan Yu <sup>6</sup>
Kevin Y.L. Yip <sup>7</sup>
Ting Fung Chan <sup>8</sup>
Xiaodan Fan <sup>9</sup>
Wing Yee So <sup>1,2</sup>
Cheuk Chun Szeto <sup>1</sup>
Nelson Tang <sup>3</sup>
Andrea O. Luk <sup>1,2,3</sup>
Xiaoyu Tian <sup>5</sup>
Guozhi Jiang <sup>1</sup>

## SUPPLEMENTARY DATA

Claudia H.T. Tam<sup>1</sup>

Heung Man Lee<sup>1</sup>

Cadmon K.P. Lim<sup>1</sup>

Katie K.H. Chan<sup>2</sup>

Fangying Xie<sup>1</sup>

Alex C.W. Ng<sup>1</sup>

Grace P.Y. Cheung<sup>1</sup>

Ming-wai Yeung<sup>1</sup>

Shi Mai<sup>5</sup>

Fei Xie<sup>1</sup>

Sen Zhang<sup>6</sup>

Pu Yu<sup>6</sup>

Meng Weng<sup>6</sup>

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### **Affiliations**

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<sup>2</sup>Hong Kong Institute of Diabetes and Obesity, The Chinese University of Hong Kong, Hong Kong

<sup>3</sup>Li Ka Shing Institute of Health Sciences, The Chinese University of Hong Kong, Hong Kong

<sup>4</sup>Integrated Bioinformatics Laboratory for Cancer Biology and Metabolic Diseases, The Chinese University of Hong Kong, Hong Kong

<sup>5</sup>School of Biomedical Sciences, The Chinese University of Hong Kong

<sup>6</sup>Department of Electronic and Computer Engineering, The Hong Kong University of Science and Technology

SUPPLEMENTARY DATA

<sup>7</sup> Department of Computer Science and Engineering, The Chinese University of Hong Kong

<sup>8</sup> School of Life Sciences, The Chinese University of Hong Kong

<sup>9</sup> Department of Statistics, The Chinese University of Hong Kong, Hong Kong

**Supplementary Table S14.** Group membership of The Warren 3/UK GoKinD Study Group

Centre	Members
Belfast	A. P. Maxwell, A. J. McKnight, D. A. Savage
Edinburgh	J. Walker
London	S. Thomas, G. C. Viberti
Manchester	A. J. M. Boulton
Newcastle	S. Marshall
Plymouth	A. G. Demaine, B. A. Millward
Swansea	S. C. Bain

**Supplementary Table S15.** Membership of the GENIE Consortium

FinnDiane, Finland:	Niina Sandholm <sup>1,2,3</sup> , Carol Forsblom <sup>1,2</sup> , Valma Harjutsalo <sup>1,2,4</sup> , Ville-Petteri Mäkinen <sup>1,2, 4,6</sup> , Aila J Ahola <sup>1,2</sup> , Emma Dahlström <sup>1,2</sup> , Daniel Gordin <sup>1,2</sup> , Outi Heikkilä <sup>1,2</sup> , Kustaa Hietala <sup>1,7</sup> , Janne Kytö <sup>1,7</sup> , Markku Lehto <sup>1,2</sup> , Raija Lithovius <sup>1,2</sup> , Nicolae Mircea Panduru <sup>1,8</sup> , Maija Parkkonen <sup>1,2</sup> , Milla Rosengård-Bärlund <sup>1,2</sup> , Markku Saraheimo <sup>1,2</sup> , Jenny Söderlund <sup>1,2</sup> , Aino Soro-Paavonen <sup>1,2</sup> , Anna Syreeni <sup>1,2</sup> , Lena M Thorn <sup>1,2</sup> , Nina Tolonen <sup>1,2</sup> , Johan Wadén <sup>1,2</sup> , Per-Henrik Groop <sup>1,2,9</sup>
Belfast, UK:	Amy Jayne McKnight <sup>10</sup> , Gareth J. McKay <sup>10</sup> , Alexander P. Maxwell <sup>10,11</sup>
Boston, MA, USA:	Rany M. Salem <sup>12,13,14</sup> , Tamara Isakova <sup>15,16</sup> , Cameron Palmer <sup>12,13</sup> , Candace Guiducci <sup>12</sup> , Andrew Taylor <sup>12,17</sup> , Daniel B. Mirel <sup>12</sup> , Winfred W. Williams <sup>14,17</sup> , Joel N. Hirschhorn <sup>12,13,14</sup> , Jose C. Florez <sup>12,14,17</sup>
Dublin, Ireland:	Eoin P. Brennan <sup>18,19</sup> , Denise M. Sadlier <sup>18,19</sup> , Finian Martin <sup>18,19</sup> , Catherine Godson <sup>18,19</sup>
Affiliations:	Folkhälsan Institute of Genetics, Folkhälsan Research Center, Helsinki, Finland Department of Medicine, Division of Nephrology, Helsinki University Central Hospital, Helsinki, Finland Department of Biomedical Engineering and Computational Science, Aalto University, Espoo, Finland Diabetes Prevention Unit, National Institute for Health and Welfare, Helsinki, Finland. Department of Integrative Biology and Physiology, University of California



SUPPLEMENTARY DATA

<p>Los Angeles, United States          South Australian Health and Medical Research Institute, Adelaide, Australia          Department of Ophthalmology, Helsinki University Central Hospital, Helsinki, Finland.          Chair of pathophysiology, 2nd clinical Department, "Carol Davila" University of Medicine and Pharmacy, Bucharest, Romania.          Baker IDI Heart and Diabetes Institute, Melbourne, Australia.          Nephrology Research, Centre for Public Health, Queen's University of Belfast, Belfast, UK.          Regional Nephrology Unit, Level 11, Tower Block, Belfast City Hospital, Belfast, UK.          Program in Medical and Population Genetics, Broad Institute, Cambridge, MA, USA.          Endocrine Research Unit, Department of Endocrinology, Children's Hospital, Boston, MA, USA.          Department of Medicine, Harvard Medical School, Boston, MA, USA.          Division of Nephrology and Hypertension, University of Miami, Miami, Florida, USA          Center for Translational Metabolism and Health - Institute for Public Health and Medicine, Northwestern University Feinberg School of Medicine, Chicago, Illinois, USA          Center for Human Genetic Research, Massachusetts General Hospital, Boston, MA, USA.          Diabetes Research Centre, Conway Institute, School of Medicine and Medical Sciences, University College Dublin, Dublin, Ireland.          Mater Misericordiae Hospital, Dublin, Ireland.</p>
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**Supplementary Table S16.** DCCT/EDIC group members

<b>CLINIC #</b>	<b>CLINIC NAME</b>	<b>STUDY COORDINATORS</b>	<b>PRINCIPAL INVESTIGATORS</b>
01	Case Western Reserve University	Lynne Mayer	Rose Gubitosi-Klug
02	University of Pennsylvania	Patti Bourne	Mark Schutta
03	Cornell University	Mary Ellen Lackaye	Naina Sinha Gregory
04	Henry Ford Health System	Davida Kruger J. Kimberly Jones	Arti Bhan
05	Joslin Diabetes Center	Ellen Golden	Lloyd Aiello
06	Massachusetts General Hospital	Mary Larkin	David Nathan
07	Mayo Clinic	Georgia Ziegler	John Service
08	Med University of South Carolina	Susan Caulder Clare Pittman	Louis Luttrell Maria Lopes-Virella

