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Genetically Determined Plasma Lipid Levels and Risk of Diabetic Retinopathy: A Mendelian Randomization Study

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Abstract

Results from observational studies examining dyslipidemia as a risk factor for diabetic retinopathy (DR) have been inconsistent. We evaluated the causal relationship between plasma lipids and DR using a Mendelian randomization (MR) approach. We pooled genome-wide association studies summary statistics from 18 studies for 2 DR phenotypes: any DR (N=2,969 case; 4,096 controls) and severe DR, (N=1,277 cases; 3,980 controls). Previously identified lipid-associated single nucleotide polymorphisms (SNPs) served as instrumental variables. Meta-analysis to combine the MR estimates from different cohorts was conducted. There was no statistically significant change in odds ratios (OR) of having any DR or severe DR for any of lipid fractions in the primary analysis which used SNPs that did not have a pleiotropic effect on another lipid fraction. Similarly, there was no significant association in the Caucasian and Chinese subgroup analyses. This study did not show evidence of a causal role of the four lipid fractions on DR. However, the study had limited power to detect OR less than 1.23 per standard deviation (SD) in genetically-induced increase in plasma lipid levels, thus we cannot exclude that causal relationships with more modest effect sizes exist.

Diabetic retinopathy (DR) is a major microvascular complication of diabetes and is the leading cause of blindness in working aged adults (1). It has been estimated that the global prevalence for any DR and proliferative DR (PDR) to be 34.6% and 7.0% respectively (2).

Dyslipidemia is a major cardiovascular risk factor, and has been suggested also as a potential risk factor for DR, in particular the more severe endpoints such as PDR and diabetic macular edema (DME) (2; 3). However, in contrast to tight glycemic and blood pressure control, which have been shown in clinical trials to reduce DR progression (4; 5), therapies targeted at dyslipidemia have not shown similar results (6; 7). In this regard, fenofibrate, a peroxisome proliferator-activated receptor alpha (PPAR-α) agonist, has shown benefits in reducing requirements for laser treatment of DR and DME (8), but the therapeutic effects of fenofibrate may not be lipid-dependent. The association of dyslipidemia with DR has been inconsistent among observational studies (9-12). Possible reasons for this include confounding (e.g. with obesity), reverse causation and measurement biases. As such, there is difficulty in establishing a causal relationship between plasma lipids and DR.

Mendelian Randomization (MR) is a study design utilizing genetic variants as instrumental variables (IVs) to evaluate the causal relationship between a biomarker and an outcome of interest (13). Because it takes advantage of the natural randomization of genetic variants inherited independent of confounding factors such as lifestyle and environmental factors (14; 15), MR avoids the issues of confounders and reverse causality and serves as a practical approach to evaluate the relationship between plasma lipids and DR.

In this study, we used an MR approach pooling multiple studies to evaluate the causal relationship between plasma lipids and two DR phenotypes: *1)* any DR, and *2)* severe DR by employing genetic variants associated with plasma lipids as IVs.

Methods

Study Participants

We included a total of 18 genome-wide association studies (GWAS) on DR: African American Proliferative Diabetic Retinopathy Study (AAPDR), Age, Gene, Environment, Susceptibility - Reykjavik Study (AGES), Australian Genetics of Diabetic Retinopathy Study (AUST), Blue Mountains Eye Study (BMES), Cardiovascular Health Study-African American (CHS-AA), Cardiovascular Health Study-Whites (CHS-Whites), Genetic Center, China Medical University Hospital, Taiwan, Genetics of Latinos Diabetic Retinopathy (GOLDR), Jackson Heart Study (JHS), Multi-Ethnic Study of Atherosclerosis-African American (MESA-AA), Multi-Ethnic Study of Atherosclerosis-Chinese (MESA-CHN), Multi-Ethnic Study of Atherosclerosis-European (MESA-EU), Multi-Ethnic Study of Atherosclerosis-Hispanic (MESA-HIS), Singapore Chinese Eye Study (SCES), Singapore Malay Eye Study (SiMES), Singapore Indian Eye Study (SINDI), Starr County Health Studies and Taiwan–US Diabetic Retinopathy Study (TUDR). Details of the individual studies have been previously described (16-31). Of them, 17 had phenotype information on any DR and 11 on severe DR. Genotyping was performed on either the Illumina (San Diego, CA, USA) or Affymetrix (Santa Clara, CA, USA) platforms. Imputation was done using the Markov Chain Haplotyping software IMPUTE2 or MaCH with 1000 Genomes or HapMap Phase II as reference panels (Table 1). Details about imputation quality control and adjustment are provided in Table 1. Informed consent was obtained from all participants,

ethics approval was obtained from the local ethics committee and recommendations of the Declaration of Helsinki were adhered to.

Diabetic Retinopathy Assessment and Definition

DR was either assessed through retinal photography or clinical diagnosis in the studies involved. DR was graded using the Early Treatment Diabetic Retinopathy Study (ETDRS) adaptation of the modified Airlie House classification system or the American Academy of Ophthalmology (AAO) International Clinical Diabetic Retinopathy Disease Severity Scale. On the ETDRS scale, grade 10 represents no DR, grades ≥ 20 indicates any DR, and grades ≥ 53 indicates severe non-proliferative DR (NPDR) and proliferative DR (PDR). On the AAO scale, the category no DR indicates absence of DR, the remaining 4 categories together indicate any DR, and the two highest categories together capture severe NPDR and PDR. Since all the studies were graded by one of these two scales and it is straightforward to harmonize DR phenotypes across these two scales, it was possible to easily harmonize the DR phenotype across all the studies.

Two DR phenotypes were assessed in MR analyses: *1)* any DR referred to participants with evidence of presence of DR; *2)* severe DR referred to participants with severe NPDR and/or PDR (Table 1). Controls in the GWAS analyses were defined as type 2 diabetics without DR; cases were type 2 diabetics with either of the defined DR phenotypes.

Genetic Instrumental Variables

We selected lipid-associated single nucleotide polymorphisms at 157 loci, including 60 for high-density lipoprotein (HDL) cholesterol, 30 for low-density lipoprotein (LDL) cholesterol, 28 for triglycerides and 39 for total cholesterol, previously identified by the Global Lipids

Genetic Consortium (GLGC) (32) in individuals of European ancestry. Summary statistics data for the association between these 157 SNPs and plasma lipids were used as genetic IVs for MR analyses in all ethnicities and for Caucasian cohorts. The SNPs used as IVs were not in linkage disequilibrium ($R^2 < 0.2$) with each other as reported by the original report (32). We then tested the effects of these 157 SNPs on plasma lipid levels in East Asian populations from the Asian Genetic Epidemiology Network (AGEN) consortium, identified 51 SNPs (28 for HDL cholesterol, 10 for LDL cholesterol and 13 for triglycerides) associated with plasma lipids ($P < 0.05$) in East Asians and used them for MR analysis in Chinese groups.

Since the goal was to estimate the unconfounded association of specific lipid fractions with the DR outcomes, any of the 157 SNPs that was also associated with another fraction by definition violates the MR assumption that the SNP IV has no pleiotropic effect and only acts on the outcome via the specific lipid fraction exposure. Therefore, for the primary analysis, we selected the subset of SNPs that were unique (independent) to each lipid fraction (i.e. did not also have pleiotropic effect on another lipid fraction) as reported by the GLGC (32). Using type2diabetesgenetics.org, we also examined whether any of these SNPs were significantly associated ($P < 5 \times 10^{-8}$) with other risk factors for DR (type 2 diabetes itself, related glycemic traits and hypertension). We also eliminated those SNPs from the primary analysis (Supplementary Table 1). However, we were also concerned that the primary analysis would suffer from a significant loss of power and might overcorrect for pleiotropy among the different lipid fractions. Therefore, we also performed a secondary analysis where with the entire set of 157 SNPs. Of note, the 157 SNPs were chosen such that each SNP was only chosen assigned to be the IV for the lipid fraction for which it most strongly associated. That is, if a SNP was significantly associated with both HDL and total cholesterol levels but the association with HDL levels was stronger, then it was only chosen as an IV for HDL

levels. This eliminated some pleiotropic SNPs from the analysis, although it was not as conservative as the primary analysis which eliminated SNPs with any pleiotropic effects completely, e.g. they were not assigned as IVs for any lipid fraction.

Statistical Analysis

We obtained GWAS summary statistics data from individual studies for either or both DR phenotypes for the SNPs where genotype and imputed data were available. We then performed inverse variance-weighted, fixed-effect meta-analyses with METAL software to pool available GWAS summary data for each SNP for both DR phenotypes from individual studies. Individual SNP data were pooled from all studies, as well as studies from Caucasian and Chinese cohorts separately.

Next, the association between plasma lipids and DR at each SNP was calculated as $\beta_{(lipid\text{-}DR)} = \beta_{(SNP\text{-}lipid)}/\beta_{(SNP\text{-}DR)}$ (33) where $\beta_{(lipid\text{-}DR)}$ represents the estimated effect size (logarithm of the odds ratio [OR]) of 1 SD of genetically determined plasma lipid levels on DR. To assess the association between each lipid trait and DR, we combined the $\beta_{(lipid\text{-}DR)}$ estimates across multiple SNPs using fixed-effect meta-analysis. Cochran's Q test was applied to assess heterogeneity across SNPs. Heterogeneity across SNPs was found to be low ($I^2 < 40\%$) among studies (Supplementary Table 2), hence random-effect meta-analysis was not carried out.

We performed the same analysis for 2 subgroups of studies for each DR phenotype where the IVs were presumed to be stronger on account of similar ancestry backgrounds: *1)* among studies of Caucasian ancestry using the SNPs identified by the GLGC as IVs, and *2)* among studies of Chinese ancestry using SNPs from the AGEN consortium as IVs. Of note, $\beta_{(SNP\text{-}}$

$_{lipid)}$ estimates differed between GLGC and AGEN, thus supporting the separate analyses in these two populations. All statistical analyses were performed using Stata 14 (StataCorp LP, College Station, TX).

Results

The baseline characteristics of the participants in each study are shown in Table 2. A total of 2,969 cases and 4,096 controls were included in the analysis of the any DR phenotype and 1,277 cases and 3,980 controls were included in the analysis of the severe DR phenotype. A summary of the 157 lipid-associated SNPs used as IVs for MR analysis and the SNPs' pooled association with DR are shown Supplementary Tables 3 and 4.

Tables 3 and 4 show the results of the MR analysis for the any DR phenotype in all cohorts as well as the subgroup Caucasian and Chinese cohort analyses. We did not find any significant association between plasma lipids and DR. In the primary analysis (Table 3), for each 1 SD increase in genetically induced increase in plasma lipid profiles, the OR of having any DR was 0.91 (95% CI: 0.67–1.23) for HDL, 2.50 (0.91–6.87) for LDL, 1.00 (0.86–1.15) for triglycerides and 0.83 (0.53–1.31) for total cholesterol in the all ethnicities analysis.

In the secondary analysis (Table 4), for each 1 SD increase in genetically induced increase in plasma lipid profiles, the OR of having DR was 0.94 (95% CI: 0.79–1.14) for HDL, 0.95 (0.75–1.20) for LDL, 1.08 (0.96–1.22) for triglycerides and 0.92 (0.74–1.14) for total cholesterol in the all ethnicities analysis.

Tables 5 and 6show the results of the MR analysis for the severe DR phenotype. For the primary analysis (Table 5), the OR (95% CI) for the association between plasma lipids and severe DR was 0.98 (0.74–1.31) for HDL, 0.95 (0.39–2.36) for LDL, 0.84 (0.33-2.12) for

triglycerides, and 0.68 (0.25–1.87) for total cholesterol. In the secondary analysis (Table 6), the OR (95% CI) for the association between HDL, LDL and total cholesterol and severe DR was 1.02 (0.81–1.29), 0.94 (0.80–1.10) and 0.69 (0.41–1.16), respectively. In the secondary analysis, there was stronger evidence that raised genetically determined plasma triglycerides levels conferred an increased risk of having severe DR (OR: 1.37, 95% CI: 0.99–1.88), although the results did not achieve statistical significance (P = 0.056). We did not find any association between plasma lipids and severe DR in the subgroup Caucasian and Chinese cohort analyses.

Of note, in the primary analysis using only strictly-defined independent IVs, the risk of genetically determined plasma triglycerides levels on having severe DR was greatly reduced (OR: 0.84, 95% CI: 0.33–2.12), suggesting that the association in the secondary analysis was due to pleiotropic triglyceride-related SNPs. Given this finding, we also repeated the analysis for triglycerides and severe DR using the 12 SNPs that have effects on triglycerides and at least one other lipid fraction (Table 6). The risk of genetically determined plasma triglycerides levels on having severe DR was strengthened (OR 1.42, 95% CI: 1.01 -2.00, P=0.044) when only these 12 pleiotropic SNPs were used. Because the PPAR-α agonist fenofibrate has shown benefits in reducing requirements for laser treatment of DR and DME (8) that are not explained by its therapeutic effects on triglyceride levels, we examined whether any of these 12 SNPs were in or near PPAR-α target genes (34). We found that 3 of these 12 SNPs are near PPAR-α target genes involved in lipoprotein uptake/metabolism and lipogenesis (Supplementary Table 5).

We calculated the power for this study using all 157 SNPs. We determined power for varying ORs for DR per SD of the exposure variable (plasma lipid), with the assumption that

the proportion of lipid variance explained by SNP IVs is R^2 ~ 10% and with a type-1 error of 0.05 (Supplementary Table 6) (35). The minimum OR for which the study has 80% power is 1.23 for the any DR outcome and approximately 1.3 for the severe DR outcome.

Discussion

To the best of our knowledge, our study is the most comprehensive MR study to evaluate the causal role of plasma lipids in DR development by combining multi-ethnic cohorts from different countries. We did not see clear evidence of a causal relationship between lipid measures and DR in the group as a whole, nor in the subgroup analyses in Caucasian and Chinese cohorts using stronger IVs. Our findings may help shed light on the considerable variability in previous observational studies exploring the association between plasma lipids and DR (36). In previous studies, HDL (37; 38), LDL (39; 40), triglycerides (41) and total cholesterol (38) have been inconsistently shown to be associated with DR. Our findings suggest that these associations previously observed may overall be non-causal, partially due to residual confounders. Our findings were generally consistent throughout the subgroup analyses and across populations as we found no heterogeneity across different populations. However, this study was not powered to detect modest (OR < 1.23) effect sizes and thus we cannot exclude the possibility that more modest causal associations between lipid levels and DR may exist.

Our findings did suggest a possible causal relationship between a pleiotropic pathway that includes the triglyceride pathway and severe DR. In a sub-analysis examining the SNPs that have effects on triglycerides and at least one other lipid fraction, there was a marginally significant (P=0.044) association between the genetically determined plasma lipid levels and severe DR risk. This finding must be interpreted cautiously given the multiple hypotheses

tested in this study, but it is an interesting finding that should be followed up in future studies.

Previous studies have shown an association between dyslipidemia and severe DR (2) as well as beneficial effects of fenofibrate treatment on DR (42). Fenofibrate acts mainly to lower plasma triglycerides levels but the mechanism of its effect on DR is unclear (43). In the Fenofibrate Intervention and Event Lowering in Diabetes (FIELD) study, treatment with fenofibrate reduced the need for laser treatment for DR and also a reduction in 2-step progression in DR among those with pre-existing DR (8). The Action to Control Cardiovascular Risk in Diabetes (ACCORD) study similarly showed that fenofibrate reduced DR progression in combination with statins, although this effect could not be entirely explained based on plasma lipid-altering effects (5). Our data suggests that the SNPs that influence triglyceride levels but also influence other plasma lipid fractions may have the strongest influence on DR risk, suggesting pleiotropic effects of SNPs may be important. In particular further examination of the effects of the three triglyceride SNPs near PPAR-α target genes (Supplementary Table 5) may help to further explain how fenofibrate reduces DR progression with a mechanism other than change in plasma lipid profile.

It is possible that the traditional lipid measures of total, HDL and LDL cholesterol, and triglycerides may not accurately measure the effects of dyslipidemia on DR. Previous studies have suggested a more direct relationship between apolipoprotein AI (ApoAI) and apolipoprotein B (ApoB) with DR compared to traditional lipid measures. ApoAI can be found in HDL and is overexpressed in the retina of diabetic patients (44). ApoB is a structural protein for very-low-density lipoprotein, intermediate-density lipoprotein and LDL (45) and may reflect the atherogenic potential of lipid metabolism (46). Observational studies have

found ApoAI, ApoB and ApoB-to-ApoAI ratio to be significantly associated with DR with higher discriminating abilities for DR compared to traditional lipid measures (47). Our study did not evaluate genetically determined apolipoprotein levels as IVs for MR analysis which may yet reveal possible causal relationships between dyslipidemia and DR.

The strengths of this study include pooled data from multiple population-based studies allowing us to increase sample size and thus statistical power. Despite this, our study is still limited by sample size. It is possible that a larger, better powered study in the future could reveal a positive finding. We also used multiple lipid-associated SNPs to increase the ability to detect an association between each lipid trait and DR as effects of individual SNPs on DR may be modest. The IVs used for the European analysis (all genome-wide significant SNPs) were quite strong with an estimated F-Statistic of greater than 10, given the $R^2 \sim 10\%$ in the original report (32). For Asian sub-analysis, the IVs were weaker, but the sensitivity analysis using the strong IVs (genome-wide significant SNPs) did not change the results materially (Supplementary Tables 2 and 7).

Limitations to this study include differing DR grading methodologies among pooled studies, but harmonization was straightforward because all studies were graded on one of two widely accepted scales. Another limitation is that the traditional meta-analysis techniques used do not completely take into account the variability in allelic effects between ethnic groups. Fixed-effects meta-analysis assumes the allelic effect to be the same in all populations. Conversely, random effects meta-analysis assumes that each population has a different underlying allelic effect, which is also suboptimal since populations from the same ethnic group tend to be more homogenous that those that are more distantly related. We found little evidence of heterogeneity and, therefore, we feel that the fixed-effect meta-analysis approach

is justified and that heterogeneity is not a likely explanation for the negative results. However, we cannot exclude the possibility that some trans-ethnic heterogeneity may decrease the power of this study slightly. The variation in imputation thresholds and adjustment among the cohorts is another limitation of the study since whether a SNP was imputed and imputation accuracy can affect the precision, variance explained, and power of the study. In addition, our study did not explore the relationship between plasma lipids and diabetic macular edema which has been suggested in previous studies (48).

The SNPs chosen as IVs for MR analysis in all ethnicities were identified from a previous study of individuals from European ancestry which explained only 10-15% of total lipid trait variance (32) and this might also have weakened the IV strength in our non-European cohorts. However, when we compare findings from that largest European GWAS for lipid levels to the findings from genetic association studies performed in African Americans, Hispanics and Asians, we find great consistency with regards to effect size and direction among ethnicities (Supplementary Tables 8-11). While there may be some loss of power from potential interancestry differences in SNPs affecting lipid levels, it is likely outweighed by the gain in power by utilizing the larger number of SNPs from the European lipid GWAS which explains a greater amount of lipid level variation.

In addition, the SNPs chosen as IVs from MR analysis were derived from a study of mainly non-diabetic subjects which may also decrease the validity of the measures in our study. However, a recent GWAS of lipid levels performed exclusively in type 2 diabetic patients identified all of the top findings had been previously found in non-diabetic populations, indicating that there is significant alignment of the genetic architecture of lipid levels between non-diabetic and diabetic populations (Supplementary Table 12) (49). We did not

establish the association of the SNPs with lipid levels directly in our own cohorts because we only had lipid level data on a subset of patients. This is a limitation but we note that other MR studies of lipid SNPs have also used the approach we employ here with positive results (50), and so we do not think this methodologic limitation is likely to explain our negative results.

One final limitation of this study is the inability to convert risk estimates into more clinically meaningful estimates. This is a limitation of all MR studies using the summary statistics from large GWAS studies, but it does not invalidate the main aim of these studies, which is to garner evidence for causality (50). In the GLGC GWAS, the statistical analysis was a linear regression with the inverse normal transformed lipid trait as the dependent variable (32). The effect estimates were provided in SD units. Unfortunately the raw lipid value data from this study are not available. Therefore we are not able to convert our findings to a more clinically meaningful outcome such as SD of raw plasma lipid levels. The GLGC GWAS does provide the average SD for LDL (36.8 mg/dL), HDL (14.7 mg/dL), triglycerides (92.3 mg/dL), and total cholesterol (42.7 mg/dL) in its Supplementary Table 1 (32). But the SD of the raw plasma lipid values cannot be derived directly from the SD of the inverse normalized values without access to raw data.

In conclusion, our findings did not find clear evidence of a causal role of dyslipidemia on the risk for DR, suggesting that the inconsistently observed associations from previous studies were non-causal, and may also have been affected by confounders. We did find a nominal association between pleiotropic triglyceride IVs and severe retinopathy which should be explored in further studies, particularly given that some of these IVs are in loci near genes that are targets for PPAR-α and that fenofibrate, a PPAR-α agonist, has been shown to

decrease DR progression. Our study provides further understanding of the relative contribution of plasma lipids to the pathogenesis of diabetic complications.

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Author Contributions

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Guarantor Statement

CY-C is the guarantor of this work and, as such, had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Conflict of Interest

All authors declare no conflicts of interest.

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Table 1. Details of Each Study Population

Study	Country	Year	Ethnicity	Genotyping Platform	Imputation: Reference pool/quality cut-off threshold/adjustment in association tests	DR Ascertainment Method	DR Grading Method	DR Phenotypes (number of cases, controls)
AAPDR	USA	2012 – 2013	African American	Affymetrix 5.0	1000 Genomes/ INFO > 0.6, MAF > 1%, or > 5 copies in imputed data/no	Retinal photography	ETDRS	1) Any DR (274, 56) 2) PDR (255, 56)
AGES	Iceland	2002 – 2006	Caucasian	Illumina HumanCNV370-Duo BeadChip	HapMap Phase II/ INFO > 0.6, MAF > 1%, or > 5 copies in imputed data/no	Retinal photography	ETDRS	1) Any DR (85, 222)
AUST	Australia	2006 – 2011	Caucasian	Illumina Human OmniExpress BeadChip	1000 Genomes/INFO > 0.6, MAF > 1%, or > 5 copies in imputed data/no	Clinical diagnosis	ETDRS	1) Any DR (522, 435) 2) PDR (187, 435)
BMES	Australia	1992 – 1994, 1997 – 2000, 2002 – 2004, 2007 – 2010	Caucasian	Illumina Human670-QuadCustom chip	1000 Genomes, HapMap Phase II/ INFO > 0.6, MAF > 1%, or > 5 copies in	Retinal photography	ETDRS	1) Any DR (124, 208)

					imputed data/no			
CHS-AA	USA	1997 – 1998	African American	Illumina HumanOmni1-Quad v1.0 BeadChip	1000 Genomes/ INFO > 0.6, MAF > 1%, or > 5 copies in imputed data/no	Retinal photography	ETDRS	1) Any DR (22, 39)
CHS-Whites	USA	1997 – 1998	Caucasian	Illumina HumanCNV370-Duo BeadChip	1000 Genomes/ INFO > 0.6, MAF > 1%, or > 5 copies in imputed data/no	Retinal photography	ETDRS	1) Any DR (28, 143)
Genetic Center, China Medical University Hospital, Taiwan,	Taiwan	2006 – 2007	Chinese	Illumina HumanHap550-Duo BeadChip	1000 Genomes	Clinical diagnosis	AAO	1) Any DR (177, 579) 2) Severe NPDR/ PDR (78, 579)
GOLDR	USA	2007 – 2011	Hispanic	Illumina OmniExpress Chip	1000 Genomes/ INFO > 0.3/yes	Retinal photography	ETDRS	1) Any DR (292, 221) 2) Severe NPDR/ PDR (78, 221)
JHS	USA	2010 – 2012	African American	Affymetrix 5.0	1000 Genomes/ INFO > 0.6, MAF > 1%, or > 5 copies in	Retinal photography	ETDRS	1) Any DR (91, 160) 2)

					imputed data/no			PDR (12, 160)
MESA-AA	USA	2002 – 2004	African American	Affymetrix 6.0	1000 Genomes/ INFO > 0.6, MAF > 1%, or > 5 copies in imputed data/no	Retinal photography	ETDRS	1) Any DR (101, 258) 2) PDR (11, 258)
MESA-CHN	USA	2002 – 2004	Chinese	Affymetrix 6.0	1000 Genomes/ INFO > 0.6, MAF > 1%, or > 5 copies in imputed data/no	Retinal photography	ETDRS	1) Any DR (25, 79)
MESA-EU	USA	2002 – 2004	Caucasian	Affymetrix 6.0	1000 Genomes/ INFO > 0.6, MAF > 1%, or > 5 copies in imputed data/no	Retinal photography	ETDRS	1) Any DR (38, 200)
MESA-HIS	USA	2002 – 2004	Hispanic	Affymetrix 6.0	1000 Genomes/ INFO > 0.6, MAF > 1%, or > 5 copies in imputed data/no	Retinal photography	ETDRS	1) Any DR (88, 179)
SCES	Singapore	2009 – 2011	Chinese	Illumina Human610 Quad BeadChip	1000 Genomes/ r^2> 0.8/yes	Retinal photography	ETDRS	1) Any DR (71, 168) 2) Severe NPDR/ PDR (12, 168)
SiMES	Singapore	2004 – 2006	Malay	Illumina Human610 Quad	1000 Genomes/ r^2> 0.8/yes	Retinal photography	ETDRS	1) Any DR (198, 363)

				BeadChip				2) Severe NPDR/ PDR (37, 363)
SINDI	Singapore	2007 – 2009	Indian	Illumina Human610 Quad BeadChip	1000 Genomes/ r^2> 0.8/yes	Retinal photography	ETDRS	1) Any DR (304, 537) 2) Severe NPDR/ PDR (49, 537)
Starr County Health Studies	U.S.	1981 – 2009	Hispanic	Affymetrix Genome-wide SNP Array 6.0	1000 Genomes/ r^2 > 0.5/yes	Retinal photography	ETDRS	1) Any DR (529, 249) 2) Severe NPDR/ PDR (124, 654)
TUDR	Taiwan	1996 – 2011	Chinese	1) Illumina OmniExpress 730K Array 2) Illumina iSelect 200K Cardio-MetaboChip	1000 Genomes/ INFO > 0.4/no	Clinical diagnosis	AAO	1) PDR (434, 549)

AAO = American Academy of Ophthalmology; AAPDR = African American Proliferative Diabetic Retinopathy Study; AGES = Age, Gene, Environment, Susceptibility - Reykjavik Study; AUST = Australian Genetics of Diabetic Retinopathy Study; BMES = Blue Mountains Eye Study; CHS-AA = Cardiovascular Health Study-African American; CHS-Whites = Cardiovascular Health Study-Whites; DR = diabetic retinopathy; ETDRS = Early Treatment Diabetic Retinopathy Study; GOLDR = Genetics of Latinos Diabetic Retinopathy; JHS = Jackson Heart Study; MESA-AA = Multi-Ethnic Study of Atherosclerosis-African American; MESA-CHN = Multi-Ethnic Study of Atherosclerosis-Chinese; MESA-EU = Multi-Ethnic Study of Atherosclerosis-European; MESA-HIS = Multi-Ethnic Study of Atherosclerosis-Hispanic; NPDR = non-

proliferative diabetic retinopathy; PDR = proliferative diabetic retinopathy; SCES = Singapore Chinese Eye Study; SiMES = Singapore Malay Eye Study; SINDI = Singapore Indian Eye Study; TUDR = Taiwan–US Diabetic Retinopathy Study

Table 2. Baseline Characteristics of Participants in Each Study

Study	Any DR						Severe DR					
	Case			Control			Case			Control		
	Age, years	Gender, % male	Sample size	Age, years	Gender, % male	Sample size	Age, years	Gender, % male	Sample size	Age, years	Gender, % male	Sample size
AAPDR	59.4	40.9	274	61.5	32.1	56	59.5	41.2	255	61.5	32.1	56
AGES	76.2	52.9	85	76.0	56.3	222		–			–	
AUST	66.4	58.6	522	67.3	52.4	435	64.6	60.8	187	67.3	52.4	435
BMES	64.3	50.0	124	63.8	48.1	208		–			–	
CHS-AA	77.0	9.1	22	78.3	46.2	39		–			–	
CHS-Whites	78.1	46.4	28	77.4	43.4	143		–			–	
Genetic Center, China Medical University Hospital, Taiwan,	62.0	50.3	177	58.0	53.9	579	62.2	50.0	78	58.0	53.9	579
GOLDR	53.4	40.4	292	54.0	32.6	221	53.6	47.4	78	54.0	32.6	221
JHS	61.2	34.1	91	63.7	36.2	160	64.4	30.8	12	63.7	36.2	160
MESA-AA	63.2	50.6	101	63.6	45.6	258	68.3	50.0	11	63.6	45.6	258
MESA-CHN	67.0	48.0	25	66.9	51.9	79		–			–	
MESA-EU	61.9	55.6	38	65.3	61.2	200		–			–	

MESA-HIS	66.4	54.6	88	64.0	47.5	179		–			–	
SCES	62.0	57.7	71	62.5	57.7	168	61.6	75.0	12	62.5	57.7	168
SiMES	63.2	41.9	198	62.9	47.7	363	63.1	35.1	37	62.9	47.7	363
SINDI	61.8	55.9	304	60.9	51.8	537	62.4	46.9	49	60.9	51.8	537
Starr County Health Studies	60.3	40.6	529	57.8	40.2	249	62.0	47.6	124	59.0	39.1	654
TUDR		–			–		61.2	44.2	434	66.8	58.3	549

Cases are individuals with DR; controls are those without DR

AAPDR = African American Proliferative Diabetic Retinopathy Study; AGES = Age, Gene, Environment, Susceptibility - Reykjavik Study; AUST = Australian Genetics of Diabetic Retinopathy Study; BMES = Blue Mountains Eye Study; CHS-AA = Cardiovascular Health Study-African American; CHS-Whites = Cardiovascular Health Study-Whites; DR = diabetic retinopathy; GOLDR = Genetics of Latinos Diabetic Retinopathy; JHS = Jackson Heart Study; MESA-AA = Multi-Ethnic Study of Atherosclerosis-African American; MESA-CHN = Multi-Ethnic Study of Atherosclerosis-Chinese; MESA-EU = Multi-Ethnic Study of Atherosclerosis-European; MESA-HIS = Multi-Ethnic Study of Atherosclerosis-Hispanic; SCES = Singapore Chinese Eye Study; SiMES = Singapore Malay Eye Study; SINDI = Singapore Indian Eye Study; TUDR = Taiwan–US Diabetic Retinopathy Study

Table 3. Mendelian Randomization Estimate of the Association between Lipids and Any Diabetic Retinopathy using SNPs Unique to Each Lipid Fraction and Independent of Glycemic traits[#] (Primary Analysis).

	All Ethnicities (N = 2969 cases, 4096 controls)				Caucasian (N = 797 cases, 1208 controls)				Chinese (N = 273 cases, 826 controls)			
	No. of SNPs*	OR[†] (95% CI)	P value	I^2, %	No. of SNPs*	OR[†] (95% CI)	P value	I^2, %	No. of SNPs*	OR[†] (95% CI)	P value	I^2, %
HDL	44	0.91 (0.67 – 1.23)	0.539	0.0	44	0.99 (0.61 – 1.60)	0.960	8.3	21	1.36 (0.29 – 6.44)	0.699	0.0
LDL	9	2.50 (0.91 – 6.87)	0.075	0.0	9	3.93 (0.53 – 29.33)	0.182	0.0	3	0.70 (0.01 – 88.38)	0.885	0.0
Triglycerides	15	1.00 (0.86 – 1.15)	0.983	0.0	15	1.05 (0.67 – 1.65)	0.828	0.0	4	1.09 (0.05 – 25.66)	0.959	5.1
Total Cholesterol	18	0.83 (0.53 – 1.31)	0.424	0.0	18	0.74 (0.42 – 1.30)	0.293	0.0	–	–	–	–

HDL = high-density lipoprotein cholesterol; LDL = low-density lipoprotein cholesterol; OR = odds ratio

$\beta_{(SNP\text{-}lipid)}$ estimates taken from the Global Lipids Genetic Consortium for Caucasians and the Asian Genetic Epidemiology Network consortium for Chinese differed. Therefore, we performed analyses in these two populations separately.

*Number of SNPs included in meta-analysis.

†Odds ratios are for a SD of genetically induced increases in plasma lipid profiles.

#Two SNPs which showed genome-wide significant association with glycemic traits excluded: rs9686661and rs12328675.

Table 4. Mendelian Randomization Estimate of the Association Between Lipids and Any Diabetic Retinopathy for all SNPs (Secondary Analysis).

	All Ethnicities (N = 2969 cases, 4096 controls)				Caucasian (N = 797 cases, 1208 controls)				Chinese (N = 273 cases, 826 controls)			
	No. of SNPs**	OR* (95% CI)	P value	I^2, %	No. of SNPs**	OR* (95% CI)	P value	I^2, %	No. of SNPs**	OR* (95% CI)	P value	I^2, %
HDL	60	0.94 (0.79–1.14)	0.543	0.0	60	1.02 (0.76–1.35)	0.917	12.8	28	1.16 (0.51–2.63)	0.728	0.0
LDL	30	0.95 (0.75–1.20)	0.651	0.0	30	0.87 (0.60–1.28)	0.487	0.0	10	1.44 (0.31–6.70)	0.641	0.0
Triglycerides	28	1.08 (0.96–1.22)	0.227	0.0	28	1.11 (0.85–1.44)	0.453	0.0	13	1.55 (0.70–3.41)	0.280	0.0
Total Cholesterol	39	0.92 (0.74–1.14)	0.438	0.0	39	0.98 (0.70–1.37)	0.889	5.2	–	–	–	–

HDL = high-density lipoprotein cholesterol; LDL = low-density lipoprotein cholesterol; OR = odds ratio

$\beta_{(SNP\text{-}lipid)}$ estimates taken from the Global Lipids Genetic Consortium for Caucasians and the Asian Genetic Epidemiology Network consortium for Chinese differed. Therefore, we performed analyses in these two populations separately.

*Odds ratios are for a SD of genetically induced increases in plasma lipid profiles.

**Number of SNPs included in meta-analysis.

Table 5. Mendelian Randomization Estimate of the Association between Lipids and Severe Diabetic Retinopathy using SNPs Unique to Each Lipid Fraction and Independent of Glycemic Traits[#] (Primary Analysis).

	All Ethnicities (N = 1277 cases, 3980 controls)				Caucasian (N = 187 cases, 435 controls)				Chinese (N = 524 cases, 1296 controls)			
	No. of SNPs*	OR[†] (95% CI)	P value	I^2, %	No. of SNPs*	OR[†] (95% CI)	P value	I^2, %	No. of SNPs*	OR[†] (95% CI)	P value	I^2, %
HDL	44	0.98 (0.74 – 1.31)	0.909	0.0	44	1.71 (0.59 – 5.02)	0.325	0.0	21	1.06 (0.33 – 3.42)	0.925	0.0
LDL	9	0.95 (0.39 – 2.36)	0.917	0.0	9	0.85 (0.28 – 2.60)	0.782	0.0	3	1.42 (0.03 – 62.62)	0.855	0.0
Triglycerides	15	0.84 (0.33 – 2.12)	0.712	0.0	15	0.61 (0.06 – 6.36)	0.678	11.6	4	0.66 (0.05 – 8.85)	0.754	0.0
Total Cholesterol	18	0.68 (0.25 – 1.87)	0.454	0.0	18	0.53 (0.06 – 4.79)	0.568	0.0	–	–	–	–

HDL = high-density lipoprotein cholesterol; LDL = low-density lipoprotein cholesterol; OR = odds ratio

$\beta_{(SNP\text{-}lipid)}$ estimates taken from the Global Lipids Genetic Consortium for Caucasians and the Asian Genetic Epidemiology Network consortium for Chinese differed. Therefore, we performed analyses in these two populations separately.

*Number of SNPs included in meta-analysis.

†Odds ratios are for a SD of genetically induced increases in plasma lipid profiles.

#Two SNPs which showed genome-wide significant association with glycemic traits excluded: rs9686661and rs12328675.

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Table 6. Mendelian Randomization Estimate of the Association Between Lipids and Severe Diabetic Retinopathy for all SNPs (Secondary Analysis).

	All ethnicities (N = 1277 cases, 3980 controls)				Caucasian (N = 187 cases, 435 controls)				Chinese (N = 524 cases, 1296 controls)			
	No. of SNPs**	OR* (95% CI)	P value	I^2, %	No. of SNPs**	OR* (95% CI)	P value	I^2, %	No. of SNPs**	OR* (95% CI)	P value	I^2, %
HDL	60	1.02 (0.81–1.29)	0.861	0.3	60	1.49 (0.77–2.87)	0.235	0.0	28	1.00 (0.54–1.85)	0.991	0.0
LDL	30	0.94 (0.80–1.10)	0.440	0.0	30	0.93 (0.73–1.18)	0.538	0.0	10	0.62 (0.21–1.89)	0.401	0.0
Triglycerides	28	1.37 (0.99–1.88)	0.056	0.0	28	1.27 (0.58–2.79)	0.552	21.9	13	0.90 (0.48–1.67)	0.730	0.0
Triglycerides†	12	1.42 (1.01–2.00)	0.044	2.5	12	1.43 (0.62–3.31)	0.403	38.0	9	0.91 (0.48–1.73)	0.780	0.0
Total Cholesterol	39	0.69 (0.41–1.16)	0.159	0.0	39	1.18 (0.36–3.90)	0.788	0.0	–	–	–	–

HDL = high-density lipoprotein cholesterol; LDL = low-density lipoprotein cholesterol; OR = odds ratio

$\beta_{(SNP\text{-}lipid)}$ estimates taken from the Global Lipids Genetic Consortium for Caucasians and the Asian Genetic Epidemiology Network consortium for Chinese differed. Therefore, we performed analyses in these two populations separately

*Odds ratios are for a SD of genetically induced increases in plasma lipid profiles.

**Number of SNPs included in meta-analysis.

† The SNPs are rs6831256 (pleiotropic with TC, LDL), rs998584 (HDL), rs731839 (HDL), rs2131925 (LDL, TC), rs1260326 (TC), rs17145738 (HDL), rs1495741 (TC), rs12678919 (HDL), rs2954029 (TC, LDL, HDL), rs174546 (LDL, TC, HDL), rs964184 (TC, HDL, LDL), and rs11613352 (HDL).

Supplementary Tables

Supplementary Table 1. Association of plasma lipid associated SNPs from Global Lipids Genetic Consortium with risk factors for diabetic retinopathy.