SUPPLEMENTARY DATA

09	International Diabetes Center	Mary Johnson Kimberly Gunyou	Richard Bergenstal
10	University of Iowa	Brenda Vittetoe	William Sivitz
11	University of Minnesota	Nancy Flaherty	John Bantle
12	University of Missouri	Susan Hitt	David Goldstein Dean Hainsworth
13	University of Pittsburgh	Lori Cimino	Trevor Orchard
14	University of Tennessee	Christine Wigley	Samuel Dagogo-Jack
15	University of Texas	Suzanne Strowig	Philip Raskin
16	University of Toronto	Annette Barnie	Bernard Zinman
17	University of Washington	Robyn Fahlstrom	Jerry Palmer
18	University of Western Ontario	Judith Harth Marsha Driscoll	Charlotte McDonald
19	Vanderbilt University	Janie Lipps Hagan	Michael May
20	Washington University St. Louis	Lucy Levandoski	Neil White

<b>CLINIC #</b>	<b>CLINIC NAME</b>	<b>STUDY COORDINATORS</b>	<b>PRINCIPAL INVESTIGATORS</b>
21	Yale University	Patricia Gatcomb	William Tamborlane
23	Northwestern University	Daphne Adelman Susan Colson	Mark Molitch
24	University California San Diego	Gayle Lorenzi	Sunder Mudaliar
25	University of MD Baltimore	Sherry Johnsonbaugh	Ryan Miller
26	University of New Mexico	Janene Canady	David Schade
27	University of South Florida	Maria Luisa Bernal	John Malone Anthony Morrison
41	University of Michigan	Catherine Martin	William Herman Rodica Pop-Busui
<b>Executive Committee</b>	<b>Title</b>	<b>Name</b>	
	Co-Chairman	David Nathan	
	NIDDK Project Scientist	Catherine Cowie	

SUPPLEMENTARY DATA

	NIDDK Program Director	Ellen Leschek
	Lead Research Scientist	Patricia Cleary
	Principal Investigator Data Coordinating Center	John Lachin
	Vice Chairman	Bernie Zinman
	Chair, P&P Committee	
	Principal Investigator Clinical Coordinating Center	Rose Gubitosi-Klug
	Co-Chair, Study Coordinators	Gayle Lorenzi
	Chair, DQA Committee	
	Co-Chair, Study Coordinators	Catherine Martin
	Director Data Coordinating Center	Barbara Braffett
<b>Central Units</b>	<b>Title</b>	<b>Name</b>
	Principal Investigator	Mike Steffes
	Project Manager	Valerie Arends
	Director	Barbara Blodi
	Principal Investigator	Ronald Danis
	Project Manager	Daniel Lawrence
	Lead Photographer	Hugh Wabers
	Director	Elsayed Soliman
	Senior MD Coder	Zhu-Ming Zhang
	Programmer/Analyst	Charles Campbell
	Senior ECG Technician	Susan Hensley
	Assistant Project Manager	Lisa Keasler

SUPPLEMENTARY DATA

**Supplementary Table S17.** Members of the SUMMIT consortium

<b>Partner</b>	<b>Name</b>	<b>Position</b>
1	<b>Michael Mark</b>	<b>Coordinator, WP6 leader</b>
Boehringer-Ingelheim	Markus Albertini	Project manager
Ingelheim, Germany	Carine Boustany	Chronic Kidney Disease, Head of Lab
	Alexander Ehlgen	Transmed
	Martin Gerl	Biomarker & Bioanalysis, Group leader
	Jochen Huber	In vivo Scientist CMDR, Head of Lab
	Corinna Schölch	Biomarker & Bioanalysis, Head of Lab
	Heike Zimdahl-Gelling	Pharmacogenomics, Head of Lab
2	<b>Leif Groop</b>	<b>Prof. Endocrinology; Coordinator Managing entity IMI-JU; PI; WP1 and WP6 leader</b>
Lund University	Elisabet Agardh	Prof. Ophthalmology
Clinical Research Centre	Emma Ahlqvist	Postdoc
Malmö, Sweden	Tord Ajanki	Communication strategist
	Nibal Al Maghrabi	Research nurse
	Peter Almgren	Biostatistician
	Jan Apelqvist	Diabetologist
	Eva Bengtsson	Assis. Prof. Cardiovascular research
	Lisa Berglund	Postdoc
	Harry Björckbacka	Assis. Prof. Cardiovascular research
	Ulrika Blom-Nilsson	LUDC administrator
	Mattias Borell	Website, server management
	Agneta Burström	Research nurse
	Corrado Cilio	Assoc. Prof. Cellular autoimmunity
	Magnus Cinthio	Assist. Prof. Electrical Measurements, Lund Technical University
	Karl Dreja	Nephrologist
	Pontus Dunér	Postdoc Exp. Cardiovasc. Research
	Daniel Engelbertsen	PhD student Exp. Cardiovasc. Research
	Joao Fadista	Postdoc

SUPPLEMENTARY DATA

Partner	Name	Position
	Maria Gomez	Assoc. Prof. Cardiovascular disease, <b>WP4 co-leader</b>
	Isabel Goncalves	Assis. Prof. Cardiovascular research
	Bo Hedblad	Prof. Cardiovascular epidemiology
	Anna Hultgårdh	Prof. Vessel Wall Biology
	Martin E. Johansson	Pathologist
	Cecilia Kennbäck	Laboratory Engineer
	Jasmina Kravic	Database manager
	Claes Ladenvall	Genetic statistician
	Åke Lernmark	Prof. Type 1 diabetes and celiac disease
	Eero Lindholm	Physician, Researcher Diabetic Complications
	Charlotte Ling	Assist. Prof. Epigenetics
	Holger Luthman	Prof. Medical genetics
	Olle Melander	Assoc. Prof. Hypertension and cardiovascular disease
	Malin Neptin	Biomedical analyst
	Jan Nilsson	Prof. Experimental Cardiovascular research, <b>WP3 leader</b>
	Peter Nilsson	Prof. Internal medicine
	Tobias Nilsson	PhD student Electrical Measurements, Lund Technical University
	Gunilla Nordin Fredriksson	Prof. Cardiovascular research
	Marju Orho-Melander	Prof. Genetic epidemiology
	Emilia Ottoson-Laakso	PhD student
	Annie Persson	Research nurse
	Margaretha Persson	Laboratory Engineer
	Mats-Åke Persson	Database manager
	Jacqueline Postma	Project manager
	Elisabeth Pranter	Research nurse
	Sara Rattik	PhD student Exp. Cardiovasc. Research
	Gunnar Sterner	Chief physician Internal Medicine Research Unit
	Lilian Tindberg	Research nurse
	Maria Wigren	Postdoc Exp. Cardiovasc. Research
	Anna Zetterqvist	PhD student

SUPPLEMENTARY DATA

Partner	Name	Position
	Mikael Åkerlund	Postdoc
	Gerd Östling	Laboratory Engineer
3	<b>Timo Kanninen</b>	Technical director; PI
Biocomputing Platforms	Anni Ahonen-Bishopp	Software development manager
(BC Platforms)	Anita Eliasson	Financial and administrative director
Espoo, Finland	Timo Herrala	System (server) specialist
	Päivi Tikka-Kleemola	Service manager
4	<b>Anders Hamsten</b>	Prof. Cardiovascular disease; Atherosclerosis Research Unit; PI
Karolinska Institute	Christer Betsholtz	Prof. Vascular biology
Stockholm, Sweden	Ami Björkholm	Administrator
	Ulf de Faire	Professor emeritus Cardiovascular epidemiology
	Fariba Foroogh	Research engineer
	Guillem Genové	Scientist
	Karl Gertow	Research Assist. Prof. Cardiovascular genetics
	Bruna Gigante	Assoc. Professor Cardiovascular epidemiology
	Bing He	Postdoc
	Karin Leander	Assoc. Professor Cardiovascular epidemiology
	Olga McLeod	Postdoc
	Maria Nastase-Mannila	Postdoc
	Jaako Patrakka	Postdoc
	Angela Silveira	Assoc. Prof. Cardiovascular genetics
	Rona Strawbridge	Postdoc
	Karl Tryggvason	Prof. Medical Chemistry
	Max Vikström	Statistician
	John Öhrvik	Professor
	Anne-May Österholm	Postdoc
5	<b>Barbara Thorand</b>	Nutritional scientist, epidemiologist

SUPPLEMENTARY DATA

Partner	Name	Position
Helmholtz Centre	Christian Gieger	Statistician
Munich, Germany	Harald Grallert	Biologist
	Tonia Ludwig	Statistician
	Barbara Nitz	Scientist
	Andrea Schneider	Data manager
	Rui Wang-Sattler	Scientist
	Astrid Zierer	Statistician
	<b>6 Giuseppe Remuzzi</b>	Institute director; PI
Mario Negri Institute for	Ariela Benigni	Head of department Molecular Medicine
Pharmacological Research	Roberta Donadelli	Scientist
	Maria Domenica Lesti	Researcher
Bergamo, Italy	Marina Noris	Head Laboratory Immunology and genetics of transplanted and rare diseases
	Norberto Perico	Senior scientist
	Annalisa Perna	Biostatistician
	Rossella Piras	Postdoc
	Piero Ruggerenti	Head of department Renal medicine, Assist. Prof. Nephrology and dialysis
	Erica Rurali	Postdoc
	<b>7 David Dunger (att: Jane Horsford)</b>	Prof. Paediatrics; PI
University of Cambridge	Ludo Chassin	Senior Data Manager
UK	Neil Dalton, London	Clinical biochemistry
	John Deanfield, London	Paediatric cardiology
	Jane Horsford	PA to Prof. Dunger
	Clare Rice	Operations manager/financial contact
	James Rudd	Cardiovascular imaging
	Neil Walker	Head Data services
	Karen Whitehead	Technician
	Max Wong	Postdoc

SUPPLEMENTARY DATA

Partner	Name	Position
	8 <b>Helen Colhoun</b>	Prof. Public health and epidemiology; PI; Vice coordinator Managing entity; <b>WP2 leader</b>
	Fiona Adams	
University of Dundee	Tahira Akbar	PA to Helen Colhoun
Scotland	Jill Belch	Prof. Vasucular disease
	Harshal Deshmukh	PhD student
	Fiona Dove	
	Angela Ellingford	NHS Tayside Diabetic Retinopathy Screening Programme manager
	Bassam Farran	Statistician
	Mike Ferguson	Dean of research Biological chemistry and drug discovery
	Gary Henderson	
	Graeme Houston	Consultant radiologist/senior lecturer
	Faisel Khan	Reader, Vascular & Inflammatory Diseases Research Unit
	Graham Leese	Consultant diabetologist/reader
	Yiyuan Liu	PhD student
	Shona Livingstone	Senior statistician
	Helen Looker	Epidemiologist
	Margaret McCann	Project assistant
	Stuart McGurnaghan	Lead data programmer
	Andrew Morris	Prof. Diabetic medicine
	David Newton	
	Colin Palmer	Prof. Pharmacogenomics
	Ewan Pearson	Consultant diabetologist/senior lecturer
	Gillian Reekie	Research Nurse
	Natalie Smith	Research Nurse
	9 <b>Angela Shore</b>	Prof. Cardiovascular Science, PI
Peninsula Medical School	Kuni Aizawa	Postdoc
Exeter, UK	Claire Ball	Research nurse
	Nick Bellenger	Cardiologist



SUPPLEMENTARY DATA

Partner	Name	Position
	Francesco Casanova	Associate Research Fellow Vascular medicine
	Tim Frayling	Prof. Genetics
	Phil Gates	Senior lecturer Cardiovascular science
	Kim Gooding	Postdoc Vascular medicine
	Andrew Hattersley	Prof. Molecular medicine
	Roland Ling	Consultant ophthalmologist
	David Mawson	Research technician
	Robin Shandas	Prof. Bioengineering (Colorado)
	David Strain	Stroke physician, clinical lecturer
	Clare Thorn	Postdoc Vascular medicine
10	<b>Ulf Smith</b>	Prof. ; PI
University of Gothenburg	Ann Hammarstedt	Researcher Molecular and clinical medicine
Sweden	Hans Häring	Prof. University of Tübingen
	Oluf Pedersen	Prof. Steno Centre, Copenhagen
	Georgio Sesti	Prof. Universtiy of Catanzaro
11	<b>Per-Henrik Groop</b>	Prof. Diabetes genetics; PI
	Emma Fagerholm	PhD student, genetics
Folkhälsan	Carol Forsblom	Clinical coordinator
Helsinki, Finland	Valma Harjutsalo	
	Maikki Parkkonen	Laboratory manager
	Niina Sandholm	DSc(PhD); GWAS and bioinformatics
	Nina Tolonen	MD PhD
	Iiro Toppila	BSc, bioinformatician
	Erkka Valo	MSc, bioinformatician
12	<b>Veikko Salomaa</b>	Prof. Epidemiology; PI; <b>deputy leader WP2</b>
The National Institute for Health and Welfare	Aki Havulinna	DSc. (tech), statistician
Helsinki, Finland	Kati Kristiansson	Postdoc

SUPPLEMENTARY DATA

Partner	Name	Position
	Pia Okamo	THL press officer
	Tomi Peltola	
	Markus Perola	Professor
	Arto Pietilä	Statistician
	Samuli Ripatti	Professor, Statistics
	Marketta Taimi	Research assistant
13	<b>Seppo Ylä-Herttuala</b>	Prof.; PI; <b>WP4 leader</b>
University of Eastern Finland	Mohan Babu	PhD student
Kuopio, Finland	Marika Dijkstra	PhD student
	Erika Gurzeler	PhD student
	Jenni Huusko	PhD student
	Ivana Kholová	Postdoc
	Markku Laakso	Prof.
	Mari Merentie	PhD student
	Marja Poikolainen	PA Prof Ylä-Herttuala
14	<b>Mark McCarthy</b>	Prof. Human type 2 diabetes; Oxford Centre for Diabetes, Endocrinology and Metabolism; Wellcome Trust Centre for Human Genetics; PI; <b>deputy leader WP1</b>
University of Oxford	Chris Groves	Technical staff
UK	Thorhildur Juliusdottir	PhD student
	Fredrik Karpe	PI OCDEM
	Vasiliki Lagou	Postdoc
	Andrew Morris	Wellcome Trust Senior Fellow; Bioinformatics and statistical genetics
	Will Rayner	Database manager
	Neil Robertson	Informatics
	Natalie van Zuydam	Postdoc
15	<b>Claudio Cobelli</b>	Prof. ; PI; <b>WP5 leader</b>
University of Padova	Barbara Di Camillo	Assist. Prof.