SNP	Nearest Gene	Primary trait/Secondary trait(s)	Fasting Glucose P-Value	Study	HbA1c P-Value	Study	Hypertension P-Value	Study	Type 2 Diabetes P-Value	Study
rs1047891	**CPS1**	**HDL**	**0.798**	**13K exome sequence analysis**	**0.533**	**13K exome sequence analysis**	**-**	**-**	**0.00893**	**GoT2D WGS + replication**
rs2290547	**SETD2**	**HDL**	**0.131**	**MAGIC GWAS**	**0.853**	**MAGIC GWAS**	**-**	**-**	**0.241**	**GoT2D WGS**
rs2013208	**RBM5**	**HDL**	**0.74**	**BioMe AMP T2D GWAS**	**0.868**	**BioMe AMP T2D GWAS**	**-**	**-**	**0.154**	**GWAS SIGMA**
rs6805251	**GSK3B**	**HDL**	**0.48**	**BioMe AMP T2D GWAS**	**0.771**	**BioMe AMP T2D GWAS**	**-**	**-**	**0.0085**	**70Kfor T2D GWAS**
rs10019888	**C4orf52**	**HDL**	**0.216**	**MAGIC GWAS**	**0.967**	**MAGIC GWAS**	**-**	**-**	**0.107**	**GWAS SIGMA**
rs3822072	**FAM13A**	**HDL**	**0.774**	**MAGIC GWAS**	**0.86**	**MAGIC GWAS**	**-**	**-**	**0.00319**	**70Kfor T2D GWAS**
rs605066	**CITED2**	**HDL**	**0.801**	**BioMe AMP T2D GWAS**	**0.711**	**BioMe AMP T2D GWAS**	**-**	**-**	**0.0381**	**GoT2D WGS**
rs702485	**DAGLB**	**HDL**	**0.243**	**BioMe AMP T2D GWAS**	**0.806**	**BioMe AMP T2D GWAS**	**-**	**-**	**0.234**	**70Kfor T2D GWAS**
rs4142995	**SNX13**	**HDL**	**0.543**	**BioMe AMP T2D GWAS**	**0.605**	**BioMe AMP T2D GWAS**	**-**	**-**	**0.0261**	**70Kfor T2D GWAS**
rs17173637	**TMEM176A**	**HDL**	**0.967**	**BioMe AMP T2D GWAS**	**0.803**	**BioMe AMP T2D GWAS**	**-**	**-**	**0.065**	**GWAS SIGMA**
rs11246602	**OR4C46**	**HDL**	**0.0292**	**MAGIC GWAS**	**0.819**	**MAGIC GWAS**	**-**	**-**	**0.115**	**GoT2D WGS + replication**
rs4759375	**SBNO1**	**HDL**	**0.207**	**BioMe AMP T2D GWAS**	**0.802**	**BioMe AMP T2D GWAS**	**-**	**-**	**0.0335**	**GoT2D WGS**
rs4148008	**ABCA8**	**HDL**	**0.765**	**MAGIC GWAS**	**0.814**	**MAGIC GWAS**	**-**	**-**	**0.11**	**DIAGRAM Transethnic meta-analysis**
rs12967135	**MC4R**	**HDL**	**0.0182**	**MAGIC GWAS**	**0.816**	**MAGIC GWAS**	**-**	**-**	**0.000367**	**GoT2D WGS + replication**
rs12328675	COBLL1	HDL	0.538	BioMe AMP T2D GWAS	0.863	BioMe AMP T2D GWAS	0.0192	Oxford BioBank exome chip analysis	1.12E-08	GoT2D 82k exome chip analysis
rs386000	**LILRA3**	**HDL**	**0.712**	**BioMe AMP T2D GWAS**	**0.859**	**BioMe AMP T2D GWAS**	**0.0392**	**Oxford BioBank exome chip analysis**	**0.229**	**CAMP GWAS**
rs2925979	**CMIP**	**HDL**	**0.844**	**BioMe AMP T2D GWAS**	**0.67**	**BioMe AMP T2D GWAS**	**0.136**	**Oxford BioBank exome chip analysis**	**0.0000014**	**70Kfor T2D GWAS**
rs7134594	**MVK**	**HDL**	**0.415**	**BioMe AMP T2D GWAS**	**0.326**	**BioMe AMP T2D GWAS**	**0.145**	**Oxford BioBank exome chip analysis**	**0.107**	**BioMe AMP T2D GWAS**
rs7134375	**PDE3A**	**HDL**	**0.179**	**BioMe AMP T2D GWAS**	**0.458**	**BioMe AMP T2D GWAS**	**0.152**	**Oxford BioBank exome chip analysis**	**0.00654**	**70Kfor T2D GWAS**
rs1689800	**ZNF648**	**HDL**	**0.0497**	**BioMe AMP T2D GWAS**	**0.36**	**BioMe AMP T2D GWAS**	**0.246**	**Oxford BioBank exome chip analysis**	**0.000162**	**70Kfor T2D GWAS**
rs3136441	**LRP4**	**HDL**	**0.00424**	**CAMP GWAS**	**0.296**	**MAGIC GWAS**	**0.312**	**Oxford BioBank exome chip analysis**	**0.394**	**SIGMA exome chip analysis**
rs2293889	**TRPS1**	**HDL**	**0.222**	**Oxford BioBank exome chip analysis**	**-**	**-**	**0.327**	**Oxford BioBank exome chip analysis**	**-**	**-**
rs838880	**SCARB1**	**HDL**	**0.456**	**BioMe AMP T2D GWAS**	**0.855**	**BioMe AMP T2D GWAS**	**0.351**	**Oxford BioBank exome**	**0.000491**	**SIGMA exome chip analysis**

								chip analysis			
rs4650994	ANGPTL1	HDL	0.795	BioMe AMP T2D GWAS	0.852	BioMe AMP T2D GWAS	0.363	Oxford BioBank exome chip analysis	0.16	CAMP GWAS
rs2602836	ADH5	HDL	0.443	BioMe AMP T2D GWAS	0.421	MAGIC GWAS	0.384	Oxford BioBank exome chip analysis	0.0928	GWAS SIGMA
rs12801636	KAT5	HDL	0.288	BioMe AMP T2D GWAS	0.824	BioMe AMP T2D GWAS	0.454	Oxford BioBank exome chip analysis	0.0124	GoT2D 82k exome chip analysis
rs2606736	ATG7	HDL	0.175	BioMe AMP T2D GWAS	0.424	BioMe AMP T2D GWAS	0.487	Oxford BioBank exome chip analysis	0.0131	GoT2D 82k exome chip analysis
rs13326165	STAB1	HDL	0.274	BioMe AMP T2D GWAS	0.791	BioMe AMP T2D GWAS	0.508	Oxford BioBank exome chip analysis	0.0994	CAMP GWAS
rs11869286	STARD3	HDL	0.776	BioMe AMP T2D GWAS	0.107	BioMe AMP T2D GWAS	0.525	Oxford BioBank exome chip analysis	0.0306	GoT2D 82k exome chip analysis
rs12145743	HDGF-PMVK	HDL	0.592	BioMe AMP T2D GWAS	0.0163	BioMe AMP T2D GWAS	0.555	Oxford BioBank exome chip analysis	0.00569	70Kfor T2D GWAS
rs6450176	ARL15	HDL	0.49	BioMe AMP T2D GWAS	0.395	BioMe AMP T2D GWAS	0.603	Oxford BioBank exome chip analysis	0.00000077	70Kfor T2D GWAS
rs16942887	LCAT	HDL	0.491	BioMe AMP T2D GWAS	0.456	BioMe AMP T2D GWAS	0.613	Oxford BioBank exome chip analysis	0.0608	GoT2D WGS
rs499974	MOGAT2-DGAT2	HDL	0.376	BioMe AMP T2D GWAS	0.0894	BioMe AMP T2D GWAS	0.673	Oxford BioBank exome chip analysis	0.034	DIAGRAM Transethnic meta-analysis
rs737337	ANGPTL8	HDL	0.354	BioMe AMP T2D GWAS	0.683	BioMe AMP T2D GWAS	0.679	Oxford BioBank exome chip analysis	0.0102	GoT2D WGS
rs2923084	AMPD3	HDL	0.137	BioMe AMP T2D GWAS	0.967	BioMe AMP T2D GWAS	0.683	Oxford BioBank exome chip analysis	0.0414	BioMe AMP T2D GWAS
rs4731702	KLF14	HDL	0.978	BioMe AMP T2D GWAS	0.837	BioMe AMP T2D GWAS	0.696	Oxford BioBank exome chip analysis	0.0000035	DIAGRAM Transethnic meta-analysis
rs7255436	ANGPTL4	HDL	0.0304	BioMe AMP T2D GWAS	0.551	BioMe AMP T2D GWAS	0.794	Oxford BioBank exome chip analysis	0.118	SIGMA exome chip analysis
rs4983559	ZBTB42-AKT1	HDL	0.787	BioMe AMP T2D GWAS	0.265	BioMe AMP T2D GWAS	0.804	Oxford BioBank exome chip analysis	0.266	GoT2D 82k exome chip analysis
rs13107325	SLC39A8	HDL	0.569	BioMe AMP T2D GWAS	0.924	BioMe AMP T2D GWAS	0.832	Oxford BioBank exome chip analysis	0.158	BioMe AMP T2D GWAS
rs4129767	PGS1	HDL	0.0502	BioMe AMP T2D GWAS	0.255	BioMe AMP T2D GWAS	0.834	Oxford BioBank exome chip analysis	0.0381	GoT2D 82k exome chip analysis
rs2652834	LACTB	HDL	0.881	BioMe AMP T2D GWAS	0.479	BioMe AMP T2D GWAS	0.888	Oxford BioBank exome chip analysis	0.11	70Kfor T2D GWAS
rs181362	UBE2L3	HDL	0.599	Oxford BioBank exome chip analysis	-	-	0.893	Oxford BioBank exome chip analysis	-	-
rs4917014	IKZF1	HDL	0.599	BioMe AMP T2D GWAS	0.767	BioMe AMP T2D GWAS	0.914	Oxford BioBank exome chip analysis	0.208	70Kfor T2D GWAS
rs17695224	HAS1	HDL	0.519	BioMe AMP T2D GWAS	0.595	BioMe AMP T2D GWAS	0.965	Oxford BioBank exome chip analysis	0.0128	SIGMA exome chip analysis

rs4660293	**PABPC4**	**HDL**	**0.925**	**BioMe AMP T2D GWAS**	**0.794**	**BioMe AMP T2D GWAS**	**0.657**	**Oxford BioBank exome chip analysis**	**0.000000115**	**70Kfor T2D GWAS**
rs3764261	CETP	HDL/LDL/TC/TG	0.446	BioMe AMP T2D GWAS	0.0434	BioMe AMP T2D GWAS	0.142	Oxford BioBank exome chip analysis	0.117	BioMe AMP T2D GWAS
rs12748152	PIGV-NR0B2	HDL/LDL/TG	0.655	BioMe AMP T2D GWAS	0.724	BioMe AMP T2D GWAS	0.577	Oxford BioBank exome chip analysis	0.0482	BioMe AMP T2D GWAS
rs1883025	ABCA1	HDL/TC	0.588	BioMe AMP T2D GWAS	0.779	BioMe AMP T2D GWAS	0.0834	Oxford BioBank exome chip analysis	0.0906	70Kfor T2D GWAS
rs7241918	LIPG	HDL/TC	0.977	BioMe AMP T2D GWAS	0.698	BioMe AMP T2D GWAS	0.48	Oxford BioBank exome chip analysis	0.00401	CAMP GWAS
rs581080	TTC39B	HDL/TC	0.478	GoT2D 82k exome chip analysis	0.732	BioMe AMP T2D GWAS	0.709	Oxford BioBank exome chip analysis	0.177	CAMP GWAS
rs970548	MARCH8-ALOX5	HDL/TC	0.865	BioMe AMP T2D GWAS	0.644	BioMe AMP T2D GWAS	0.719	Oxford BioBank exome chip analysis	0.0715	GoT2D 82k exome chip analysis
rs1800961	HNF4A	HDL/TC	0.337	BioMe AMP T2D GWAS	0.934	BioMe AMP T2D GWAS	0.836	Oxford BioBank exome chip analysis	0.00000095	GoT2D 82k exome chip analysis
rs9987289	PPP1R3B	HDL/TC/LDL	0.883	BioMe AMP T2D GWAS	0.0902	BioMe AMP T2D GWAS	0.458	Oxford BioBank exome chip analysis	0.0022	DIAGRAM Transethnic meta-analysis
rs1532085	LIPC	HDL/TC/TG	0.0706	BioMe AMP T2D GWAS	0.121	BioMe AMP T2D GWAS	0.446	Oxford BioBank exome chip analysis	0.00553	70Kfor T2D GWAS
rs6065906	PLTP	HDL/TG	0.0398	CAMP GWAS	0.464	MAGIC GWAS	-	-	0.0197	70Kfor T2D GWAS
rs2972146	IRS1	HDL/TG	0.572	BioMe AMP T2D GWAS	0.308	BioMe AMP T2D GWAS	0.018	Oxford BioBank exome chip analysis	4.97E-12	GoT2D 82k exome chip analysis
rs4765127	ZNF664	HDL/TG	0.612	BioMe AMP T2D GWAS	0.199	BioMe AMP T2D GWAS	0.138	Oxford BioBank exome chip analysis	0.00235	70Kfor T2D GWAS
rs4846914	GALNT2	HDL/TG	0.468	BioMe AMP T2D GWAS	0.0758	BioMe AMP T2D GWAS	0.139	Oxford BioBank exome chip analysis	0.0539	GoT2D 82k exome chip analysis
rs1121980	FTO	HDL/TG	0.526	BioMe AMP T2D GWAS	0.819	BioMe AMP T2D GWAS	0.355	Oxford BioBank exome chip analysis	5.97E-29	GoT2D 82k exome chip analysis
rs1936800	RSPO3	HDL/TGa	0.423	MAGIC GWAS	0.0453	MAGIC GWAS	-	-	0.01	GoT2D WGS + replication
rs2710642	**EHBP1**	**LDL**	**0.538**	**MAGIC GWAS**	**0.313**	**MAGIC GWAS**	**-**	**-**	**0.0863**	**GWAS SIGMA**
rs2328223	**SNX5**	**LDL**	**0.25**	**BioMe AMP T2D GWAS**	**0.128**	**BioMe AMP T2D GWAS**	**-**	**-**	**0.0369**	**GoT2D WGS**
rs1250229	**FN1**	**LDL**	**0.826**	**BioMe AMP T2D GWAS**	**0.501**	**BioMe AMP T2D GWAS**	**0.149**	**Oxford BioBank exome chip analysis**	**0.25**	**GoT2D 82k exome chip analysis**
rs5763662	**MTMR3**	**LDL**	**0.415**	**MAGIC GWAS**	**0.903**	**MAGIC GWAS**	**0.213**	**Oxford BioBank exome chip analysis**	**0.0899**	**GoT2D WGS**
rs4942486	**BRCA2**	**LDL**	**0.462**	**BioMe AMP T2D GWAS**	**0.0208**	**BioMe AMP T2D GWAS**	**0.216**	**Oxford BioBank exome chip analysis**	**0.00431**	**SIGMA exome chip analysis**
rs267733	**ANXA9-CERS2**	**LDL**	**0.293**	**BioMe AMP T2D GWAS**	**0.819**	**BioMe AMP T2D GWAS**	**0.492**	**Oxford BioBank exome chip analysis**	**0.225**	**BioMe AMP T2D GWAS**
rs8017377	**NYNRIN**	**LDL**	**0.0587**	**BioMe AMP T2D GWAS**	**0.0882**	**BioMe AMP T2D GWAS**	**0.674**	**Oxford BioBank exome chip analysis**	**0.125**	**GoT2D WGS + replication**

rs1801689	**APOH-PRXCA**	**LDL**	**0.697**	**Oxford BioBank exome chip analysis**	**-**	**-**	**0.678**	**Oxford BioBank exome chip analysis**	**-**	**-**
rs364585	**SPTLC3**	**LDL**	**0.214**	**BioMe AMP T2D GWAS**	**0.16**	**BioMe AMP T2D GWAS**	**0.901**	**Oxford BioBank exome chip analysis**	**0.117**	**70Kfor T2D GWAS**
rs17404153	ACAD11	LDL/HDLc	0.159	BioMe AMP T2D GWAS	0.805	BioMe AMP T2D GWAS	0.277	Oxford BioBank exome chip analysis	0.0403	70Kfor T2D GWAS
rs1800562	HFE	LDL/TC	0.564	BioMe AMP T2D GWAS	0.285	BioMe AMP T2D GWAS	-	-	0.015	GoT2D 82k exome chip analysis
rs11136341	PLEC1	LDL/TC	0.971	BioMe AMP T2D GWAS	0.88	BioMe AMP T2D GWAS	-	-	0.03	DIAGRAM Transethnic meta-analysis
rs9411489	ABO	LDL/TC	-	-	-	-	-	-	-	-
rs11220462	ST3GAL4	LDL/TC	0.987	BioMe AMP T2D GWAS	0.844	BioMe AMP T2D GWAS	-	-	0.156	BioMe AMP T2D GWAS
rs7206971	OSBPL7	LDL/TC	0.746	BioMe AMP T2D GWAS	0.039	BioMe AMP T2D GWAS	-	-	0.0911	GoT2D WGS + replication
rs629301	SORT1	LDL/TC	0.664	BioMe AMP T2D GWAS	0.0536	BioMe AMP T2D GWAS	0.167	Oxford BioBank exome chip analysis	0.0026	DIAGRAM Transethnic meta-analysis
rs4299376	ABCG5/8	LDL/TC	0.051	MAGIC GWAS	0.179	MAGIC GWAS	0.208	Oxford BioBank exome chip analysis	0.0595	GWAS SIGMA
rs10102164	SOX17	LDL/TC	0.949	BioMe AMP T2D GWAS	0.626	BioMe AMP T2D GWAS	0.232	Oxford BioBank exome chip analysis	0.051	DIAGRAM Transethnic meta-analysis
rs4530754	CSNK1G3	LDL/TC	0.255	BioMe AMP T2D GWAS	0.047	BioMe AMP T2D GWAS	0.26	Oxford BioBank exome chip analysis	0.083	DIAGRAM Transethnic meta-analysis
rs3757354	MYLIP	LDL/TC	0.193	BioMe AMP T2D GWAS	0.561	BioMe AMP T2D GWAS	0.354	Oxford BioBank exome chip analysis	0.102	GoT2D WGS
rs2030746	LOC84931	LDL/TC	0.954	BioMe AMP T2D GWAS	0.389	BioMe AMP T2D GWAS	0.45	Oxford BioBank exome chip analysis	0.0599	GoT2D WGS
rs7640978	CMTM6	LDL/TC	0.162	BioMe AMP T2D GWAS	0.586	BioMe AMP T2D GWAS	0.745	Oxford BioBank exome chip analysis	0.0257	BioMe AMP T2D GWAS
rs1564348	LPA	LDL/TC	0.226	BioMe AMP T2D GWAS	0.49	BioMe AMP T2D GWAS	0.854	Oxford BioBank exome chip analysis	0.05	DIAGRAM Transethnic meta-analysis
rs6029526	TOP1	LDL/TC	0.65	BioMe AMP T2D GWAS	0.518	BioMe AMP T2D GWAS	0.885	Oxford BioBank exome chip analysis	0.013	GoT2D 82k exome chip analysis
rs1367117	APOB	LDL/TC	0.296	BioMe AMP T2D GWAS	0.637	BioMe AMP T2D GWAS	0.909	Oxford BioBank exome chip analysis	0.0696	70Kfor T2D GWAS
rs6511720	LDLR	LDL/TC	0.491	BioMe AMP T2D GWAS	0.251	BioMe AMP T2D GWAS	0.95	Oxford BioBank exome chip analysis	0.03	DIAGRAM Transethnic meta-analysis
rs2479409	PCSK9	LDL/TC	0.525	BioMe AMP T2D GWAS	0.0274	BioMe AMP T2D GWAS	0.251	Oxford BioBank exome chip analysis	0.0169	70Kfor T2D GWAS
rs4420638	APOE	LDL/TC/HDL	0.789	BioMe AMP T2D GWAS	0.289	BioMe AMP T2D GWAS	-	-	0.0000002	DIAGRAM Transethnic meta-analysis
rs10490626	INSIG2	LDL/TCb	0.799	BioMe AMP T2D GWAS	0.52	BioMe AMP T2D GWAS	0.523	Oxford BioBank exome chip analysis	0.0534	CAMP GWAS
rs4722551	MIR148A	LDL/TGd/TC	0.451	BioMe AMP T2D GWAS	0.552	BioMe AMP T2D GWAS	0.563	Oxford BioBank exome chip analysis	0.526	BioMe AMP T2D GWAS

rs7570971	**RAB3GAP1**	**TC**	**0.674**	**MAGIC GWAS**	**0.453**	**MAGIC GWAS**	**-**	**-**	**0.141**	**GoT2D WGS**
rs11694172	**FAM117B**	**TC**	**0.856**	**BioMe AMP T2D GWAS**	**0.975**	**BioMe AMP T2D GWAS**	**-**	**-**	**0.015**	**DIAGRAM Transethnic meta-analysis**
rs2758886	**KCNK17**	**TC**	**0.688**	**MAGIC GWAS**	**0.148**	**MAGIC GWAS**	**-**	**-**	**0.064**	**GoT2D WGS + replication**
rs492602	**FLJ36070**	**TC**	**0.446**	**BioMe AMP T2D GWAS**	**0.616**	**BioMe AMP T2D GWAS**	**-**	**-**	**0.00467**	**GoT2D 82k exome chip analysis**
rs2277862	**ERGIC3**	**TC**	**0.708**	**BioMe AMP T2D GWAS**	**0.932**	**BioMe AMP T2D GWAS**	**-**	**-**	**0.251**	**GoT2D WGS**
rs10904908	**VIM-CUBN**	**TC**	**0.79**	**BioMe AMP T2D GWAS**	**0.0738**	**BioMe AMP T2D GWAS**	**0.103**	**Oxford BioBank exome chip analysis**	**0.157**	**GoT2D 82k exome chip analysis**
rs2290159	**RAF1**	**TC**	**0.159**	**BioMe AMP T2D GWAS**	**0.164**	**BioMe AMP T2D GWAS**	**0.279**	**Oxford BioBank exome chip analysis**	**0.144**	**GoT2D WGS + replication**
rs13315871	**PXK**	**TC**	**0.0932**	**BioMe AMP T2D GWAS**	**0.228**	**BioMe AMP T2D GWAS**	**0.345**	**Oxford BioBank exome chip analysis**	**0.14**	**DIAGRAM Transethnic meta-analysis**
rs2814982	**C6orf106**	**TC**	**0.151**	**BioMe AMP T2D GWAS**	**0.368**	**BioMe AMP T2D GWAS**	**0.381**	**Oxford BioBank exome chip analysis**	**0.0798**	**GoT2D WGS + replication**
rs4253772	**PPARA**	**TC**	**0.353**	**BioMe AMP T2D GWAS**	**0.831**	**BioMe AMP T2D GWAS**	**0.394**	**Oxford BioBank exome chip analysis**	**0.0213**	**70Kfor T2D GWAS**
rs2287623	**ABCB11**	**TC**	**0.671**	**BioMe AMP T2D GWAS**	**0.975**	**BioMe AMP T2D GWAS**	**0.496**	**Oxford BioBank exome chip analysis**	**0.0395**	**70Kfor T2D GWAS**
rs10128711	**SPTY2D1**	**TC**	**0.791**	**BioMe AMP T2D GWAS**	**0.973**	**BioMe AMP T2D GWAS**	**0.515**	**Oxford BioBank exome chip analysis**	**0.239**	**70Kfor T2D GWAS**
rs11603023	**PHLDB1**	**TC**	**0.177**	**BioMe AMP T2D GWAS**	**0.775**	**BioMe AMP T2D GWAS**	**0.611**	**Oxford BioBank exome chip analysis**	**0.04**	**DIAGRAM Transethnic meta-analysis**
rs7515577	**EVI5**	**TC**	**0.602**	**MAGIC GWAS**	**0.385**	**BioMe AMP T2D GWAS**	**0.663**	**Oxford BioBank exome chip analysis**	**0.663**	**GoT2D 82k exome chip analysis**
rs9376090	**HBS1L**	**TC**	**0.583**	**BioMe AMP T2D GWAS**	**0.845**	**BioMe AMP T2D GWAS**	**0.669**	**Oxford BioBank exome chip analysis**	**0.0298**	**CAMP GWAS**
rs138777	**TOM1**	**TC**	**0.509**	**BioMe AMP T2D GWAS**	**0.264**	**BioMe AMP T2D GWAS**	**0.739**	**Oxford BioBank exome chip analysis**	**0.018**	**DIAGRAM Transethnic meta-analysis**
rs1997243	**GPR146**	**TC**	**0.312**	**BioMe AMP T2D GWAS**	**0.248**	**BioMe AMP T2D GWAS**	**0.944**	**Oxford BioBank exome chip analysis**	**0.0526**	**GoT2D 82k exome chip analysis**
rs4883201	**PHC1-A2ML1**	**TC**	**0.738**	**BioMe AMP T2D GWAS**	**0.458**	**BioMe AMP T2D GWAS**	**0.945**	**Oxford BioBank exome chip analysis**	**0.047**	**DIAGRAM Transethnic meta-analysis**
rs1077514	**ASAP3**	**TC**	**0.813**	**BioMe AMP T2D GWAS**	**0.974**	**BioMe AMP T2D GWAS**	**0.223**	**Oxford BioBank exome chip analysis**	**0.3**	**DIAGRAM Transethnic meta-analysis**
rs7941030	UBASH3B	TC/HDL	0.961	Oxford BioBank exome chip analysis	-	-	0.252	Oxford BioBank exome chip analysis	-	-
rs2642442	MOSC1	TC/LDL	0.0574	BioMe AMP T2D GWAS	0.218	BioMe AMP T2D GWAS	-	-	0.34	DIAGRAM Transethnic meta-analysis
rs514230	IRF2BP2	TC/LDL	0.166	MAGIC GWAS	0.128	MAGIC GWAS	-	-	0.174	GoT2D 82k exome chip analysis
rs11563251	UGT1A1	TC/LDL	0.254	MAGIC GWAS	0.156	MAGIC GWAS	-	-	0.175	GWAS SIGMA

rs12916	HMGCR	TC/LDL	0.194	BioMe AMP T2D GWAS	0.692	BioMe AMP T2D GWAS	-	-	0.0425	GWAS SIGMA
rs3177928	HLA	TC/LDL	0.394	BioMe AMP T2D GWAS	0.163	BioMe AMP T2D GWAS	-	-	0.232	GoT2D WGS + replication
rs9488822	FRK	TC/LDL	0.593	MAGIC GWAS	0.333	MAGIC GWAS	-	-	0.531	GWAS SIGMA
rs2902940	MAFB	TC/LDL	0.617	MAGIC GWAS	0.438	MAGIC GWAS	-	-	0.376	70Kfor T2D GWAS
rs2081687	CYP7A1	TC/LDL	0.0354	BioMe AMP T2D GWAS	0.757	BioMe AMP T2D GWAS	0.065	Oxford BioBank exome chip analysis	0.00221	GoT2D 82k exome chip analysis
rs11065987	BRAP	TC/LDL	0.314	BioMe AMP T2D GWAS	0.808	BioMe AMP T2D GWAS	0.219	Oxford BioBank exome chip analysis	0.0629	GoT2D 82k exome chip analysis
rs1169288	HNF1A	TC/LDL	0.855	MAGIC GWAS	0.633	BioMe AMP T2D GWAS	0.727	Oxford BioBank exome chip analysis	0.000445	19K exome sequence analysis
rs3780181	VLDLR	TC/LDL	0.842	BioMe AMP T2D GWAS	0.548	BioMe AMP T2D GWAS	0.786	Oxford BioBank exome chip analysis	0.0863	GWAS SIGMA
rs314253	DLG4	TC/LDL	0.506	BioMe AMP T2D GWAS	0.844	BioMe AMP T2D GWAS	0.832	Oxford BioBank exome chip analysis	0.00147	70Kfor T2D GWAS
rs12670798	DNAH11	TC/LDL	0.075	MAGIC GWAS	0.1	BioMe AMP T2D GWAS	0.876	Oxford BioBank exome chip analysis	0.0598	GoT2D WGS
rs2072183	NPC1L1	TC/LDL	0.417	BioMe AMP T2D GWAS	0.64	BioMe AMP T2D GWAS	0.877	Oxford BioBank exome chip analysis	0.00366	GoT2D 82k exome chip analysis
rs2000999	HPR	TC/LDL	0.994	BioMe AMP T2D GWAS	0.16	BioMe AMP T2D GWAS	0.924	Oxford BioBank exome chip analysis	0.194	70Kfor T2D GWAS
rs2255141	GPAM	TC/LDL	0.97	BioMe AMP T2D GWAS	0.549	BioMe AMP T2D GWAS	0.986	Oxford BioBank exome chip analysis	0.000909	GoT2D 82k exome chip analysis
rs12027135	LDLRAP1	TC/LDL	0.65	BioMe AMP T2D GWAS	0.023	BioMe AMP T2D GWAS	0.683	Oxford BioBank exome chip analysis	0.0408	GWAS SIGMA
rs6882076	TIMD4	TC/TG/LDL	0.527	BioMe AMP T2D GWAS	0.901	BioMe AMP T2D GWAS	0.593	Oxford BioBank exome chip analysis	0.0052	DIAGRAM Transethnic meta-analysis
rs10401969	CILP2	TC/TG/LDL	0.454	BioMe AMP T2D GWAS	0.7	BioMe AMP T2D GWAS	0.673	Oxford BioBank exome chip analysis	0.000000417	GoT2D 82k exome chip analysis
rs13238203	**TYW1B**	**TG**	**0.00087**	**CAMP GWAS**	**0.025**	**MAGIC GWAS**	**-**	**-**	**0.0289**	**GoT2D WGS**
rs3198697	**PDXDC1**	**TG**	**0.335**	**BioMe AMP T2D GWAS**	**0.514**	**BioMe AMP T2D GWAS**	**-**	**-**	**0.0256**	**GoT2D WGS**
rs11649653	**CTF1**	**TG**	**0.674**	**BioMe AMP T2D GWAS**	**0.152**	**BioMe AMP T2D GWAS**	**-**	**-**	**0.04**	**DIAGRAM Transethnic meta-analysis**
rs5756931	**PLA2G6**	**TG**	**0.95**	**BioMe AMP T2D GWAS**	**0.409**	**BioMe AMP T2D GWAS**	**-**	**-**	**0.127**	**CAMP GWAS**
rs2068888	**CYP26A1**	**TG**	**0.729**	**BioMe AMP T2D GWAS**	**0.55**	**BioMe AMP T2D GWAS**	**0.0743**	**Oxford BioBank exome chip analysis**	**0.03**	**DIAGRAM Transethnic meta-analysis**
rs10761731	**JMJD1C**	**TG**	**0.41**	**BioMe AMP T2D GWAS**	**0.999**	**BioMe AMP T2D GWAS**	**0.084**	**Oxford BioBank exome chip analysis**	**0.0839**	**CAMP GWAS**
rs7248104	**INSR**	**TG**	**0.42**	**BioMe AMP T2D GWAS**	**0.132**	**BioMe AMP T2D GWAS**	**0.132**	**Oxford BioBank exome chip analysis**	**0.00422**	**GoT2D 82k exome chip analysis**
rs2929282	**FRMD5**	**TG**	**0.504**	**BioMe AMP T2D GWAS**	**0.313**	**BioMe AMP T2D GWAS**	**0.192**	**Oxford BioBank exome chip analysis**	**0.187**	**GoT2D 82k exome chip analysis**

rs1832007	**AKR1C4**	**TG**	**0.0186**	**BioMe AMP T2D GWAS**	**0.18**	**BioMe AMP T2D GWAS**	**0.287**	**Oxford BioBank exome chip analysis**	**0.0421**	**GWAS SIGMA**
rs8077889	**MPP3**	**TG**	**0.939**	**BioMe AMP T2D GWAS**	**0.324**	**BioMe AMP T2D GWAS**	**0.354**	**Oxford BioBank exome chip analysis**	**0.0566**	**CAMP GWAS**
rs11776767	**PINX1**	**TG**	**0.486**	**BioMe AMP T2D GWAS**	**0.516**	**BioMe AMP T2D GWAS**	**0.503**	**Oxford BioBank exome chip analysis**	**0.18**	**DIAGRAM Transethnic meta-analysis**
rs2412710	**CAPN3**	**TG**	**0.362**	**BioMe AMP T2D GWAS**	**0.893**	**BioMe AMP T2D GWAS**	**0.545**	**Oxford BioBank exome chip analysis**	**0.0373**	**GoT2D WGS + replication**
rs645040	**MSL2L1**	**TG**	**0.0381**	**BioMe AMP T2D GWAS**	**0.266**	**BioMe AMP T2D GWAS**	**0.695**	**Oxford BioBank exome chip analysis**	**0.00594**	**GoT2D WGS + replication**
rs442177	**KLHL8**	**TG**	**0.0875**	**BioMe AMP T2D GWAS**	**0.507**	**BioMe AMP T2D GWAS**	**0.825**	**Oxford BioBank exome chip analysis**	**0.012**	**DIAGRAM Transethnic meta-analysis**
rs9686661	MAP3K1	TG	0.0357	BioMe AMP T2D GWAS	0.554	BioMe AMP T2D GWAS	0.995	Oxford BioBank exome chip analysis	2.54E-09	70Kfor T2D GWAS
rs38855	**MET**	**TG**	**0.715**	**BioMe AMP T2D GWAS**	**0.437**	**BioMe AMP T2D GWAS**	**0.997**	**Oxford BioBank exome chip analysis**	**0.0824**	**GoT2D WGS + replication**
rs998584	VEGFA	TG/HDL	0.427	BioMe AMP T2D GWAS	0.201	BioMe AMP T2D GWAS	-	-	0.00224	GoT2D 82k exome chip analysis
rs11613352	LRP1	TG/HDL	0.404	MAGIC GWAS	0.775	MAGIC GWAS	-	-	0.021	70Kfor T2D GWAS
rs17145738	MLXIPL	TG/HDL	0.0524	BioMe AMP T2D GWAS	0.0336	BioMe AMP T2D GWAS	0.0584	Oxford BioBank exome chip analysis	0.0107	GoT2D 82k exome chip analysis
rs12678919	LPL	TG/HDL	0.805	BioMe AMP T2D GWAS	0.609	BioMe AMP T2D GWAS	0.341	Oxford BioBank exome chip analysis	0.00338	70Kfor T2D GWAS
rs731839	PEPD	TG/HDL	0.561	BioMe AMP T2D GWAS	0.937	BioMe AMP T2D GWAS	0.525	Oxford BioBank exome chip analysis	0.0001	DIAGRAM Transethnic meta-analysis
rs2131925	ANGPTL3	TG/LDL/TC	0.743	BioMe AMP T2D GWAS	0.535	BioMe AMP T2D GWAS	0.0332	Oxford BioBank exome chip analysis	0.0288	70Kfor T2D GWAS
rs174546	FADS1-2-3	TG/LDL/TC/HDL	0.534	BioMe AMP T2D GWAS	0.532	BioMe AMP T2D GWAS	0.618	Oxford BioBank exome chip analysis	0.0035	GoT2D 82k exome chip analysis
rs1495741	NAT2	TG/TC	0.235	BioMe AMP T2D GWAS	0.101	BioMe AMP T2D GWAS	0.613	Oxford BioBank exome chip analysis	0.0844	GoT2D 82k exome chip analysis
rs1260326	GCKR	TG/TC	0.51	BioMe AMP T2D GWAS	0.642	BioMe AMP T2D GWAS	0.672	Oxford BioBank exome chip analysis	4.8E-09	GoT2D 82k exome chip analysis
rs964184	APOA1	TG/TC/HDL/LDL	0.369	BioMe AMP T2D GWAS	0.0107	BioMe AMP T2D GWAS	0.119	Oxford BioBank exome chip analysis	0.11	DIAGRAM Transethnic meta-analysis
rs2954029	TRIB1	TG/TC/LDL/HDL	0.0136	BioMe AMP T2D GWAS	0.449	BioMe AMP T2D GWAS	0.0798	Oxford BioBank exome chip analysis	0.0342	70Kfor T2D GWAS
rs6831256	LRPAP1	TG/TCf/LDLf	0.307	BioMe AMP T2D GWAS	0.119	BioMe AMP T2D GWAS	0.136	Oxford BioBank exome chip analysis	0.0123	GoT2D 82k exome chip analysis

Green cells indicate significant P-Values (P < 5E-8).

Bold cells indicate SNPs that are not significant for independent of type 2 diabetes, Hemoglobin A1c (HbA1c), fasting glucose, and hypertension and are unique to each lipid fraction.

Details on the studies cited in this table can be found at http://www.type2diabetesgenetics.org/informational/data.

Supplementary Table 2. Heterogeneity I^2 estimates for all SNPs.

	Any DR		Severe DR	
SNP	I2, %	P value	I2, %	P value
rs12748152	0.0	0.501	15.5	0.305
rs12145743	32.4	0.116	0.0	0.641
rs4650994	0.0	0.786	0.0	0.584
rs4660293	4.0	0.407	0.0	0.997
rs1689800	0.0	0.557	20.0	0.253
rs4846914	0.0	0.774	0.0	0.437
rs1047891	0.0	0.953	0.0	0.959
rs12328675	0.0	0.810	0.0	0.610
rs2972146	0.0	0.731	15.8	0.298
rs2606736	31.0	0.109	0.0	0.600
rs2290547	0.0	0.815	0.0	0.770
rs2013208	20.0	0.220	0.0	0.861
rs13326165	16.6	0.263	11.0	0.342
rs6805251	0.0	0.610	0.0	0.952
rs10019888	28.2	0.161	0.0	0.690
rs3822072	35.1	0.076	50.5	0.027
rs2602836	0.0	0.794	0.0	0.519
rs13107325	57.8	0.020	0.0	0.372
rs6450176	18.1	0.241	0.0	0.508
rs1936800	34.7	0.079	51.6	0.024
rs605066	0.0	0.467	0.0	0.664
rs702485	0.0	0.595	15.1	0.300
rs4142995	0.0	0.680	0.0	0.786
rs4917014	29.2	0.131	23.9	0.223
rs17173637	0.0	0.614	48.3	0.036
rs4731702	6.7	0.377	40.3	0.089
rs9987289	37.8	0.058	17.3	0.279
rs2293889	35.1	0.076	22.9	0.225
rs581080	12.0	0.313	0.0	0.634
rs1883025	42.4	0.038	2.2	0.421
rs970548	49.9	0.010	0.0	0.748
rs11246602	41.0	0.045	39.4	0.086
rs12801636	0.0	0.824	0.0	0.590
rs499974	0.0	0.800	28.5	0.182
rs2923084	7.2	0.371	27.6	0.190
rs3136441	0.0	0.515	0.0	0.696
rs7134375	0.0	0.983	0.0	0.850
rs7134594	20.8	0.212	24.2	0.213
rs4759375	49.5	0.011	20.7	0.252

rs4765127	0.0	0.462	0.0	0.812
rs838880	0.0	0.589	0.0	0.448
rs4983559	0.0	0.590	10.3	0.351
rs1532085	0.0	0.812	0.0	0.847
rs2652834	30.5	0.125	45.7	0.056
rs1121980	0.0	0.834	47.1	0.049
rs3764261	25.8	0.158	25.8	0.198
rs16942887	30.2	0.116	0.0	0.811
rs2925979	5.0	0.396	0.0	0.937
rs11869286	0.0	0.533	0.0	0.518
rs4148008	35.4	0.074	28.1	0.177
rs4129767	6.7	0.377	0.0	0.868
rs7241918	28.9	0.134	0.0	0.883
rs12967135	0.0	0.510	0.0	0.551
rs17695224	0.0	0.590	0.0	0.941
rs7255436	0.0	0.509	41.8	0.079
rs737337	0.0	0.464	30.3	0.158
rs386000	25.5	0.186	20.0	0.271
rs1800961	0.0	0.517	18.8	0.286
rs6065906	44.9	0.031	0.0	0.460
rs181362	8.8	0.351	0.0	0.582
rs267733	27.6	0.140	24.5	0.210
rs2479409	0.0	0.493	0.0	0.893
rs629301	24.2	0.187	5.8	0.388
rs2710642	0.0	0.599	0.0	0.758
rs10490626	0.0	0.458	37.4	0.172
rs2030746	0.0	0.727	1.4	0.428
rs1250229	0.0	0.553	0.0	0.565
rs1367117	25.5	0.161	33.7	0.129
rs4299376	0.0	0.562	0.0	0.507
rs7640978	11.2	0.325	0.0	0.972
rs17404153	0.0	0.626	0.0	0.496
rs4530754	0.0	0.630	7.5	0.373
rs3757354	0.0	0.779	0.0	0.532
rs1800562	0.0	0.698	0.0	0.964
rs1564348	0.0	0.614	31.6	0.176
rs4722551	24.8	0.168	14.7	0.308
rs10102164	0.0	0.485	48.9	0.034
rs11136341	0.0	0.526	46.9	0.068
rs635634	0.0	0.774	0.0	0.451
rs11220462	0.0	0.802	0.0	0.805
rs4942486	14.4	0.289	0.0	0.776
rs8017377	16.5	0.274	0.0	0.808
rs1801689	0.0	0.670	13.5	0.282

rs7206971	35.3	0.080	0.0	0.892
rs6511720	0.0	0.993	5.2	0.388
rs4420638	3.7	0.411	0.0	0.926
rs364585	0.0	0.757	0.0	0.972
rs2328223	0.0	0.487	0.0	0.711
rs6029526	4.8	0.398	9.2	0.357
rs5763662	0.0	0.941	0.0	0.536
rs2131925	13.5	0.299	11.4	0.335
rs1260326	0.0	0.469	0.0	0.643
rs645040	0.0	0.553	0.0	0.670
rs6831256	21.1	0.208	0.0	0.925
rs442177	18.1	0.241	26.8	0.189
rs9686661	0.0	0.776	0.0	0.483
rs998584	29.1	0.138	51.2	0.030
rs38855	43.0	0.031	0.0	0.736
rs13238203	0.0	0.907	0.0	0.398
rs17145738	0.0	0.787	21.1	0.249
rs11776767	0.0	0.615	28.0	0.178
rs1495741	25.8	0.158	57.0	0.010
rs12678919	0.0	0.951	0.0	0.963
rs2954029	0.0	0.468	35.0	0.118
rs1832007	22.9	0.188	14.0	0.317
rs10761731	0.0	0.481	36.2	0.109
rs2068888	24.1	0.175	3.7	0.407
rs174546	0.0	0.668	0.0	0.483
rs964184	0.0	0.579	55.7	0.013
rs11613352	9.0	0.349	9.7	0.352
rs2412710	0.0	0.729	0.0	0.886
rs2929282	10.9	0.327	33.5	0.131
rs3198697	9.5	0.352	54.6	0.040
rs11649653	25.1	0.171	14.7	0.304
rs8077889	51.3	0.014	40.0	0.112
rs7248104	24.1	0.182	45.5	0.057
rs731839	23.2	0.186	35.4	0.116
rs5756931	0.0	0.461	8.2	0.366
rs1077514	0.0	0.574	19.4	0.265
rs12027135	44.7	0.024	58.5	0.007
rs7515577	18.8	0.239	4.7	0.399
rs2642442	0.0	0.942	0.0	0.752
rs514230	0.0	0.539	0.0	0.975
rs2287623	0.0	0.693	0.0	0.901
rs11694172	0.0	0.913	0.0	0.705
rs11563251	39.9	0.046	13.2	0.319
rs7570971	0.0	0.976	0.0	0.547

rs13315871	7.0	0.376	3.3	0.405
rs2290159	18.5	0.237	0.0	0.842
rs12916	27.8	0.138	0.0	0.892
rs6882076	24.9	0.167	1.6	0.426
rs2758886	0.0	0.526	0.0	0.623
rs9376090	0.8	0.444	34.7	0.121
rs3177928	0.0	0.883	0.0	0.766
rs2814982	54.0	0.004	0.0	0.467
rs9488822	18.6	0.236	19.3	0.260
rs1997243	0.0	0.797	4.7	0.396
rs12670798	1.2	0.439	30.1	0.159
rs2072183	48.9	0.017	57.4	0.009
rs2081687	26.7	0.149	15.3	0.298
rs3780181	15.8	0.272	0.0	0.620
rs10904908	0.0	0.864	0.0	0.983
rs2255141	0.0	0.464	0.0	0.912
rs11603023	3.4	0.414	0.0	0.579
rs10128711	0.0	0.691	0.0	0.782
rs7941030	28.5	0.132	21.1	0.243
rs4883201	1.9	0.427	25.2	0.228
rs11065987	0.0	0.601	20.5	0.261
rs1169288	23.6	0.181	0.0	0.473
rs2000999	5.6	0.388	17.4	0.283
rs314253	23.3	0.196	0.0	0.596
rs10401969	8.8	0.351	8.7	0.361
rs492602	31.6	0.116	27.9	0.187
rs2277862	0.0	0.739	11.0	0.339
rs2902940	0.0	0.701	0.4	0.437
rs138777	4.4	0.403	47.6	0.039
rs4253772	0.0	0.729	3.3	0.401