SUPPLEMENTARY DATA

Partner	Name	Position
Italy	Francesca Finotello	PhD student
-	Francesco Sambo	Postdoctoral fellow
-	Gianna Toffolo	Prof.
-	Emanuele Trifoglio	PhD student
-	-	-
16	<b>Riccardo Bellazzi</b>	Prof. Bioengineering; PI; <b>deputy leader WP5</b>
	Nicola Barbarini	Postdoctoral fellow
University of Pavia	Mauro Bucalo	Software engineer
Italy	Christiana Larizza	Assist. Prof.
	Paolo Magni	Assoc. Prof.
	Alberto Malovini	Postdoctoral fellow
	Simone Marini	Postdoctoral fellow
	Francesca Mulas	Postdoctoral fellow
	Silvana Quaglini	Prof.
	Lucia Sacchi	Assist. Prof.
	Francesca Vitali	
17	<b>Ele Ferrannini</b>	Prof. Medicine; PI
	Beatrice Boldrini	Postdoctoral fellow
University of Pisa	Michaela Kozakova	Senior investigator Medical Pathophysiology
Italy	Andrea Mari	Senior researcher Biomedical engineering (ISIB-CNR, Padova)
	Carmela Morizzo	Biologist, Sonographer Cardiovascular ultrasound
	Lucrecia Mota	EGIR administrative office
	Andrea Natali	Assoc. Prof. Medicine
	Carlo Palombo	Assoc. Prof. Medicine; <b>deputy leader WP3</b>
	Elena Venturi	Researcher
	Mark Walker	Prof. Molecular diabetic medicine (Univ Newcastle-upon-Tyne )
18	<b>Carlo Patrono</b>	Prof. Pharmacology; PI
Catholic University of Rome	Francesca Pagliaccia	PhD student

SUPPLEMENTARY DATA

Partner	Name	Position
Italy	Bianca Rocca	Assist. Prof. Pharmacology
19	<b>Pirjo Nuutila</b>	Prof. ; PI
University of Turku	Johanna Haukkala	PhD student
Finland	Juhani Knuuti	Prof. ; Director Turku PET Centre
	Anne Roivainen	Prof.
	Antti Saraste	Adj. Prof.
20	<b>Paul McKeague</b>	Prof. Genetic Epidemiology; PI
University of Edinburgh	Norma Brown	Research administrator, Public Health Services
Scotland	Marco Colombo	Bioinformaticist
21	<b>Birgit Steckel-Hamann</b>	Deputy coordinator; PI, Manager IMI, LRL
Eli Lilly	Krister Bokvist	Biostatistician
	Sudha Shankar	Diabetologist
	Melissa Thomas	Translational Science
22	<b>Li-ming Gan</b>	Prof.; Translational Science Director Cardiovascular Disease; PI, <b>WP3 leader</b>
AstraZeneca	Suvi Heinonen	PhD, Internal AZ postdoc, Bioscience
	Ann-Cathrine Jönsson-Rylander	PhD, Assoc. Prof., Team Leader Bioscience, <b>WP4 leader</b>
	Remi Momo	Postdoctoral fellow
	Volker Schneck	Informatician Translational Science, <b>WP5 leader</b>
	Robert Unwin	Translational Science Director Diabetic Nephropathy
	Anna Walentinsson	Geneticist Translational Science
	Carl Whatling	Bioscientist
23	<b>Everson Nogoceke</b>	Pre-clinical and clinical aspects of metabolic and vascular disease; PI; <b>WP2 leader</b>
Roche	Gonzalo Durán Pacheco	Senior Research Statistician
	Ivan Formentini	Biomarker & Experimental Medicine Leader

SUPPLEMENTARY DATA

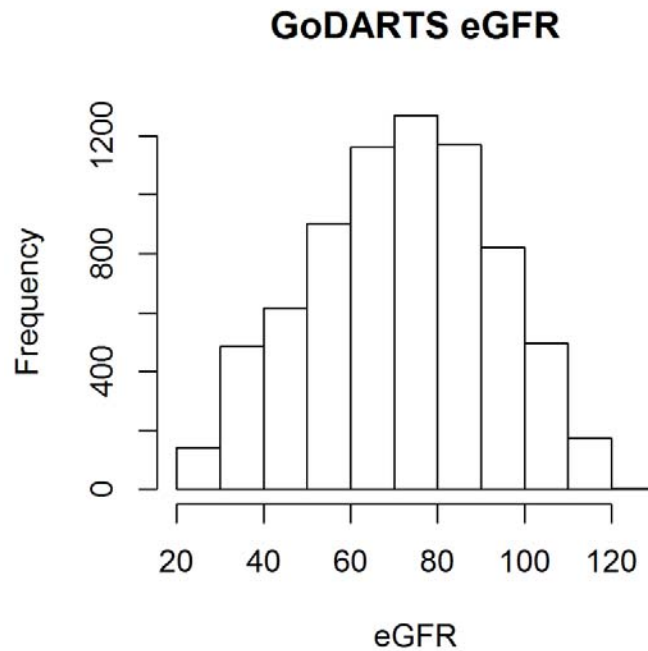
Partner	Name	Position
	Thomas Schindler	Pre-clinical and clinical and clinical biomarkers
24	<b>Piero Tortoli</b>	Professor of Electronics
University of Florence	Luca Bassi	Postdoctoral fellow
	Enrico Boni	Postdoctoral fellow
	Alessandro Dallai	Postdoctoral fellow
	Francesco Guidi	Technician
	Matteo Lenge	PhD student
	Riccardo Matera	PhD student
	Alessandro Ramalli	PhD student
	Stefano Ricci	Assist. Prof.
	Jacopo Viti	PhD student
25	<b>Bernd Jablonka</b>	SAD internal IMI coordinator
Sanofi-aventis	Dan Crowther	Biomarker researcher
	Johan Gassenhuber	Biostatistician
	Sibylle Hess	Biomarker researcher
	Thomas Hübschle	Pharmacologist Diabetes
	Hans-Paul Juretschke	Imaging
	Hartmut Rütten	Head Translational Medicine
	Thorsten Sadowski	Pharmacologist Diabetes
	Paulus Wohlfart	Pharmacologist Diabetes
26	<b>Julia Brosnan</b>	Biochemist, (pre)clinical research CVD, Pfizer US; <b>WP2 leader</b>
Pfizer	Valerie Clerin	Cardio-renal biologist, WP2
	Eric Fauman	Computational biologist
	Craig Hyde	Statistician
	Anders Malarstig	Human genetics, Pfizer Europe; <b>WP1 leader</b>
	Nick Pullen	Renal Disease Research Director
	Mera Tilley	