Supplementary Table 3. Summary of previously-reported lipid-associated SNPs and association with diabetic retinopathy in all pooled studies

SNP ID	Chromosome	Build 37 Position	Effect/Reference Allele	GLGC Data		Any DR			Severe DR		
				β	P value	β	SE	P value	β	SE	P value
HDL											
rs12748152	1	27138393	C/T	0.051	1.0E-15	-0.063	0.091	0.486	-0.176	0.125	0.161
rs12145743	1	156700651	G/T	0.02	2.0E-08	-0.004	0.016	0.796	0.01	0.081	0.899
rs4650994	1	178515312	G/A	0.021	7.0E-09	-0.039	0.042	0.351	-0.038	0.063	0.546
rs4660293	1	40028180	A/G	0.035	3.0E-18	-0.044	0.065	0.497	-0.16	0.088	0.067
rs1689800	1	182168885	A/G	0.034	5.0E-20	-0.028	0.033	0.396	-0.032	0.057	0.579
rs4846914	1	230295691	A/G	0.048	4.0E-41	-0.007	0.049	0.893	-0.048	0.068	0.478
rs1047891	2	211540507	C/A	0.027	9.0E-10	0.000	0.016	0.996	0.000	0.005	0.975
rs12328675	2	165540800	C/T	0.045	2.0E-15	-0.07	0.068	0.304	0.016	0.126	0.899
rs2972146	2	227100698	G/T	0.032	2.0E-17	-0.077	0.045	0.09	-0.009	0.046	0.847
rs2606736	3	11400249	C/T	0.025	5.0E-08	0.001	0.032	0.967	-0.026	0.043	0.551
rs2290547	3	47061183	G/A	0.03	4.0E-09	-0.002	0.037	0.958	-0.031	0.075	0.681
rs2013208	3	50129399	T/C	0.025	9.0E-12	-0.026	0.029	0.362	-0.002	0.023	0.939
rs13326165	3	52532118	A/G	0.029	9.0E-11	0.014	0.035	0.686	0.066	0.084	0.435
rs6805251	3	119560606	T/C	0.02	1.0E-08	0.046	0.043	0.278	0.11	0.061	0.071
rs10019888	4	26062990	A/G	0.027	5.0E-08	-0.073	0.057	0.205	-0.086	0.087	0.327
rs3822072	4	89741269	G/A	0.025	4.0E-12	-0.017	0.037	0.645	-0.012	0.054	0.831
rs2602836	4	100014805	A/G	0.019	5.0E-08	0.024	0.047	0.619	0.005	0.068	0.944
rs13107325	4	103188709	C/T	0.071	1.0E-15	-0.124	0.131	0.344	-0.142	0.219	0.515
rs6450176	5	53298025	G/A	0.025	7.0E-10	-0.016	0.039	0.686	0.035	0.057	0.539
rs1936800	6	127436064	C/T	0.02	3.0E-10	-0.035	0.027	0.196	-0.028	0.052	0.584
rs605066	6	139829666	T/C	0.028	3.0E-08	-0.042	0.037	0.26	0.076	0.056	0.172
rs702485	7	6449272	G/A	0.024	7.0E-12	0.006	0.032	0.852	0.029	0.055	0.593
rs4142995	7	17919258	G/T	0.026	9.0E-12	-0.046	0.041	0.26	-0.087	0.063	0.166

rs4917014	7	50305863	G/T	0.022	1.0E-08	0	0.052	0.998	0.105	0.066	0.113
rs17173637	7	150529449	T/C	0.036	2.0E-08	-0.061	0.055	0.267	-0.193	0.144	0.181
rs4731702	7	130433384	T/C	0.029	5.0E-17	-0.076	0.039	0.051	0.038	0.06	0.532
rs9987289	8	9183358	G/A	0.082	2.0E-41	-0.007	0.023	0.763	0.186	0.102	0.068
rs2293889	8	116599199	G/T	0.031	4.0E-17	-0.106	0.044	0.017	-0.043	0.044	0.334
rs581080*	9	15305378	C/G	0.042	1.0E-19	0.128	0.055	0.02	0.025	0.079	0.756
rs1883025	9	107664301	C/T	0.07	2.0E-65	0.008	0.042	0.842	0.126	0.058	0.031
rs970548	10	46013277	C/A	0.026	2.0E-10	0.023	0.037	0.522	0.072	0.06	0.233
rs11246602	11	51512090	C/T	0.034	2.0E-10	-0.011	0.075	0.888	0.02	0.09	0.826
rs12801636	11	65391317	A/G	0.024	3.0E-08	-0.02	0.039	0.612	0.002	0.064	0.981
rs499974	11	75455021	C/A	0.026	1.0E-08	-0.003	0.051	0.946	0.094	0.066	0.157
rs2923084	11	10388782	A/G	0.026	5.0E-08	0.062	0.046	0.176	-0.032	0.066	0.632
rs3136441	11	46743247	C/T	0.054	7.0E-29	-0.022	0.02	0.291	0.014	0.062	0.827
rs7134375	12	20473758	A/C	0.021	1.0E-08	-0.01	0.036	0.775	-0.027	0.055	0.618
rs7134594	12	110000193	T/C	0.035	2.0E-13	0.092	0.041	0.025	0.088	0.062	0.159
rs4759375	12	123796238	T/C	0.056	3.0E-08	0.044	0.03	0.135	0.011	0.063	0.86
rs4765127	12	124460167	T/G	0.032	8.0E-10	0.091	0.048	0.056	0.054	0.073	0.457
rs838880	12	125261593	C/T	0.048	6.0E-32	-0.026	0.047	0.582	0.022	0.066	0.738
rs4983559	14	105277209	G/A	0.02	1.0E-08	-0.045	0.057	0.425	-0.161	0.08	0.046
rs1532085	15	58683366	A/G	0.107	1.0E-188	0.021	0.04	0.59	0.08	0.058	0.169
rs2652834	15	63396867	G/A	0.028	4.0E-11	0.048	0.051	0.351	0.134	0.08	0.094
rs1121980	16	53809247	G/A	0.02	7.0E-09	0.008	0.017	0.637	0.078	0.066	0.234
rs3764261	16	56993324	A/C	0.241	0.0E+00	-0.018	0.047	0.703	-0.056	0.063	0.369
rs16942887	16	67928042	A/G	0.083	8.0E-54	0.06	0.056	0.284	0.046	0.087	0.603
rs2925979	16	81534790	C/T	0.035	1.0E-19	-0.036	0.045	0.418	-0.002	0.036	0.952
rs11869286	17	37813856	C/G	0.032	3.0E-17	0.016	0.039	0.681	0.004	0.057	0.942
rs4148008	17	66875294	C/G	0.028	1.0E-12	0.032	0.025	0.2	0.013	0.044	0.764
rs4129767	17	76403984	A/G	0.024	2.0E-11	-0.001	0.04	0.979	-0.049	0.055	0.379

rs7241918	18	47160953	T/G	0.09	1.0E-44	-0.013	0.024	0.573	-0.029	0.077	0.711
rs12967135	18	57849023	G/A	0.026	4.0E-08	-0.079	0.048	0.101	-0.027	0.073	0.715
rs17695224	19	52324216	G/A	0.029	2.0E-13	0.068	0.045	0.134	0.094	0.065	0.145
rs7255436	19	8433196	A/C	0.032	2.0E-08	-0.014	0.038	0.71	-0.118	0.065	0.07
rs737337	19	11347493	T/C	0.056	5.0E-17	0.007	0.023	0.76	-0.011	0.05	0.824
rs386000	19	54792761	C/G	0.048	3.0E-23	-0.009	0.051	0.867	0.008	0.054	0.875
rs1800961	20	43042364	C/T	0.127	2.0E-34	-0.036	0.142	0.802	-0.236	0.206	0.252
rs6065906	20	44554015	T/C	0.059	5.0E-40	0.03	0.059	0.618	0.061	0.098	0.533
rs181362	22	21932068	C/T	0.038	4.0E-18	0.004	0.042	0.926	-0.127	0.058	0.028
LDL											
rs267733	1	150958836	A/G	0.033	5E−9	0.081	0.065	0.212	-0.141	0.128	0.274
rs2479409	1	55504650	G/A	0.064	3.0E-50	-0.038	0.042	0.363	-0.041	0.051	0.427
rs629301	1	109818306	T/G	0.167	5.0E-241	-0.025	0.051	0.621	-0.031	0.105	0.767
rs2710642	2	63149557	A/G	0.024	6E−9	0.02	0.045	0.665	-0.071	0.059	0.229
rs10490626	2	118835841	G/A	0.015	2.0E-12	-0.082	0.086	0.341	-0.012	0.199	0.951
rs2030746	2	121309488	T/C	0.021	9.0E-09	0.053	0.03	0.078	0.007	0.053	0.897
rs1250229	2	216304384	C/T	0.024	3E−8	0.001	0.039	0.983	0.045	0.054	0.406
rs1367117	2	21263900	A/G	0.1	3.0E-139	0.009	0.032	0.791	-0.032	0.07	0.642
rs4299376	2	44072576	G/T	0.079	3.0E-73	0.049	0.05	0.333	0	0.01	0.979
rs7640978	3	32533010	C/T	0.039	1E−8	0.023	0.07	0.743	0.052	0.098	0.594
rs17404153	3	132163200	G/T	0.034	2.0E-09	-0.054	0.067	0.419	-0.068	0.087	0.437
rs4530754	5	122855416	A/G	0.028	4.0E-12	-0.034	0.041	0.41	-0.063	0.061	0.303
rs3757354	6	16127407	C/T	0.038	2.0E-17	-0.037	0.035	0.297	-0.047	0.052	0.368
rs1800562	6	26093141	G/A	0.062	8.0E-14	0.04	0.197	0.84	-0.003	0.01	0.772
rs1564348	6	160578860	C/T	0.048	3.0E-21	-0.009	0.055	0.87	0.024	0.107	0.823
rs4722551	7	25991826	C/T	0.039	4E−14	0.056	0.054	0.297	0.012	0.075	0.878
rs10102164	8	55421614	A/G	0.032	4E−11	0.025	0.054	0.643	-0.014	0.074	0.855
rs11136341	8	145043543	G/A	0.045	7.0E-12	0.07	0.049	0.156	0.078	0.074	0.293

rs635634	9	136155000	T/C			0.039	0.057	0.494	-0.012	0.078	0.881
rs11220462	11	126243952	A/G	0.059	7.0E-21	-0.049	0.058	0.392	0.006	0.013	0.617
rs4942486	13	32953388	T/C	0.024	2E−11	0.007	0.039	0.861	-0.038	0.054	0.481
rs8017377	14	24883887	A/G	0.03	3.0E-15	0.103	0.05	0.041	-0.066	0.084	0.435
rs1801689	17	64210580	C/A	0.103	1E−11	0.017	0.272	0.95	0.275	0.458	0.549
rs7206971	17	45425115	A/G	0.029	3.0E-07	-0.011	0.04	0.784	0.024	0.046	0.608
rs6511720	19	11202306	G/T	0.221	4.0E-262	-0.067	0.06	0.267	-0.161	0.126	0.2
rs4420638	19	45422946	G/A	0.225	2.0E-178	-0.059	0.067	0.379	-0.174	0.095	0.065
rs364585	20	12962718	G/A	0.025	4E−10	-0.05	0.044	0.254	0.025	0.046	0.591
rs2328223	20	17845921	C/A	0.03	6E−9	0.035	0.044	0.434	0.001	0.018	0.972
rs6029526	20	39672618	A/T	0.044	5.0E-18	-0.016	0.041	0.692	-0.028	0.059	0.635
rs5763662	22	30378703	T/C	0.044	1E−8	0.091	0.069	0.183	0.027	0.089	0.765
Triglycerides											
rs2131925	1	63025942	T/G	0.066	3.0E-74	-0.006	0.017	0.728	-0.009	0.033	0.781
rs1260326	2	27730940	T/C	0.115	2.0E-239	0.056	0.037	0.133	0.035	0.046	0.448
rs645040	3	135926622	T/G	0.029	2.0E-12	-0.021	0.042	0.622	-0.067	0.06	0.261
rs6831256	4	3473139	G/A	0.026	2.0E-12	0.003	0.032	0.939	0.048	0.056	0.394
rs442177	4	88030261	T/G	0.031	1.0E-18	-0.035	0.039	0.364	-0.076	0.054	0.159
rs9686661	5	55861786	T/C	0.038	3.0E-16	0.018	0.039	0.653	0.139	0.071	0.05
rs998584	6	43757896	A/C	0.029	3.0E-15	0.06	0.03	0.045	0.118	0.062	0.056
rs38855	7	116358044	A/G	-0.019	2.0E-08	-0.017	0.041	0.683	0.032	0.057	0.575
rs13238203	7	72129667	C/T	0.059	3.0E-06	0.002	0.095	0.98	-0.297	0.593	0.616
rs17145738	7	72982874	C/T	0.115	9.0E-99	0.109	0.066	0.101	0.119	0.091	0.192
rs11776767	8	10683929	C/G	0.022	3.0E-11	0	0.007	0.999	0.075	0.061	0.215
rs1495741	8	18272881	G/A	0.04	3.0E-12	0.045	0.041	0.27	0.086	0.055	0.118
rs12678919	8	19844222	A/G	0.17	2.0E-199	0.079	0.06	0.191	0.116	0.103	0.258
rs2954029	8	126490972	A/T	0.076	1.0E-107	0.014	0.022	0.535	0.034	0.057	0.554
rs1832007	10	5254847	A/G	-0.033	2.0E-12	-0.02	0.048	0.678	-0.016	0.047	0.737

rs10761731	10	65027610	A/T	-0.031	8.0E-12	-0.034	0.036	0.343	-0.045	0.051	0.378
rs2068888	10	94839642	G/A	-0.024	2.0E-11	0.005	0.016	0.781	0.018	0.052	0.729
rs174546	11	61569830	T/C	0.045	7.0E-38	-0.047	0.045	0.291	-0.082	0.06	0.168
rs964184	11	116648917	G/C	0.234	7.0E-224	0.076	0.048	0.115	0.105	0.068	0.123
rs11613352	12	57792580	C/T	0.028	9.0E-14	-0.009	0.012	0.454	-0.008	0.016	0.598
rs2412710	15	42683787	A/G	0.099	2.0E-11	0.02	0.039	0.61	0.144	0.301	0.631
rs2929282	15	44245931	T/A	0.072	2.0E-09	-0.079	0.057	0.162	-0.006	0.057	0.923
rs3198697	16	15129940	C/T	0.02	2.0E-08	0.005	0.056	0.928	-0.008	0.098	0.935
rs11649653	16	30918487	C/G	0.027	2.0E-07	-0.007	0.036	0.839	0.085	0.068	0.216
rs8077889	17	41878166	C/A	0.025	1.0E-08	-0.066	0.058	0.254	-0.011	0.044	0.796
rs7248104	19	7224431	G/A	0.022	5.0E-10	0	0.002	0.904	-0.042	0.06	0.479
rs731839	19	33899065	G/A	0.022	3.0E-09	-0.005	0.032	0.885	0.03	0.052	0.568
rs5756931	22	38546033	T/C	0.02	3.0E-08	0.067	0.033	0.042	0.046	0.042	0.275
Total Cholesterol											
rs1077514	1	23766233	T/C	0.03	6.0E-09	0.08	0.046	0.084	0.024	0.063	0.711
rs12027135	1	25775733	T/A	0.027	5.0E-12	-0.022	0.044	0.616	0.021	0.064	0.74
rs7515577	1	93009438	A/C	0.037	2.0E-08	0.019	0.068	0.779	-0.039	0.072	0.59
rs2642442	1	220973563	T/C	0.035	3.0E-11	0.032	0.047	0.5	-0.015	0.078	0.851
rs514230	1	234858597	T/A	0.039	5.0E-14	-0.004	0.013	0.741	-0.003	0.061	0.962
rs2287623	2	169830155	G/A	0.027	4.0E-12	-0.034	0.045	0.45	-0.015	0.06	0.809
rs11694172	2	203532304	G/A	0.028	2.0E-09	0.004	0.049	0.931	0.036	0.078	0.646
rs11563251	2	234679384	T/C	0.037	1.0E-09	0.109	0.058	0.059	0.018	0.082	0.828
rs7570971	2	135837906	A/C	0.03	1.0E-13	0.077	0.066	0.245	0.042	0.101	0.676
rs13315871	3	58381287	G/A	0.036	4.0E-08	-0.002	0.023	0.918	-0.019	0.106	0.861
rs2290159	3	12628920	G/C	0.037	2.0E-09	-0.007	0.014	0.61	0.047	0.094	0.615
rs12916	5	74656539	C/T	0.073	5.8E-77	-0.007	0.039	0.855	0.022	0.05	0.655
rs6882076	5	156390297	C/T	0.051	5.0E-04	0.017	0.04	0.671	0.024	0.065	0.715
rs2758886	6	39250837	A/G	0.023	3E−8	-0.135	0.058	0.02	-0.095	0.073	0.194

rs9376090	6	135411228	T/C	-0.025	3.0E-09	0.032	0.053	0.548	0.041	0.07	0.562
rs3177928	6	32412435	A/G	0.048	1.0E-21	0.044	0.099	0.659	-0.211	0.182	0.247
rs2814982	6	34546560	C/T	0.044	4.0E-15	-0.013	0.05	0.796	0.024	0.05	0.632
rs9488822	6	116312893	A/T	-0.034	1.0E-09	-0.056	0.039	0.147	-0.068	0.064	0.293
rs1997243	7	1083777	G/A	0.033	3.0E-10	0.024	0.076	0.757	-0.137	0.084	0.104
rs12670798	7	21607352	C/T	0.034	5.0E-14	-0.001	0.008	0.864	-0.034	0.05	0.497
rs2072183	7	44579180	C/G	0.036	4.0E-15	-0.014	0.045	0.759	-0.042	0.059	0.478
rs2081687	8	59388565	T/C	0.038	9.0E-12	0.036	0.04	0.379	0.018	0.062	0.772
rs3780181	9	2640759	A/G	0.044	7.0E-10	0.006	0.067	0.925	-0.13	0.09	0.149
rs10904908	10	17260290	G/A	0.025	3.0E-11	0.007	0.039	0.861	-0.031	0.052	0.547
rs2255141	10	113933886	A/G	0.031	7.0E-16	-0.119	0.041	0.004	-0.037	0.042	0.379
rs11603023	11	118486067	T/C	0.022	1E−8	-0.004	0.019	0.837	0.045	0.048	0.354
rs10128711	11	18632984	C/T	0.031	1.0E-11	-0.004	0.042	0.924	-0.036	0.063	0.57
rs7941030	11	122522375	C/T	0.028	2.0E-14	0.021	0.039	0.585	0.044	0.053	0.41
rs4883201	12	9082581	A/G	0.035	2.0E-09	-0.06	0.052	0.25	0.008	0.07	0.909
rs11065987	12	112072424	A/G	0.031	2.0E-16	0	0.029	0.998	-0.006	0.036	0.867
rs1169288	12	121416650	C/A	0.032	4.0E-17	0.021	0.042	0.615	0.043	0.058	0.458
rs2000999	16	72108093	A/G	0.065	4.0E-41	0.015	0.047	0.752	0.033	0.066	0.612
rs314253	17	7091650	T/C	0.023	3.0E-10	0.048	0.044	0.277	0.001	0.067	0.994
rs10401969	19	19407718	T/C	0.137	4.0E-77	-0.02	0.031	0.509	-0.155	0.095	0.102
rs492602	19	49206417	G/A	0.031	1.0E-16	-0.062	0.043	0.149	-0.117	0.076	0.123
rs2277862	20	34152782	C/T	0.035	5.0E-11	0.024	0.046	0.602	-0.144	0.077	0.061
rs2902940	20	39091487	A/G	0.024	9.0E-10	-0.023	0.042	0.596	-0.135	0.052	0.009
rs138777	22	35711098	A/G	0.021	5.0E-08	-0.008	0.013	0.516	0.034	0.057	0.545
rs4253772	22	46627603	T/C	0.032	1.0E-08	0.092	0.081	0.258	0.136	0.135	0.315