SUPPLEMENTARY DATA

<b>Partner</b>	<b>Name</b>	<b>Position</b>
	Theresa Tuthill	Imaging specialist
	Ciara Vangjeli	Cardiovascular genetic epidemiologist, Pfizer Europe
	Daniel Ziemek	Computational biologist

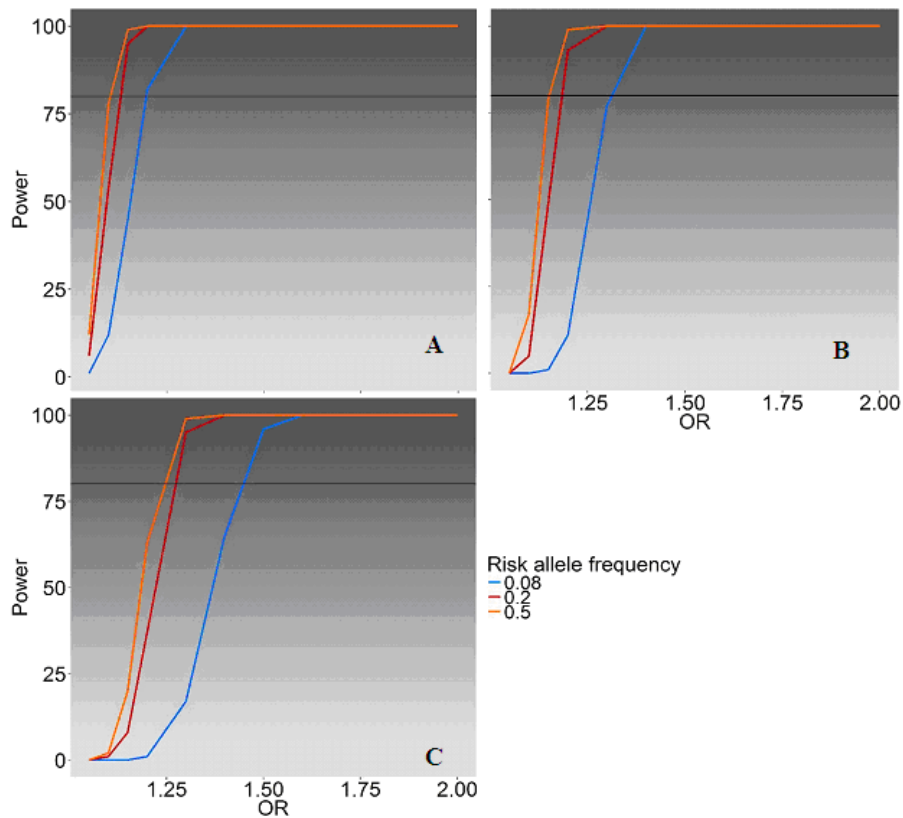
SUPPLEMENTARY DATA

**Supplementary Figure S1.** Histogram of estimated glomerular filtration rate in the Genetics of Diabetes and Audit Research in Tayside Scotland study (N=6,335) shows an approximately normal distribution.



SUPPLEMENTARY DATA

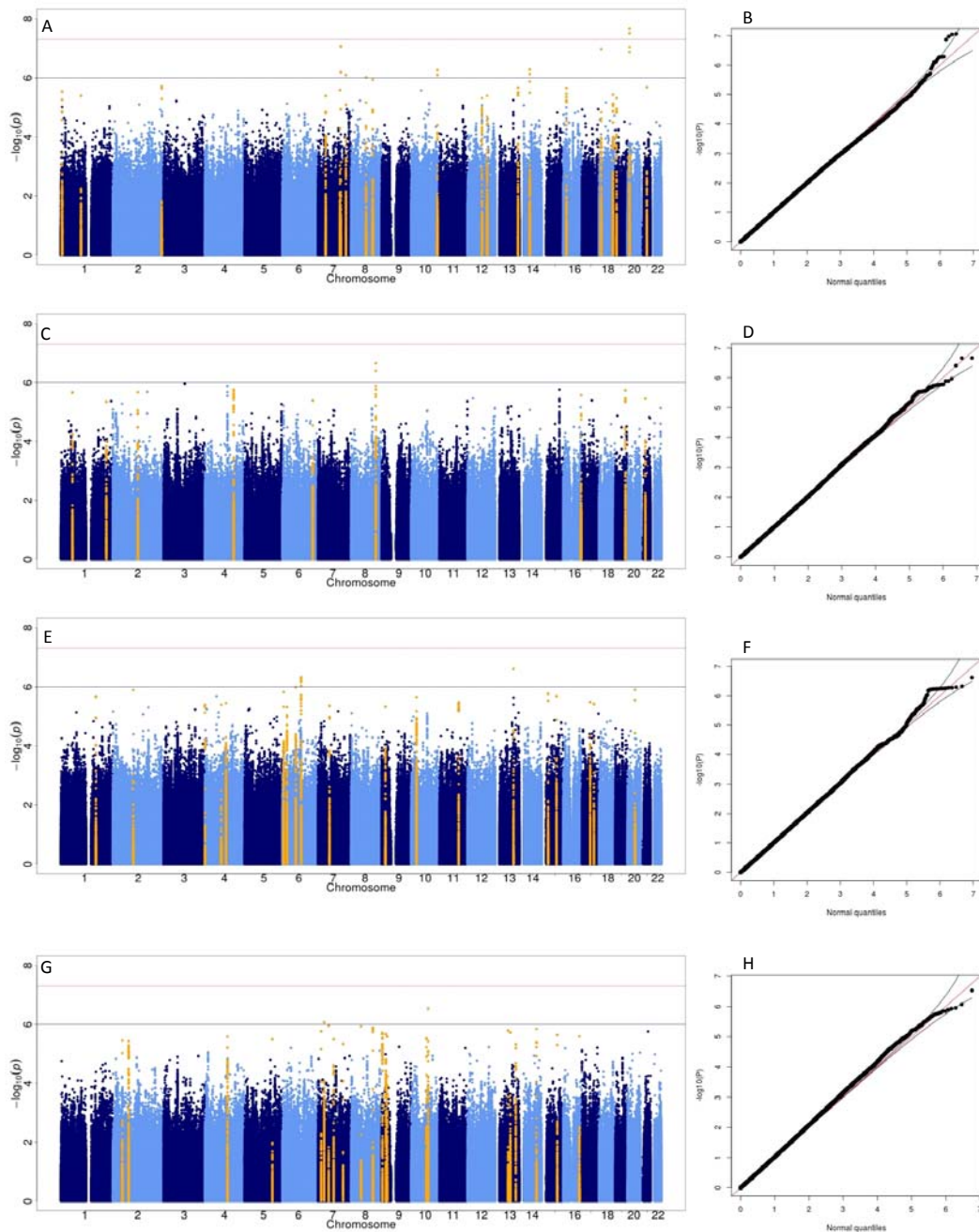
**Supplementary Figure S2.** Power calculations were performed for a range of OR (1.05-2.00) and a range of minor allele frequencies (0.08-0.50) in A: 5,908 diabetic kidney disease cases (DKD) and 4,965 controls with no history of DKD with either T2D or T1D to detect an association with a candidate gene  $\alpha = 0.05/55 = 9 \times 10^{-4}$ ; B: 5,908 DKD and 4,965 controls with no history of DKD with either T2D or T1D to detect an association at  $\alpha = 5 \times 10^{-8}$  and C: 3,345 DKD cases and 2,372 controls with no history of DKD in subjects with T2D to detect associations at  $\alpha = 5 \times 10^{-8}$ .