Supplementary Table 4. Summary of previously-reported lipid-associated SNPs and association with diabetic retinopathy in Caucasian and Chinese studies

			Caucasian						Chinese					
			Any DR			Severe DR			Any DR			Severe DR		
SNP ID	Effect/Reference Allele	β	β	SE	P value	β	SE	P value	β	SE	P value	β	SE	P value
HDL														
rs12748152	C/T	0.051	-0.068	0.122	0.576	-0.040	0.173	0.816	0.077	0.351	0.827	-0.380	0.257	0.140
rs12145743	G/T	0.02	0.038	0.070	0.582	0.063	0.139	0.650	-	-	-	-	-	-
rs4650994	G/A	0.021	0.074	0.074	0.320	0.147	0.150	0.328	-	-	-	-	-	-
rs4660293	A/G	0.035	-0.035	0.095	0.711	-0.060	0.155	0.699	-0.029	0.158	0.855	-0.203	0.125	0.105
rs1689800	A/G	0.034	-0.051	0.063	0.413	0.102	0.116	0.381	-0.267	0.124	0.031	-0.018	0.091	0.847
rs4846914	A/G	0.048	0.004	0.090	0.968	-0.112	0.127	0.378	0.073	0.133	0.582	0.025	0.104	0.810
rs1047891	C/A	0.027	0.040	0.056	0.475	0.092	0.133	0.489	-	-	-	-	-	-
rs12328675	C/T	0.045	-0.070	0.098	0.472	-0.138	0.204	0.499	-	-	-	-	-	-
rs2972146	G/T	0.032	-0.154	0.062	0.013	-0.028	0.053	0.594	0.029	0.212	0.892	0.178	0.165	0.280
rs2606736	C/T	0.025	-0.067	0.064	0.302	-0.116	0.143	0.419	-	-	-	-	-	-
rs2290547	G/A	0.03	0.029	0.053	0.585	0.144	0.171	0.400	-	-	-	-	-	-
rs2013208	T/C	0.025	-0.043	0.036	0.231	0.005	0.024	0.838	-	-	-	-	-	-
rs13326165	A/G	0.029	-0.017	0.041	0.691	0.190	0.143	0.184	-	-	-	-	-	-
rs6805251	T/C	0.02	0.063	0.067	0.352	0.157	0.120	0.191	-	-	-	-	-	-
rs10019888	A/G	0.027	-0.190	0.090	0.035	-0.218	0.171	0.204	-	-	-	-	-	-
rs3822072	G/A	0.025	0.099	0.060	0.098	0.054	0.105	0.611	-	-	-	-	-	-
rs2602836	A/G	0.019	0.024	0.074	0.751	0.036	0.108	0.742	-	-	-	-	-	-
rs13107325	C/T	0.071	-0.263	0.160	0.101	-0.260	0.255	0.308	-	-	-	-	-	-
rs6450176	G/A	0.025	0.118	0.075	0.118	0.233	0.145	0.109	-	-	-	-	-	-
rs1936800	C/T	0.02	-0.029	0.034	0.400	-0.044	0.097	0.645	-	-	-	-	-	-
rs605066	T/C	0.028	-0.018	0.060	0.762	0.142	0.131	0.280	0.098	0.124	0.430	0.139	0.091	0.125
rs702485	G/A	0.024	0.002	0.119	0.985	-0.074	0.218	0.733	0.133	0.184	0.470	0.143	0.129	0.270
rs4142995	G/T	0.026	0.004	0.068	0.949	-0.146	0.154	0.341	-0.039	0.109	0.718	-0.129	0.084	0.124

rs4917014	G/T	0.022	-0.007	0.115	0.955	0.188	0.158	0.235	-0.119	0.115	0.302	-0.031	0.088	0.720
rs17173637	T/C	0.036	-0.021	0.065	0.748	0.072	0.344	0.835	-	-	-	-	-	-
rs4731702	T/C	0.029	-0.203	0.069	0.003	-0.179	0.141	0.205	-0.096	0.119	0.419	0.022	0.094	0.812
rs9987289	G/A	0.082	-0.001	0.024	0.955	0.304	0.334	0.363	-	-	-	-	-	-
rs2293889	G/T	0.031	-0.190	0.076	0.012	0.023	0.135	0.868	0.238	0.152	0.118	0.021	0.116	0.854
rs581080	C/G	0.042	0.262	0.133	0.049	0.067	0.205	0.744	-	-	-	-	-	-
rs1883025	C/T	0.07	-0.108	0.081	0.184	0.155	0.139	0.266	0.380	0.147	0.010	0.065	0.100	0.513
rs970548	C/A	0.026	0.051	0.048	0.292	0.049	0.091	0.591	-	-	-	-	-	-
rs11246602	C/T	0.034	-0.113	0.216	0.600	-0.192	0.266	0.471	-	-	-	-	-	-
rs12801636	A/G	0.024	0.001	0.058	0.990	0.117	0.220	0.596	-0.023	0.109	0.832	0.035	0.086	0.683
rs499974	C/A	0.026	-0.028	0.091	0.762	-0.046	0.132	0.728	0.025	0.122	0.841	0.196	0.097	0.042
rs2923084	A/G	0.026	0.088	0.084	0.291	0.089	0.364	0.807	0.087	0.111	0.432	-0.140	0.085	0.098
rs3136441	C/T	0.054	-0.008	0.022	0.703	-0.025	0.258	0.923	-	-	-	-	-	-
rs7134375	A/C	0.021	-0.036	0.059	0.537	-0.086	0.104	0.409	-	-	-	-	-	-
rs7134594	T/C	0.035	0.016	0.087	0.855	0.086	0.280	0.758	0.099	0.121	0.413	-0.006	0.091	0.951
rs4759375	T/C	0.056	0.034	0.034	0.317	0.040	0.127	0.751	-	-	-	-	-	-
rs4765127	T/G	0.032	0.086	0.076	0.257	0.040	0.108	0.708	-	-	-	-	-	-
rs838880	C/T	0.048	-0.057	0.101	0.574	0.091	0.162	0.575	0.164	0.115	0.153	0.071	0.093	0.449
rs4983559	G/A	0.02	0.118	0.341	0.729	-	-	-	-	-	-	-	-	-
rs1532085	A/G	0.107	0.163	0.075	0.031	0.066	0.157	0.673	-0.118	0.107	0.273	0.138	0.083	0.094
rs2652834	G/A	0.028	0.075	0.077	0.330	0.282	0.145	0.052	-	-	-	-	-	-
rs1121980	G/A	0.02	0.029	0.045	0.516	0.172	0.115	0.135	-	-	-	-	-	-
rs3764261	A/C	0.241	0.055	0.107	0.604	0.081	0.127	0.522	-0.025	0.153	0.868	-0.163	0.115	0.157
rs16942887	A/G	0.083	0.258	0.100	0.010	0.238	0.168	0.156	0.854	0.404	0.034	0.206	0.287	0.474
rs2925979	C/T	0.035	-0.084	0.108	0.436	-0.085	0.106	0.422	-0.003	0.112	0.978	0.033	0.084	0.693
rs11869286	C/G	0.032	0.067	0.090	0.456	0.013	0.173	0.939	-0.064	0.110	0.562	-0.021	0.088	0.809
rs4148008	C/G	0.028	0.029	0.040	0.470	-0.037	0.314	0.906	-	-	-	-	-	-
rs4129767	A/G	0.024	-0.058	0.086	0.502	-0.010	0.121	0.932	-0.153	0.117	0.189	-0.084	0.091	0.356
rs7241918	T/G	0.09	-0.014	0.031	0.639	0.064	0.330	0.845	-0.053	0.153	0.732	-0.007	0.122	0.952
rs12967135	G/A	0.026	-0.004	0.082	0.963	-0.105	0.291	0.719	-	-	-	-	-	-

rs17695224	G/A	0.029	-0.079	0.086	0.356	0.124	0.127	0.328	0.180	0.141	0.202	0.079	0.108	0.461
rs7255436	A/C	0.032	-0.027	0.057	0.638	-0.289	0.110	0.008	-	-	-	-	-	-
rs737337	T/C	0.056	-0.016	0.109	0.886	-0.067	0.227	0.768	0.068	0.130	0.600	-0.071	0.096	0.460
rs386000	C/G	0.048	0.017	0.130	0.899	0.082	0.089	0.357	0.034	0.111	0.759	-0.020	0.087	0.818
rs1800961	C/T	0.127	-0.082	0.305	0.788	-0.293	0.359	0.415	-	-	-	-	-	-
rs6065906	T/C	0.059	-0.035	0.118	0.767	0.107	0.250	0.670	-	-	-	-	-	-
rs181362	C/T	0.038	0.124	0.113	0.271	-0.182	0.195	0.349	-0.023	0.108	0.831	-0.153	0.082	0.063
LDL														
rs267733	A/G	0.033	0.092	0.087	0.292	0.069	0.420	0.869	-	-	-	-	-	-
rs2479409	G/A	0.064	-0.060	0.081	0.462	-0.158	0.122	0.194	-	-	-	-	-	-
rs629301	T/G	0.167	-0.027	0.082	0.746	0.038	0.688	0.956	0.032	0.236	0.893	-0.100	0.166	0.547
rs2710642	A/G	0.024	0.055	0.091	0.543	-0.167	0.128	0.193	-	-	-	-	-	-
rs10490626	G/A	0.015	-0.002	0.101	0.982	0.273	0.290	0.347	-	-	-	-	-	-
rs2030746	T/C	0.021	0.039	0.041	0.336	0.136	0.129	0.294	-	-	-	-	-	-
rs1250229	C/T	0.024	0.046	0.064	0.473	0.106	0.154	0.489	-0.061	0.225	0.788	0.036	0.164	0.825
rs1367117	A/G	0.1	-0.104	0.063	0.098	-0.264	0.140	0.060	0.082	0.172	0.633	0.003	0.119	0.978
rs4299376	G/T	0.079	0.129	0.087	0.140	0.144	0.184	0.433	-	-	-	-	-	-
rs7640978	C/T	0.039	-0.011	0.104	0.916	0.253	0.225	0.260	-	-	-	-	-	-
rs17404153	G/T	0.034	-0.156	0.138	0.256	0.134	0.199	0.502	-	-	-	-	-	-
rs4530754	A/G	0.028	-0.040	0.080	0.618	0.072	0.221	0.744	-	-	-	-	-	-
rs3757354	C/T	0.038	-0.074	0.061	0.225	-0.102	0.139	0.464	-	-	-	-	-	-
rs1800562	G/A	0.062	0.036	0.235	0.878	-0.003	0.010	0.773	-	-	-	-	-	-
rs1564348	C/T	0.048	0.027	0.072	0.714	0.131	0.138	0.343	-	-	-	-	-	-
rs4722551	C/T	0.039	-0.006	0.069	0.927	-0.021	0.095	0.822	-	-	-	-	-	-
rs10102164	A/G	0.032	0.285	0.167	0.087	-0.052	0.305	0.865	-	-	-	-	-	-
rs11136341	G/A	0.045	0.104	0.085	0.219	0.110	0.160	0.490	0.181	0.160	0.257	-0.028	0.127	0.825
rs635634	T/C		0.075	0.098	0.444	-0.040	0.388	0.917	-	-	-	-	-	-
rs11220462	A/G	0.059	0.067	0.168	0.692	0.003	0.013	0.788	0.019	0.112	0.867	0.043	0.096	0.653
rs4942486	T/C	0.024	0.085	0.066	0.198	-0.024	0.099	0.807	-0.007	0.108	0.950	-0.033	0.084	0.699
rs8017377	A/G	0.03	0.111	0.075	0.141	-0.093	0.154	0.544	-	-	-	-	-	-

rs1801689	C/A	0.103	-0.744	1.023	0.467	-	-	-	-	-	-	-	-	-
rs7206971	A/G	0.029	0.062	0.062	0.314	0.036	0.064	0.571	-0.265	0.126	0.036	-0.015	0.100	0.883
rs6511720	G/T	0.221	-0.078	0.072	0.281	-0.318	0.179	0.075	-	-	-	-	-	-
rs4420638	G/A	0.225	-0.082	0.120	0.495	-0.206	0.193	0.285	0.176	0.196	0.370	-0.112	0.144	0.438
rs364585	G/A	0.025	-0.080	0.109	0.467	0.015	0.067	0.826	0.007	0.106	0.951	0.077	0.083	0.353
rs2328223	C/A	0.03	-0.018	0.068	0.795	-0.004	0.018	0.835	-	-	-	-	-	-
rs6029526	A/T	0.044	0.141	0.075	0.059	0.081	0.120	0.497	-0.112	0.140	0.422	-0.068	0.106	0.517
rs5763662	T/C	0.044	-0.266	0.320	0.405	0.047	0.237	0.843	-	-	-	-	-	-
Triglyceride														
rs2131925	T/G	0.066	0.000	0.020	0.987	0.005	0.046	0.922	0.028	0.122	0.822	-0.013	0.094	0.889
rs1260326	T/C	0.115	0.083	0.072	0.251	0.124	0.193	0.522	0.090	0.109	0.409	-0.009	0.085	0.912
rs645040	T/G	0.029	-0.038	0.074	0.608	-0.236	0.144	0.101	-	-	-	-	-	-
rs6831256	G/A	0.026	-0.039	0.048	0.414	-0.032	0.202	0.875	0.162	0.110	0.143	0.027	0.086	0.753
rs442177	T/G	0.031	-0.055	0.072	0.449	-0.250	0.130	0.054	-0.009	0.111	0.935	-0.001	0.085	0.996
rs9686661	T/C	0.038	0.012	0.054	0.822	-0.135	0.200	0.499	-	-	-	-	-	-
rs998584	A/C	0.029	0.210	0.077	0.006	0.227	0.135	0.094	-	-	-	-	-	-
rs38855	A/G	-0.019	-0.090	0.082	0.273	0.149	0.143	0.297	-	-	-	-	-	-
rs13238203	C/T	0.059	-0.002	0.096	0.983	0.171	0.665	0.797	-	-	-	-	-	-
rs17145738	C/T	0.115	0.074	0.107	0.490	0.558	0.220	0.011	0.075	0.191	0.697	-0.048	0.139	0.730
rs11776767	C/G	0.022	0.002	0.007	0.788	0.053	0.141	0.708	-	-	-	-	-	-
rs1495741	G/A	0.04	0.170	0.084	0.043	0.296	0.144	0.040	0.034	0.109	0.757	0.100	0.084	0.232
rs12678919	A/G	0.17	0.063	0.094	0.500	0.042	1.892	0.982	0.074	0.192	0.700	0.216	0.146	0.138
rs2954029	A/T	0.076	0.000	0.029	0.991	-0.036	0.123	0.770	0.158	0.108	0.142	-0.001	0.085	0.989
rs1832007	A/G	-0.033	-0.158	0.089	0.076	-0.304	0.145	0.036	0.440	0.184	0.017	0.082	0.140	0.561
rs10761731	A/T	-0.031	0.012	0.054	0.828	-0.012	0.069	0.863	-0.098	0.120	0.415	-0.238	0.135	0.077
rs2068888	G/A	-0.024	0.004	0.017	0.820	0.040	0.093	0.669	0.052	0.133	0.693	0.022	0.100	0.827
rs174546	T/C	0.045	-0.131	0.080	0.100	-0.289	0.144	0.044	0.037	0.109	0.735	-0.040	0.086	0.644
rs964184	G/C	0.234	0.116	0.124	0.348	0.141	0.219	0.520	-0.024	0.129	0.855	-0.109	0.104	0.292
rs11613352	C/T	0.028	-0.007	0.012	0.551	-0.014	0.028	0.613	-	-	-	-	-	-
rs2412710	A/G	0.099	0.009	0.041	0.817	0.154	1.630	0.925	-	-	-	-	-	-

rs2929282	T/A	0.072	-0.153	0.187	0.415	0.370	0.353	0.295	-	-	-	-	-	-
rs3198697	C/T	0.02	0.054	0.076	0.478	0.101	0.126	0.422	-	-	-	-	-	-
rs11649653	C/G	0.027	0.000	0.046	0.995	0.111	0.117	0.341	-	-	-	-	-	-
rs8077889	C/A	0.025	0.071	0.078	0.362	-0.100	0.188	0.594	-	-	-	-	-	-
rs7248104	G/A	0.022	-0.027	0.055	0.624	-0.110	0.132	0.405	-	-	-	-	-	-
rs731839	G/A	0.022	-0.017	0.045	0.701	-0.066	0.106	0.537	-	-	-	-	-	-
rs5756931	T/C	0.02	0.081	0.052	0.120	0.071	0.075	0.343	-	-	-	-	-	-
Total Cholesterol														
rs1077514	T/C	0.03	-0.030	0.110	0.786	0.048	0.235	0.838	-	-	-	-	-	-
rs12027135	T/A	0.027	0.030	0.099	0.762	-0.069	0.303	0.821	-	-	-	-	-	-
rs7515577	A/C	0.037	0.138	0.129	0.287	0.093	0.188	0.620	-	-	-	-	-	-
rs2642442	T/C	0.035	-0.008	0.068	0.911	-0.014	0.640	0.982	-	-	-	-	-	-
rs514230	T/A	0.039	-0.106	0.100	0.289	-0.074	0.159	0.644	-	-	-	-	-	-
rs2287623	G/A	0.027	-0.219	0.101	0.030	-0.053	0.169	0.752	-	-	-	-	-	-
rs11694172	G/A	0.028	0.032	0.095	0.735	0.151	0.174	0.386	-	-	-	-	-	-
rs11563251	T/C	0.037	0.236	0.122	0.053	0.021	0.172	0.901	-	-	-	-	-	-
rs7570971	A/C	0.03	0.188	0.146	0.198	-	-	-	-	-	-	-	-	-
rs13315871	G/A	0.036	0.164	0.110	0.136	0.040	0.140	0.777	-	-	-	-	-	-
rs2290159	G/C	0.037	-0.009	0.014	0.539	-0.108	0.195	0.580	-	-	-	-	-	-
rs12916	C/T	0.073	0.123	0.070	0.076	0.034	0.087	0.700	-	-	-	-	-	-
rs6882076	C/T	0.051	0.107	0.065	0.097	-0.061	0.231	0.793	-	-	-	-	-	-
rs2758886	A/G	0.023	-0.168	0.100	0.095	-0.059	0.096	0.534	-	-	-	-	-	-
rs9376090	T/C	-0.025	-0.081	0.091	0.375	-0.018	0.158	0.908	-	-	-	-	-	-
rs3177928	A/G	0.048	0.028	0.534	0.959	-	-	-	-	-	-	-	-	-
rs2814982	C/T	0.044	0.074	0.104	0.476	0.121	0.194	0.534	-	-	-	-	-	-
rs9488822	A/T	-0.034	-0.053	0.057	0.357	-0.291	0.125	0.020	-	-	-	-	-	-
rs1997243	G/A	0.033	-0.009	0.116	0.941	-0.077	0.096	0.420	-	-	-	-	-	-
rs12670798	C/T	0.034	-0.038	0.081	0.642	-0.242	0.191	0.205	-	-	-	-	-	-
rs2072183	C/G	0.036	0.089	0.097	0.355	0.400	0.156	0.011	-	-	-	-	-	-
rs2081687	T/C	0.038	0.081	0.079	0.303	0.262	0.142	0.066	-	-	-	-	-	-

rs3780181	A/G	0.044	-0.018	0.118	0.879	-0.163	0.186	0.381	-	-	-	-	-	-
rs10904908	G/A	0.025	-0.014	0.067	0.839	-0.101	0.088	0.250	-	-	-	-	-	-
rs2255141	A/G	0.031	-0.104	0.060	0.081	-0.079	0.085	0.351	-	-	-	-	-	-
rs11603023	T/C	0.022	-0.012	0.021	0.580	0.049	0.078	0.525	-	-	-	-	-	-
rs10128711	C/T	0.031	-0.009	0.065	0.886	-0.106	0.148	0.476	-	-	-	-	-	-
rs7941030	C/T	0.028	0.064	0.068	0.352	0.071	0.107	0.506	-	-	-	-	-	-
rs4883201	A/G	0.035	-0.169	0.093	0.068	-0.040	0.188	0.830	-	-	-	-	-	-
rs11065987	A/G	0.031	0.024	0.067	0.716	0.078	0.135	0.563	-	-	-	-	-	-
rs1169288	C/A	0.032	0.113	0.085	0.185	0.184	0.156	0.240	-	-	-	-	-	-
rs2000999	A/G	0.065	-0.099	0.101	0.327	0.274	0.150	0.069	-	-	-	-	-	-
rs314253	T/C	0.023	0.001	0.079	0.987	0.118	0.267	0.659	-	-	-	-	-	-
rs10401969	T/C	0.137	-0.004	0.033	0.908	-0.095	0.265	0.721	-	-	-	-	-	-
rs492602	G/A	0.031	-0.009	0.060	0.877	0.107	0.132	0.414	-	-	-	-	-	-
rs2277862	C/T	0.035	0.047	0.081	0.564	-0.118	0.304	0.698	-	-	-	-	-	-
rs2902940	A/G	0.024	0.066	0.098	0.502	-0.074	0.089	0.401	-	-	-	-	-	-
rs138777	A/G	0.021	-0.009	0.013	0.505	-0.175	0.135	0.192	-	-	-	-	-	-
rs4253772	T/C	0.032	0.147	0.105	0.158	0.255	0.176	0.146	-	-	-	-	-	-

Supplementary Table 5. Instrumental variable SNPs for triglycerides and at least one other lipid fraction that were used in the Mendelian randomization analysis and are near PPAR-α target genes.