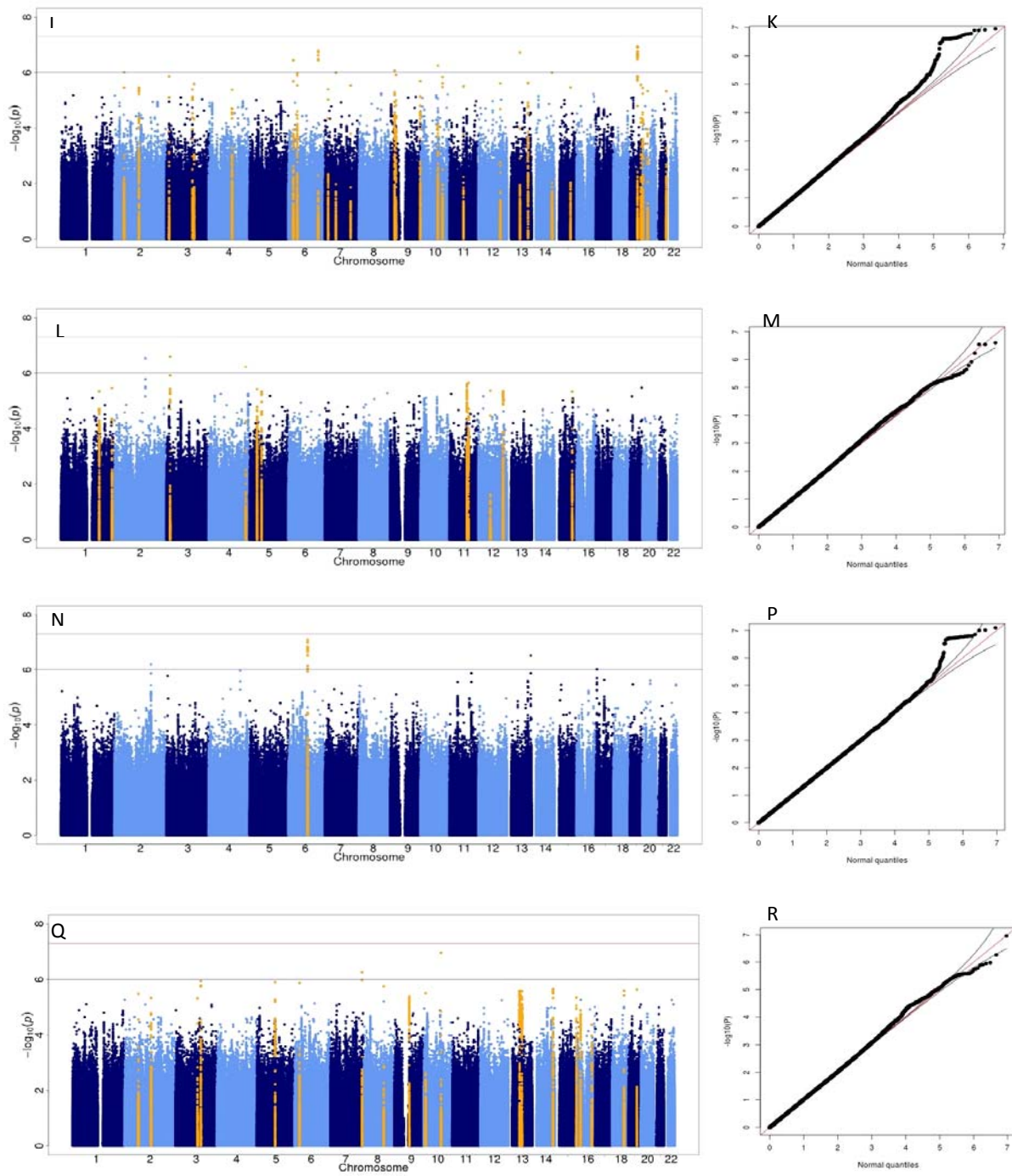


SUPPLEMENTARY DATA

**Supplementary Figure S3.** Manhattan and QQ plots of discovery p values for chronic kidney disease (CKD, plots A and B), CKD and diabetic kidney disease (DKD, plots C and D), ‘all DKD’ (plots E and F), end-stage renal disease compared to normoalbuminuric controls (ESRD, plots G and H), ESRD compared to normoalbuminuric controls and all other forms of DKD (plots J and K), ‘late DKD’ (plots L and M), microalbuminuria (plots N and P) and estimated glomerular filtration rate (plots Q and R) from the analysis of subjects with type 2 diabetes. Orange peaks represent signals selected for replication.

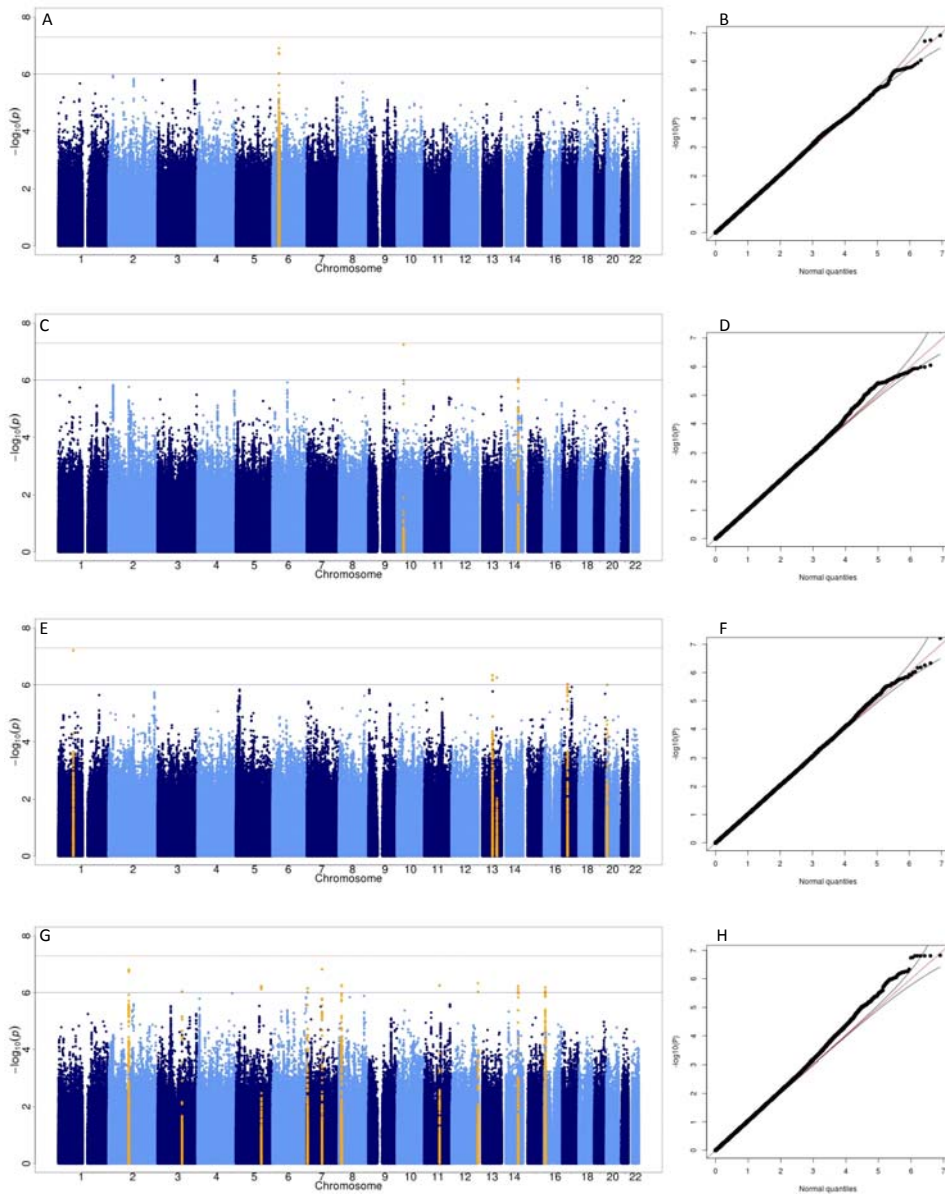


SUPPLEMENTARY DATA

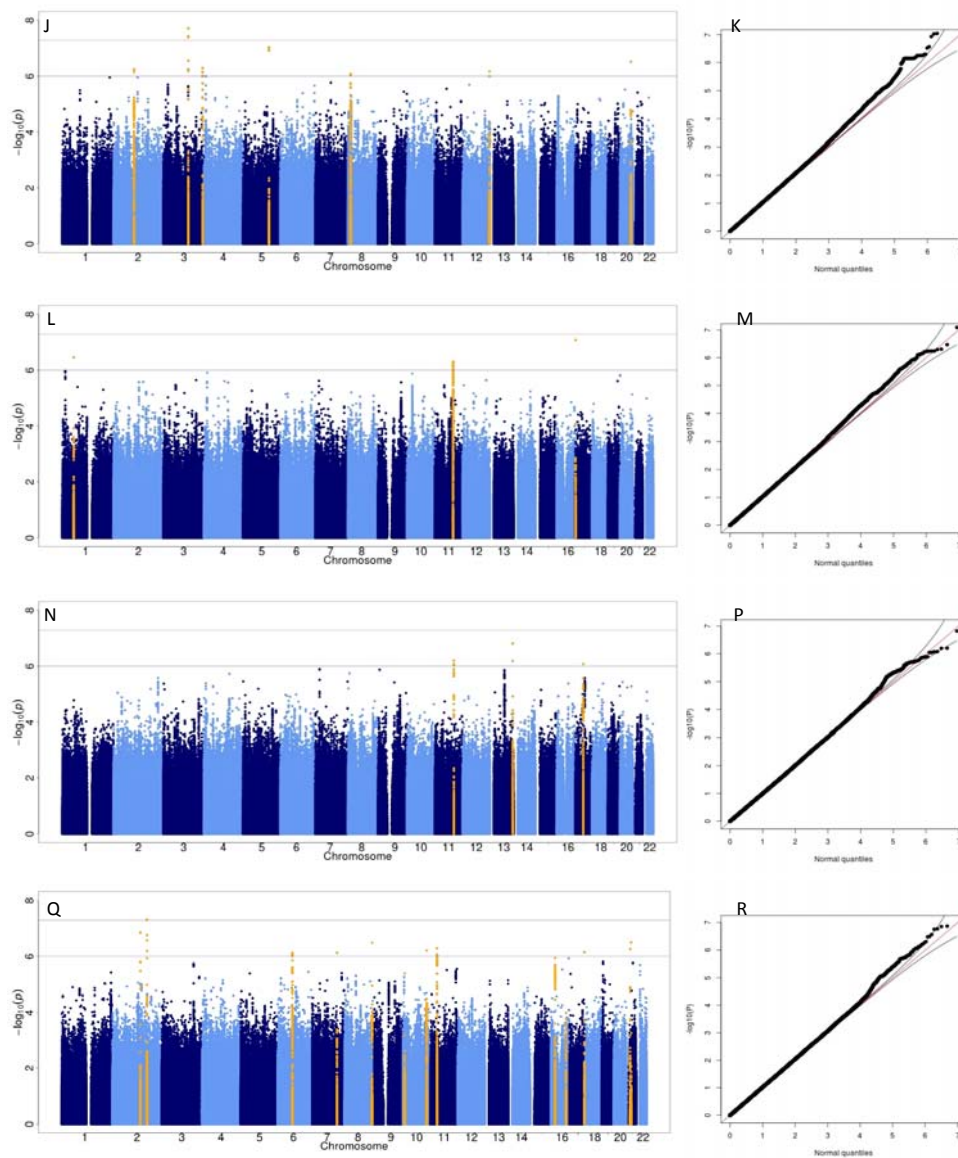


SUPPLEMENTARY DATA

**Supplementary Figure 4.** Manhattan and QQ plots for chronic kidney disease (CKD, plots A and B), CKD and diabetic kidney disease (DKD, plots C and D), ‘all DKD’ (plots E and F), end-stage renal disease compared to normoalbuminuric controls (ESRD, plots G and H), ESRD compared to normoalbuminuric controls and all other forms of DKD (plots J and K), ‘late DKD’ (plots L and M), microalbuminuria (plots N and P) and estimated glomerular filtration rate (plots Q and R) from the combined analysis of subjects with type 1 diabetes and type 2 diabetes. Orange peaks represent signals selected for replication.



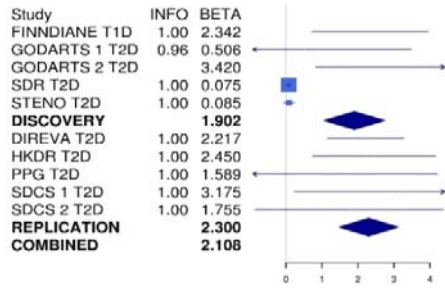
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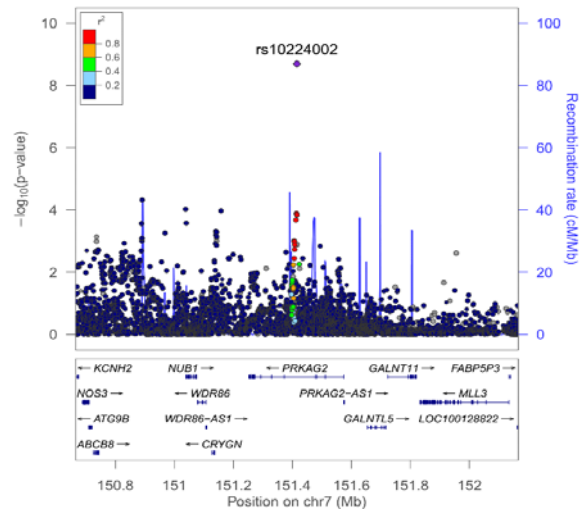
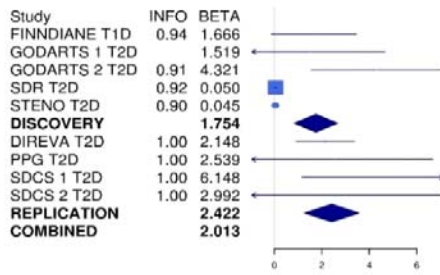
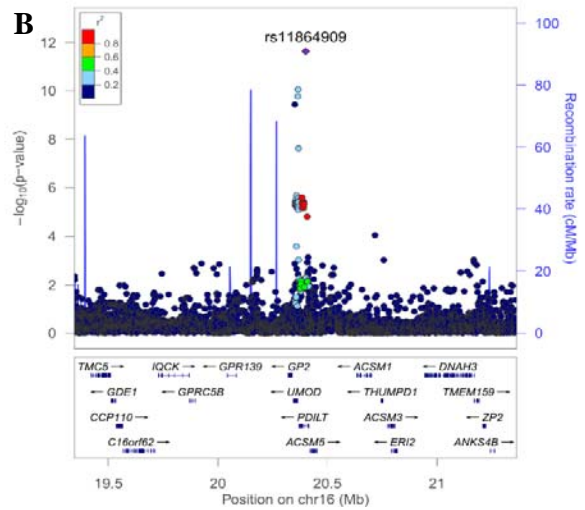
SUPPLEMENTARY DATA