SNPrsID	Chr	hg19 Position (Mb)	Nearest PPAR-α Target Gene	hg19 Position of Gene (Mb)	Function of PPAR-α Target Gene
rs12678919	8	19.84	LPL	19.80-19.82	Lipoprotein uptake and metabolism
rs174546	11	61.57	FADS1	61.567-61.584	Lipogenesis
rs964184	11	116.65	APOA5	116.660-116.663	Lipoprotein uptake and metabolism

Supplementary Table 6. Post hoc power calculations for lipid-DR association using Mendelian randomization approach.

		Odds Ratio				
Phenotype	**No. Cases/controls**	**1.1**	**1.2**	**1.23**	**1.3**	**1.4**
Any DR	2,969 cases/ 4,096 controls	0.24	0.68	0.80	0.94	1.00
Severe DR	1277 cases/ 3980 controls	0.16	0.47	0.58	0.79	0.95

Supplementary Table 7. Mendelian Randomization Estimate of the Association between Lipids and Diabetic Retinopathy in Chinese using only Genome-wide Significant SNPs.

	Any DR (N = 273 cases, 826 controls)				Severe DR (N = 524 cases, 1296 controls)			
	No. of SNP*	OR (95% CI)	P value	I^2, %	No. of SNP*	OR (95% CI)	P value	I^2, %
HDL	3	1.05 (0.38 – 2.88)	0.923	73.0	3	0.98 (0.46 – 2.08)	0.951	60.9
LDL	2	1.96 (0.25 – 15.16)	0.520	0.0	2	0.50 (0.11 – 2.14)	0.347	0.0
Triglycerides	6	1.42 (0.61 – 3.30)	0.422	0.0	6	0.87 (0.45 – 1.70)	0.684	0.0

HDL = high-density lipoprotein cholesterol; LDL = low-density lipoprotein cholesterol; OR = odds ratio
*Number of SNPs included in meta-analysis.
HDL: rs1532085, rs1883025, rs3764261; LDL: rs4420638, rs629301; Triglyceride: rs1260326, rs12678919, rs17145738, rs2131925, rs2954029, rs964184.

Supplementary Table 8. Comparison of results for lipid-associated SNPs in Caucasians identified by the Global Lipids Genetic Consortium (GLGC) to findings from genetic studies of lipid levels in Hispanics.

		GLGC		Below et al		Zubair et al		Coram et al	
SNP	EA/RA	Beta	P Value	β	P Value	β	P Value	β	P Value
HDL									
rs11613352	T/C	0.028	2.0E-13	-	-	0.300	6.3E-03	-	-
rs11869286	G/C	-0.032	3.0E-17	-	-	0.280	5.3E-02	-	-
rs12328675	C/T	0.045	2.0E-15	-	-	0.600	1.2E-02	-	-
rs12678919	G/A	0.155	1.0E-149	-	-	1.580	2.9E-09	-	-
rs1532085	A/G	0.107	1.0E-188	-	-	1.290	1.4E-16	-	-
rs16942887	A/G	0.083	8.0E-54	-	-	1.180	1.3E-09	-	-
rs17145738	T/C	0.041	5.0E-13	-	-	0.340	2.2E-01	-	-
rs174546	T/C	-0.039	8.0E-28	-	-	-	-	-	-
rs1800961	T/C	-0.127	2.0E-34	-	-	-2.520	5.2E-13	-	-
rs2652834	A/G	-0.028	4.0E-11	-	-	-0.220	2.8E-01	-	-
rs2954029	T/A	0.040	3.0E-29	-	-	0.300	4.4E-02	-	-
rs3136441	C/T	0.054	7.0E-29	-	-	0.150	3.7E-01	-	-
rs3764261	A/C	0.241	1E-769	-	-	2.900	3.8E-76	-	-
rs386000	C/G	0.048	3.0E-23	-	-	-0.470	5.8E-03	-	-
rs4148008	G/C	-0.028	1.0E-12	-	-	-0.260	1.1E-01	-	-
rs4846914	G/A	-0.048	4.0E-41	-	-	-0.380	9.9E-03	-	-
rs581080	G/C	-0.042	1.0E-19	-	-	0.060	7.4E-01	-	-
rs6065906	C/T	-0.059	5.0E-40	-	-	-0.540	1.1E-02	-	-
rs838880	C/T	0.048	6.0E-32	-	-	0.180	2.2E-01	-	-
rs964184	C/G	0.106	6.0E-48	-	-	-	-	-0.046	2.8E-12
rs10019888	G/A	−.027	5.0E-08	-	-	-	-	-	-
rs1047891	A/C	−.027	9.0E-10	-	-	-	-	-	-
rs1121980	A/G	-0.020	7.0E-09	-	-	-	-	-	-
rs11246602	C/T	0.034	2.0E-10	-	-	-	-	-	-
rs12145743	G/T	0.020	2.0E-08	-	-	-	-	-	-
rs12748152	T/C	-0.051	1.0E-15	-	-	-	-	-	-
rs12801636	A/G	0.024	3.0E-08	-	-	-	-	-	-
rs12967135	A/G	-0.026	4.0E-08	-	-	-	-	-	-
rs13107325	T/C	-0.071	1.0E-15	-	-	-	-	-	-
rs13326165	A/G	0.029	9.0E-11	-	-	-	-	-	-
rs1689800	G/A	-0.034	5.0E-20	-	-	-	-	-	-
rs17173637	C/T	−0.036	2.0E-08	-	-	-	-	-	-
rs17695224	A/G	-0.029	2.0E-13	-	-	-	-	-	-
rs181362	T/C	-0.038	4.0E-18	-	-	-	-	-	-
rs1883025	T/C	-0.070	2.0E-65	-	-	-	-	-	-
rs1936800	C/T	0.020	3.0E-10	-	-	-	-	-	-
rs2013208	T/C	0.025	9.0E-12	-	-	-	-	-	-
rs2290547	A/G	−0.030	4.0E-09	-	-	-	-	-	-
rs2293889	T/G	-0.031	4.0E-17	-	-	-	-	-	-
rs2602836	A/G	0.019	5.0E-08	-	-	-	-	-	-
rs2606736	C/T	0.025	5.0E-08	-	-	-	-	-	-
rs2923084	G/A	-0.026	5.0E-08	-	-	-	-	-	-
rs2925979	T/C	-0.035	1.0E-19	-	-	-	-	-	-
rs2972146	G/T	0.032	2.0E-17	-	-	-	-	-	-
rs3822072	A/G	−0.025	4.0E-12	-	-	-	-	-	-
rs4129767	G/A	-0.024	2.0E-11	-	-	-	-	-	-
rs4142995	T/G	−0.026	9.0E-12	-	-	-	-	-	-
rs4420638	G/A	-0.067	2.0E-21	-	-	-	-	-	-
rs4650994	G/A	0.021	7.0E-09	-	-	-	-	-	-
rs4660293	G/A	-0.035	3.0E-18	-	-	-	-	-	-
rs4731702	T/C	0.029	5.0E-17	-	-	-	-	-	-
rs4759375	T/C	0.056	3.0E-08	-	-	-	-	-	-

rs4765127	T/G	0.032	8.0E-10	-	-	-	-	-	-
rs4917014	G/T	0.022	1.0E-08	-	-	-	-	-	-
rs4983559	G/A	0.020	1.0E-08	-	-	-	-	-	-
rs499974	A/C	−0.026	1.0E-08	-	-	-	-	-	-
rs605066	C/T	-0.028	3.0E-08	-	-	-	-	-	-
rs6450176	A/G	-0.025	7.0E-10	-	-	-	-	-	-
rs6805251	T/C	0.020	1.0E-08	-	-	-	-	-	-
rs702485	G/A	0.024	7.0E-12	-	-	-	-	-	-
rs7134375	A/C	0.021	1.0E-08	-	-	-	-	-	-
rs7134594	C/T	-0.035	2.0E-13	-	-	-	-	-	-
rs7241918	G/T	-0.090	1.0E-44	-	-	-	-	-	-
rs7255436	C/A	-0.032	2.0E-08	-	-	-	-	-	-
rs731839	G/A	-0.022	3.0E-09	-	-	-	-	-	-
rs737337	C/T	-0.056	5.0E-17	-	-	-	-	-	-
rs7941030	C/T	0.027	1.0E-14	-	-	-	-	-	-
rs970548	C/A	0.026	2.0E-10	-	-	-	-	-	-
rs998584	A/C	-0.026	2.0E-11	-	-	-	-	-	-
rs9987289	A/G	-0.082	2.0E-41	-	-	-	-	-	-
rs17404153	T/G	0.028	5.0E-09	-	-	-	-	-	-
LDL									
rs11220462	A/G	0.059	7.0E-21	-	-	1.940	3.2E-01	-	-
rs12027135	A/T	-0.030	2.0E-14	-	-	0.730	9.0E-02	-	-
rs12916	C/T	0.073	5.8E-77	-	-	3.280	3.9E-13	-	-
rs1367117	A/G	0.119	1.0E-182	-	-	3.970	8.4E-12	-	-
rs2000999	A/G	0.065	4.0E-41	-	-	2.310	2.2E-04	-	-
rs2479409	G/A	0.064	3.0E-50	-	-	1.470	1.1E-03	-	-
rs2902940	G/A	-0.027	2.0E-11	-	-	-0.370	4.3E-01	-	-
rs2954029*	T/A	-0.056	2.0E-50	-	-	-2.760	5.5E-10	-	-
rs3757354	T/C	-0.038	2.0E-17	-	-	-1.600	6.8E-04	-	-
rs3764261	A/C	-0.053	2.0E-34	-	-	-0.520	2.8E-01	-	-
rs4299376	G/T	0.081	4.0E-72	-	-	2.830	7.1E-07	-	-
rs6511720	T/G	-0.221	4.0E-262	-	-	-6.710	3.5E-19	-	-
rs6882076	T/C	-0.046	3.0E-31	-	-	-1.690	3.7E-04	-	-
rs9987289	A/G	-0.071	9.0E-24	-	-	-1.000	8.4E-02	-	-
rs10102164	A/G	0.032	4E−11	-	-	-	-	-	-
rs10401969	C/T	-0.118	3.0E-54	-	-	-	-	-	-
rs10490626	A/G	-0.015	2.0E-12	-	-	-	-	-	-
rs11065987	G/A	-0.027	1.0E-11	-	-	-	-	-	-
rs11136341	G/A	0.045	7.0E-12	-	-	-	-	-	-
rs11563251	T/C	0.034	5E−8	-	-	-	-	-	-
rs1169288	C/A	0.038	6.0E-21	-	-	-	-	-	-
rs1250229	T/C	−.024	3E−8	-	-	-	-	-	-
rs12670798	C/T	0.034	5.0E-14	-	-	-	-	-	-
rs12748152	T/C	0.050	3.0E-12	-	-	-	-	-	-
rs1564348	C/T	0.048	3.0E-21	-	-	-	-	-	-
rs17404153	T/G	-0.034	2.0E-09	-	-	-	-	-	-
rs174546	T/C	-0.051	2.0E-39	-	-	-	-	-	-
rs1800562	A/G	-0.062	8.0E-14	-	-	-	-	-	-
rs1801689	C/A	0.103	1E−11	-	-	-	-	-	-
rs2030746	T/C	0.021	9.0E-09	-	-	-	-	-	-
rs2072183	C/G	0.039	7.0E-16	-	-	-	-	-	-
rs2081687	T/C	0.031	1.0E-07	-	-	-	-	-	-
rs2131925	G/T	-0.049	3.0E-32	-	-	-	-	-	-
rs2255141	A/G	0.030	1.0E-13	-	-	-	-	-	-
rs2328223	C/A	0.030	6E−9	-	-	-	-	-	-
rs2642442	C/T	-0.036	5.0E-11	-	-	-	-	-	-
rs267733	G/A	−.033	5E−9	-	-	-	-	-	-
rs2710642	G/A	−.024	6E−9	-	-	-	-	-	-
rs314253	C/T	-0.024	3.0E-10	-	-	-	-	-	-
rs3177928	A/G	0.045	3.0E-17	-	-	-	-	-	-

rs364585	A/G	−.025	4E−10	-	-	-	-	-	-
rs3780181	G/A	−0.044	2E−9	-	-	-	-	-	-
rs4253772	T/C	−0.031	3.0E-08	-	-	-	-	-	-
rs4420638	G/A	0.225	2.0E-178	-	-	-	-	-	-
rs4530754	G/A	-0.028	4.0E-12	-	-	-	-	-	-
rs4722551	C/T	0.039	4E−14	-	-	-	-	-	-
rs4942486	T/C	0.024	2E−11	-	-	-	-	-	-
rs514230	A/T	-0.036	9.0E-12	-	-	-	-	-	-
rs5763662	T/C	0.077	1E−8	-	-	-	-	-	-
rs6029526	A/T	0.044	5.0E-18	-	-	-	-	-	-
rs629301	G/T	-0.167	5.0E-241	-	-	-	-	-	-
rs7206971	A/G	0.029	3.0E-07	-	-	-	-	-	-
rs7640978	T/C	-0.039	1E−8	-	-	-	-	-	-
rs8017377	A/G	0.030	3.0E-15	-	-	-	-	-	-
rs9411489	T/C	0.077	2.0E-41	-	-	-	-	-	-
rs9488822	T/A	0.031	2.0E-07	-	-	-	-	-	-
rs964184	C/G	-0.086	2.0E-26	-	-	-	-	-	-
rs6831256	G/A	-0.025	2.0E-08	-	-	-	-	-	-
Total Cholesterol									
rs10102164	A/G	0.030	5.0E-11	0.024	4.6E-01	-	-	-	-
rs10401969	C/T	-0.137	4.0E-77	-0.215	7.8E-05	-	-	-	-
rs1077514	C/T	-0.030	6.0E-09	-0.015	5.6E-01	-	-	-	-
rs10904908	G/A	0.025	3.0E-11	-0.008	7.5E-01	-	-	-	-
rs11220462	A/G	0.047	6.0E-15	0.040	2.3E-01	-	-	-	-
rs11563251	T/C	0.037	1.0E-09	0.023	6.3E-01	-	-	-	-
rs11694172	G/A	0.028	2.0E-09	-0.002	9.3E-01	-	-	-	-
rs12670798	C/T	0.036	1.0E-16	-0.041	1.5E-01	-	-	-	-
rs12916	C/T	0.068	5.0E-74	0.051	1.8E-02	-	-	-	-
rs13315871	A/G	-0.036	4.0E-08	-0.021	6.8E-01	-	-	-	-
rs138777	A/G	0.021	5.0E-08	0.030	1.8E-01	-	-	-	-
rs1800961	T/C	-0.106	1.0E-24	-0.050	4.4E-01	-	-	-	-
rs1883025	T/C	-0.067	6.0E-53	-0.092	1.2E-04	-	-	-	-
rs1997243	G/A	0.033	3.0E-10	-0.015	7.4E-01	-	-	-	-
rs2000999	A/G	0.062	7.0E-41	0.052	8.1E-02	-	-	-	-
rs2030746	T/C	0.020	4.0E-08	-0.034	1.4E-01	-	-	-	-
rs2255141	A/G	0.031	7.0E-16	0.013	5.8E-01	-	-	-	-
rs2287623	G/A	0.027	4.0E-12	0.009	6.9E-01	-	-	-	-
rs2954029	T/A	-0.062	2.0E-65	-0.097	1.4E-05	-	-	-	-
rs314253	C/T	-0.023	3.0E-10	-0.002	9.3E-01	-	-	-	-
rs3757354	T/C	-0.035	2.0E-15	-0.020	3.9E-01	-	-	-	-
rs3780181	G/A	-0.044	7.0E-10	-0.023	5.1E-01	-	-	-	-
rs4253772	T/C	0.032	1.0E-08	0.095	5.1E-02	-	-	-	-
rs4530754	G/A	-0.023	2.0E-09	0.001	9.6E-01	-	-	-	-
rs4722551	C/T	0.023	7.0E-09	-0.026	3.7E-01	-	-	-	-
rs4883201	G/A	-0.035	2.0E-09	-0.026	5.7E-01	-	-	-	-
rs581080	G/C	-0.038	1.0E-13	-0.040	2.9E-01	-	-	-	-
rs6511720	T/G	-0.185	5.0E-202	-0.111	1.9E-02	-	-	-	-
rs6882076	T/C	-0.051	5.0E-04	-0.040	1.6E-01	-	-	-	-
rs7640978	T/C	-0.038	1.0E-08	-0.031	5.5E-01	-	-	-	-
rs9376090	T/C	-0.025	3.0E-09	0.034	3.0E-01	-	-	-	-
rs964184	C/G	-0.121	3.0E-55	0.116	3.2E-07	-	-	-	-
rs9987289	A/G	-0.084	2.0E-36	-0.066	6.8E-03	-	-	-	-
rs10128711	T/C	-0.031	1.0E-11	-	-	-	-	-	-
rs11065987	G/A	-0.031	2.0E-16	-	-	-	-	-	-
rs11136341	G/A	0.038	6.0E-09	-	-	-	-	-	-
rs11603023	T/C	0.022	1E−8	-	-	-	-	-	-
rs1169288	C/A	0.032	4.0E-17	-	-	-	-	-	-
rs12027135	A/T	-0.027	5.0E-12	-	-	-	-	-	-
rs1260326	T/C	0.051	3.0E-42	-	-	-	-	-	-
rs1367117	A/G	0.100	3.0E-139	-	-	-	-	-	-