**Supplementary Figure S5.** Two genome-wide significant ( $p < 5 \times 10^{-8}$ ) loci for eGFR from the combined analysis of subjects with either type 1 or type 2 diabetes. These loci map to two signals in *UMOD* and *PRKAG2* respectively (A and B). The Locuszoom plots show the locus specific association signal and the forest plots (C and D) the individual study effects or the top SNP.

**A**

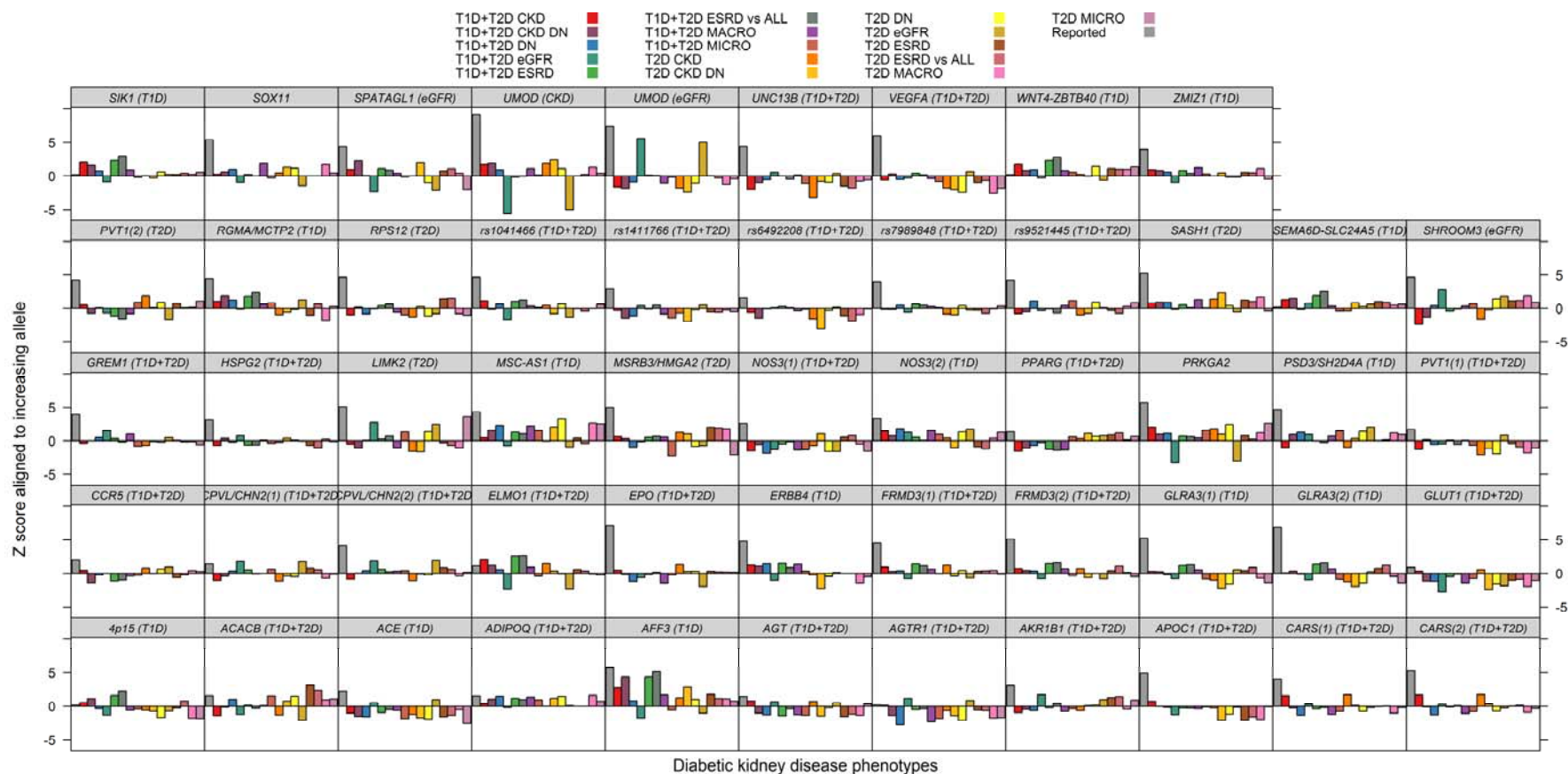


**B**



SUPPLEMENTARY DATA

**Supplementary Figure S6.** Sixty-one loci have been reported for diabetic kidney disease (DKD) in the literature. In this study we had summary statistics for 55 of these loci. The lattice plot shows the z score for the reported loci aligned to the risk or trait raising allele of the original report. The plot also reflects whether the original report was from subjects with diabetes (T1D+T2D, T1D or T2D) or irrespective of diabetes status (type of diabetes not indicated).



## SUPPLEMENTARY DATA

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### **Data availability**

The summary level GWAS is available at [www.imi-summit.eu](http://www.imi-summit.eu). Raw genotypic and phenotypic data will be made available for researchers who meet the criteria for access to confidential data for the following data: SDR: at [www.imi-summit.eu](http://www.imi-summit.eu); NFS-ORPS through JDRF/WT Diabetes and Inflammation Laboratory (DIL) in Cambridge (<https://www-gene.cimr.cam.ac.uk/>). The written consents of the FinnDiane, Eurodiab, GoDARTS and Steno studies do not allow sharing individual-level genotype or phenotype data (The authors of these studies may be contacted for collaboration: Per-Henrik Groop, [per-henrik.groop@helsinki.fi](mailto:per-henrik.groop@helsinki.fi); Helen Colhoun, [H.Colhoun@dundee.ac.uk](mailto:H.Colhoun@dundee.ac.uk), Peter Rossing, [pro@steno.dk](mailto:pro@steno.dk), respectively).

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