rs1495741	G/A	0.032	3.0E-08	-	-	-	-	-	-
rs1532085	A/G	0.054	7.0E-47	-	-	-	-	-	-
rs1564348	C/T	0.049	3.0E-23	-	-	-	-	-	-
rs174546	T/C	-0.048	3.0E-37	-	-	-	-	-	-
rs1800562	A/G	-0.056	2.0E-12	-	-	-	-	-	-
rs2072183	C/G	0.036	4.0E-15	-	-	-	-	-	-
rs2081687	T/C	0.038	9.0E-12	-	-	-	-	-	-
rs2131925	G/T	-0.075	4.0E-80	-	-	-	-	-	-
rs2277862	T/C	-0.035	5.0E-11	-	-	-	-	-	-
rs2290159	C/G	-0.037	2.0E-09	-	-	-	-	-	-
rs2479409	G/A	0.054	2.0E-39	-	-	-	-	-	-
rs2642442	C/T	-0.035	3.0E-11	-	-	-	-	-	-
rs2758886	A/G	0.023	3E−8	-	-	-	-	-	-
rs2814982	T/C	-0.044	4.0E-15	-	-	-	-	-	-
rs2902940	G/A	-0.024	9E-10/	-	-	-	-	-	-
rs3177928	A/G	0.048	1.0E-21	-	-	-	-	-	-
rs3764261	A/C	0.050	4.0E-31	-	-	-	-	-	-
rs4299376	G/T	0.079	3.0E-73	-	-	-	-	-	-
rs4420638	G/A	0.197	1.0E-149	-	-	-	-	-	-
rs492602	G/A	0.031	1.0E-16	-	-	-	-	-	-
rs514230	A/T	-0.039	5.0E-14	-	-	-	-	-	-
rs6029526	A/T	0.040	1.0E-16	-	-	-	-	-	-
rs629301	G/T	-0.134	2.0E-170	-	-	-	-	-	-
rs7206971	A/G	0.030	1.0E-07	-	-	-	-	-	-
rs7241918	G/T	-0.058	4.0E-18	-	-	-	-	-	-
rs7515577	C/A	-0.037	2.0E-08	-	-	-	-	-	-
rs7570971	A/C	0.030	1.0E-13	-	-	-	-	-	-
rs7941030	C/T	0.028	2.0E-14	-	-	-	-	-	-
rs9411489	T/C	0.069	3.0E-35	-	-	-	-	-	-
rs9488822	T/A	0.034	1.0E-09	-	-	-	-	-	-
rs970548	C/A	-0.026	8.0E-09	-	-	-	-	-	-
rs10490626	A/G	0.042	6.0E-09	-	-	-	-	-	-
rs6831256	G/A	-0.022	1.0E-10	-	-	-	-	-	-
Triglycerides									
rs10401969	C/T	-0.121	1.0E-69	-0.198	3.0E-04	-0.050	7.0E-08	-	-
rs11613352	T/C	-0.028	9.0E-14	-0.013	5.5E-01	0.000	6.0E-01	-	-
rs11776767	C/G	0.022	3.0E-11	-	-	0.010	3.4E-01	-	-
rs1260326	T/C	0.115	2.0E-239	0.094	4.2E-05	0.070	2.3E-15	-	-
rs12678919	G/A	-0.170	2.0E-199	-0.185	1.6E-04	-0.100	1.4E-21	-	-
rs12748152	T/C	0.037	1.0E-09	-0.047	5.3E-01	-	-	-	-
rs13238203	T/C	-0.059	3.0E-06	-	-	-0.240	3.7E-03	-	-
rs1532085	A/G	0.031	2.0E-18	-	-	0.010	8.2E-02	-	-
rs17145738	T/C	-0.115	9.0E-99	-	-	-0.070	7.2E-13	-	-
rs174546	T/C	0.045	7.0E-38	-	-	0.030	2.7E-06	-	-
rs1832007	G/A	-0.033	2.0E-12	-0.009	7.3E-01	-	-	-	-
rs2068888	A/G	-0.024	2.0E-11	-0.033	1.5E-01	-	-	-	-
rs2412710	A/G	0.099	2.0E-11	0.040	6.0E-01	0.020	1.0E-01	-	-
rs2954029	T/A	-0.076	1.0E-107	-	-	-0.040	5.7E-13	-	-
rs2972146	G/T	-0.028	3.0E-15	0.024	4.3E-01	-	-	-	-
rs3198697	T/C	-0.020	2.0E-08	0.022	4.2E-01	-	-	-	-
rs3764261	A/C	-0.040	2.0E-25	-	-	-0.020	7.3E-03	-	-
rs38855	G/A	-0.019	2.0E-08	-0.007	7.5E-01	-	-	-	-
rs442177	G/T	-0.031	1.0E-18	0.000	1.0E+00	-0.010	1.6E-02	-	-
rs4846914	G/A	0.040	7.0E-31	-	-	0.020	1.4E-04	-	-
rs6065906	C/T	0.053	2.0E-34	-	-	0.020	2.0E-02	-	-
rs645040	G/T	-0.029	2.0E-12	-0.003	9.2E-01	-	-	-	-
rs6831256	G/A	0.026	2.0E-12	-0.038	9.8E-02	-	-	-	-
rs6882076	T/C	-0.029	2.0E-15	-0.040	1.5E-01	-0.020	4.4E-05	-	-
rs7248104	A/G	-0.022	5.0E-10	-0.042	5.9E-02	-	-	-	-
rs731839	G/A	0.022	3.0E-09	0.022	3.3E-01	-	-	-	-

rs8077889	C/A	0.025	1.0E-08	0.033	3.8E-01	-	-	-	-
rs964184	C/G	-0.234	7.0E-224	-	-	-	-	-0.157	3.7E-33
rs9686661	T/C	0.038	3.0E-16	0.019	4.7E-01	0.020	4.5E-03	-	-
rs998584	A/C	0.029	3.0E-15	0.037	9.9E-02	-	-	-	-
rs10761731	T/A	-0.031	8.0E-12	-	-	-	-	-	-
rs1121980	A/G	-0.021	3.0E-08	-	-	-	-	-	-
rs11649653	G/C	-0.027	2.0E-07	-	-	-	-	-	-
rs1495741	G/A	0.040	3.0E-12	-	-	-	-	-	-
rs2131925	G/T	-0.066	3.0E-74	-	-	-	-	-	-
rs2929282	T/A	0.072	2.0E-09	-	-	-	-	-	-
rs4765127	T/G	-0.029	2.0E-08	-	-	-	-	-	-
rs5756931	C/T	-0.020	3.0E-08	-	-	-	-	-	-
rs1936800	C/T	-0.020	3.0E-08	-	-	-	-	-	-
rs4722551	C/T	0.029	9E−11	-	-	-	-	-	-

Purple cells indicate effects in the same direction as the GLGC study.
Green cells indicate significant P-Values ($P < 0.05$)
EA = effect allele, RA = reference allele

Supplementary Table 9. Comparison of results for lipid-associated SNPs in Caucasians identified by the Global Lipids Genetic Consortium (GLGC) to findings from genetic studies of lipid levels in African Americans.

		GLGC		Zubair et al	
SNP	Effect/Reference Allele	β	P Value	β	P Value
HDL					
rs11613352	T/C	0.028	2.00E-13	0.340	1.8E-01
rs11869286	G/C	-0.032	3.00E-17	0.760	1.8E-05
rs12328675	C/T	0.045	2.00E-15	-0.620	2.9E-03
rs12678919	G/A	0.155	1.00E-149	1.070	9.5E-06
rs1532085	A/G	0.107	1.00E-188	1.020	6.9E-10
rs16942887	A/G	0.083	8.00E-54	1.250	2.3E-11
rs17145738	T/C	0.041	5.00E-13	0.090	7.4E-01
rs174546	T/C	-0.039	8.00E-28	-0.990	2.2E-04
rs1800961	T/C	-0.127	2.00E-34	-1.990	4.2E-02
rs1883025	T/C	-0.07	2.00E-65	-0.330	4.1E-02
rs2652834	A/G	-0.028	4.00E-11	-0.290	1.1E-01
rs2954029	T/A	0.04	3.00E-29	0.200	2.1E-01
rs3136441	C/T	0.054	7.00E-29	0.460	3.3E-01
rs3764261	A/C	0.241	1E-769	2.590	2.7E-57
rs386000	C/G	0.048	3.00E-23	-0.640	2.2E-03
rs4148008	G/C	-0.028	1.00E-12	-0.380	2.0E-02
rs4846914	G/A	-0.048	4.00E-41	-0.720	8.5E-04
rs581080	G/C	-0.042	1.00E-19	0.180	2.5E-01
rs6065906	C/T	-0.059	5.00E-40	0.940	5.6E-06
rs838880	C/T	0.048	6.00E-32	0.010	9.4E-01
rs10019888	G/A	−.027	5.00E-08	-	-
rs1047891	A/C	−.027	9.00E-10	-	-
rs1121980	A/G	-0.02	7.00E-09	-	-
rs11246602	C/T	0.034	2.00E-10	-	-
rs12145743	G/T	0.02	2.00E-08	-	-
rs12748152	T/C	-0.051	1.00E-15	-	-
rs12801636	A/G	0.024	3.00E-08	-	-
rs12967135	A/G	-0.026	4E-08	-	-
rs13107325	T/C	-0.071	1.00E-15	-	-
rs13326165	A/G	0.029	9.00E-11	-	-
rs1689800	G/A	-0.034	5.00E-20	-	-
rs17173637	C/T	−.036	2.00E-08	-	-
rs17695224	A/G	−.029	2.00E-13	-	-
rs181362	T/C	-0.038	4.00E-18	-	-
rs1936800	C/T	0.02	3.00E-10	-	-
rs2013208	T/C	0.025	9.00E-12	-	-
rs2290547	A/G	−.030	4.00E-09	-	-
rs2293889	T/G	-0.031	4.00E-17	-	-
rs2602836	A/G	0.019	5.00E-08	-	-
rs2606736	C/T	0.025	5.00E-08	-	-
rs2923084	G/A	-0.026	5E-08	-	-
rs2925979	T/C	-0.035	1.00E-19	-	-
rs2972146	G/T	0.032	2.00E-17	-	-
rs3822072	A/G	−.025	4.00E-12	-	-
rs4129767	G/A	-0.024	2.00E-11	-	-
rs4142995	T/G	−.026	9.00E-12	-	-
rs4420638	G/A	-0.067	2.00E-21	-	-
rs4650994	G/A	0.021	7.00E-09	-	-
rs4660293	G/A	-0.035	3.00E-18	-	-
rs4731702	T/C	0.029	5.00E-17	-	-
rs4759375	T/C	0.056	3E-08	-	-

rs4765127	T/G	0.032	8.00E-10	-	-
rs4917014	G/T	0.022	1.00E-08	-	-
rs4983559	G/A	0.02	1.00E-08	-	-
rs499974	A/C	−.026	1.00E-08	-	-
rs605066	C/T	-0.028	3E-08	-	-
rs6450176	A/G	-0.025	7.00E-10	-	-
rs6805251	T/C	0.02	1.00E-08	-	-
rs702485	G/A	0.024	7.00E-12	-	-
rs7134375	A/C	0.021	1E-08	-	-
rs7134594	C/T	-0.035	2.00E-13	-	-
rs7241918	G/T	-0.09	1.00E-44	-	-
rs7255436	C/A	-0.032	2E-08	-	-
rs731839	G/A	-0.022	3.00E-09	-	-
rs737337	C/T	-0.056	5.00E-17	-	-
rs7941030	C/T	0.027	1.00E-14	-	-
rs964184	C/G	0.106	6.00E-48	-	-
rs970548	C/A	0.026	2.00E-10	-	-
rs998584	A/C	-0.026	2.00E-11	-	-
rs9987289	A/G	-0.082	2.00E-41	-	-
rs17404153	T/G	0.028	5.00E-09	-	-
LDL					
rs11220462	A/G	0.059	7.00E-21	0.090	9.7E-01
rs12027135	A/T	-0.03	2.00E-14	0.060	8.9E-01
rs12916	C/T	0.073	8.00E-78	1.960	2.5E-05
rs1367117	A/G	0.119	1.00E-182	4.360	8.2E-12
rs174546	T/C	-0.051	2.00E-39	-2.170	2.8E-03
rs2000999	A/G	0.065	4.00E-41	1.910	1.3E-01
rs2479409	G/A	0.064	3.00E-50	0.980	3.6E-02
rs2902940	G/A	-0.027	2.00E-11	0.210	6.1E-01
rs2954029	T/A	-0.056	2.00E-50	0.000	1.0E+00
rs3757354	T/C	-0.038	2.00E-17	-1.110	1.1E-02
rs3764261	A/C	-0.053	2.00E-34	-0.880	4.6E-02
rs4299376	G/T	0.081	4.00E-72	-2.200	2.9E-01
rs6511720	T/G	-0.221	4.00E-262	-8.080	3.7E-38
rs9987289	A/G	-0.071	9.00E-24	-1.880	1.4E-03
rs10102164	A/G	0.032	4E−11	-	-
rs10401969	C/T	-0.118	3.00E-54	-	-
rs10490626	A/G	-0.015	2.00E-12	-	-
rs11065987	G/A	-0.027	1.00E-11	-	-
rs11136341	G/A	0.045	7.00E-12	-	-
rs11563251	T/C	0.034	5E−8	-	-
rs1169288	C/A	0.038	6.00E-21	-	-
rs1250229	T/C	−.024	3E−8	-	-
rs12670798	C/T	0.034	5.00E-14	-	-
rs12748152	T/C	0.05	3.00E-12	-	-
rs1564348	C/T	0.048	3.00E-21	-	-
rs17404153	T/G	-0.034	2.00E-09	-	-
rs1800562	A/G	-0.062	8.00E-14	-	-
rs1801689	C/A	0.103	1E−11	-	-
rs2030746	T/C	0.021	9.00E-09	-	-
rs2072183	C/G	0.039	7.00E-16	-	-
rs2081687	T/C	0.031	1.00E-07	-	-
rs2131925	G/T	-0.049	3.00E-32	-	-
rs2255141	A/G	0.03	1.00E-13	-	-
rs2328223	C/A	0.03	6E−9	-	-
rs2642442	C/T	-0.036	5.00E-11	-	-
rs267733	G/A	−.033	5E−9	-	-
rs2710642	G/A	−.024	6E−9	-	-
rs314253	C/T	-0.024	3.00E-10	-	-
rs3177928	A/G	0.045	3.00E-17	-	-

rs364585	A/G	−.025	4E−10	-	-
rs3780181	G/A	−0.044	2E−9	-	-
rs4253772	T/C	−0.031	3.00E-08	-	-
rs4420638	G/A	0.225	2.00E-178	-	-
rs4530754	G/A	-0.028	4.00E-12	-	-
rs4722551	C/T	0.039	4E−14	-	-
rs4942486	T/C	0.024	2E−11	-	-
rs514230	A/T	-0.036	9.00E-12	-	-
rs5763662	T/C	0.077	1E−8	-	-
rs6029526	A/T	0.044	5.00E-18	-	-
rs629301	G/T	-0.167	5.00E-241	-	-
rs6882076	T/C	-0.046	3.00E-31	-	-
rs7206971	A/G	0.029	3.00E-07	-	-
rs7640978	T/C	-0.039	1E−8	-	-
rs8017377	A/G	0.03	3.00E-15	-	-
rs9411489	T/C	0.077	2.00E-41	-	-
rs9488822	T/A	0.031	2.00E-07	-	-
rs964184	C/G	-0.086	2.00E-26	-	-
rs6831256	G/A	-0.025	2.00E-08	-	-
Total Cholesterol					
rs10102164	A/G	0.03	5.00E-11	-	-
rs10128711	T/C	-0.031	1.00E-11	-	-
rs10401969	C/T	-0.137	4.00E-77	-	-
rs1077514	C/T	−0.03	6E−9	-	-
rs10904908	G/A	0.025	3E−11	-	-
rs11065987	G/A	-0.031	2.00E-16	-	-
rs11136341	G/A	0.038	6.00E-09	-	-
rs11220462	A/G	0.047	6.00E-15	-	-
rs11563251	T/C	0.037	1E−9	-	-
rs11603023	T/C	0.022	1E−8	-	-
rs1169288	C/A	0.032	4.00E-17	-	-
rs11694172	G/A	0.028	2E−9	-	-
rs12027135	A/T	-0.027	5.00E-12	-	-
rs1260326	T/C	0.051	3.00E-42	-	-
rs12670798	C/T	0.036	1.00E-16	-	-
rs12916	C/T	0.068	5.00E-74	-	-
rs13315871	A/G	−0.036	4E−8	-	-
rs1367117	A/G	0.1	3.00E-139	-	-
rs138777	A/G	0.021	5E−8	-	-
rs1495741	G/A	0.032	3.00E-08	-	-
rs1532085	A/G	0.054	7.00E-47	-	-
rs1564348	C/T	0.049	3.00E-23	-	-
rs174546	T/C	-0.048	3.00E-37	-	-
rs1800562	A/G	-0.056	2.00E-12	-	-
rs1800961	T/C	-0.106	1.00E-24	-	-
rs1883025	T/C	-0.067	6.00E-53	-	-
rs1997243	G/A	0.033	3E−10	-	-
rs2000999	A/G	0.062	7.00E-41	-	-
rs2030746	T/C	0.02	4.00E-08	-	-
rs2072183	C/G	0.036	4.00E-15	-	-
rs2081687	T/C	0.038	9.00E-12	-	-
rs2131925	G/T	-0.075	4.00E-80	-	-
rs2255141	A/G	0.031	7.00E-16	-	-
rs2277862	T/C	-0.035	5.00E-11	-	-
rs2287623	G/A	0.027	4E−12	-	-
rs2290159	C/G	-0.037	2.00E-09	-	-
rs2479409	G/A	0.054	2.00E-39	-	-
rs2642442	C/T	-0.035	3.00E-11	-	-
rs2758886	A/G	0.023	3E−8	-	-
rs2814982	T/C	-0.044	4.00E-15	-	-

rs2902940	G/A	-0.024	9E-10/	-	-
rs2954029	T/A	-0.062	2.00E-65	-	-
rs314253	C/T	−0.023	3E−10	-	-
rs3177928	A/G	0.048	1.00E-21	-	-
rs3757354	T/C	-0.035	2.00E-15	-	-
rs3764261	A/C	0.05	4.00E-31	-	-
rs3780181	G/A	−0.044	7E−10	-	-
rs4253772	T/C	0.032	1.00E-08	-	-
rs4299376	G/T	0.079	3.00E-73	-	-
rs4420638	G/A	0.197	1.00E-149	-	-
rs4530754	G/A	-0.023	2.00E-09	-	-
rs4722551	C/T	0.023	7.0E−9	-	-
rs4883201	G/A	−0.035	2E−9	-	-
rs492602	G/A	0.031	1.00E-16	-	-
rs514230	A/T	-0.039	5.00E-14	-	-
rs581080	G/C	-0.038	1.00E-13	-	-
rs6029526	A/T	0.04	1.00E-16	-	-
rs629301	G/T	-0.134	2.00E-170	-	-
rs6511720	T/G	-0.185	5.00E-202	-	-
rs6882076	T/C	-0.051	5.00E-41	-	-
rs7206971	A/G	0.03	1.00E-07	-	-
rs7241918	G/T	-0.058	4.00E-18	-	-
rs7515577	C/A	-0.037	2.00E-08	-	-
rs7570971	A/C	0.03	1.00E-13	-	-
rs7640978	T/C	-0.038	1E−8	-	-
rs7941030	C/T	0.028	2.00E-14	-	-
rs9376090	T/C	−0.025	3E−9	-	-
rs9411489	T/C	0.069	3.00E-35	-	-
rs9488822	T/A	0.034	1.00E-09	-	-
rs964184	C/G	-0.121	3.00E-55	-	-
rs970548	C/A	-0.026	8.00E-09	-	-
rs9987289	A/G	-0.084	2.00E-36	-	-
rs10490626	A/G	0.042	6.00E-09	-	-
rs6831256	G/A	-0.022	1.00E-10	-	-
Triglycerides					
rs10401969	C/T	-0.121	1.00E-69	0.000	7.8E-01
rs11613352	T/C	-0.028	9.00E-14	-0.010	4.1E-01
rs11776767	C/G	0.022	3.00E-11	0.000	6.2E-01
rs1260326	T/C	0.115	2.00E-239	0.050	2.3E-15
rs12678919	G/A	-0.17	2.00E-199	-0.030	2.0E-05
rs13238203	T/C	-0.059	0.000003	-0.070	5.7E-01
rs1532085	A/G	0.031	2.00E-18	0.010	5.5E-03
rs17145738	T/C	-0.115	9.00E-99	-0.040	6.0E-07
rs174546	T/C	0.045	7.00E-38	0.030	2.9E-04
rs2412710	A/G	0.099	2.00E-11	0.010	4.9E-01
rs2954029	T/A	-0.076	1.00E-107	0.000	5.8E-01
rs3764261	A/C	-0.04	2.00E-25	-0.010	2.0E-02
rs442177	G/T	-0.031	1.00E-18	-0.010	6.7E-02
rs4846914	G/A	0.04	7.00E-31	0.010	7.2E-02
rs6065906	C/T	0.053	2.00E-34	0.020	2.6E-04
rs6882076	T/C	-0.029	2.00E-15	-0.020	4.8E-04
rs9686661	T/C	0.038	3.00E-16	0.030	2.8E-06
rs10761731	T/A	-0.031	8.00E-12	-	-
rs1121980	A/G	-0.021	3.00E-08	-	-
rs11649653	G/C	-0.027	2.00E-07	-	-
rs12748152	T/C	0.037	1.00E-09	-	-
rs1495741	G/A	0.04	3.00E-12	-	-
rs1832007	G/A	−0.033	2E−12	-	-
rs2068888	A/G	-0.024	2.00E-11	-	-
rs2131925	G/T	-0.066	3.00E-74	-	-

rs2929282	T/A	0.072	2.00E-09	-	-
rs2972146	G/T	-0.028	3.00E-15	-	-
rs3198697	T/C	−0.020	2E−8	-	-
rs38855	G/A	−0.019	2E−8	-	-
rs4765127	T/G	-0.029	2.00E-08	-	-
rs5756931	C/T	-0.02	3.00E-08	-	-
rs645040	G/T	-0.029	2.00E-12	-	-
rs6831256	G/A	0.026	2.00E-12	-	-
rs7248104	A/G	−0.022	5E−10	-	-
rs731839	G/A	0.022	3.00E-09	-	-
rs8077889	C/A	0.025	1E−8	-	-
rs964184	C/G	-0.234	7.00E-224	-	-
rs998584	A/C	-0.026	3.00E-15	-	-
rs1936800	C/T	-0.02	3.00E-08	-	-
rs4722551	C/T	0.029	9E−11	-	-

Purple cells indicate effects in the same direction as the GLGC study.
Green cells indicate significant P-Values ($P < 0.05$)

Supplementary Table 10. Comparison of results for lipid-associated SNPs in Caucasians identified by the Global Lipids Genetic Consortium (GLGC) to findings from genetic studies of lipid levels in Asians.

		GLGC		AGEN		Zubair et al		Braun et al	
SNP	EA/RA	β	P Value	β	P Value	β	P Value	β	P Value
HDL									
rs1121980	A/G	-0.020	7.0E-09	0.001	9.6E-01	-	-	-	-
rs11246602	C/T	0.034	2.0E-10	-0.002	8.8E-01	-	-	-	-
rs11613352	T/C	0.028	2.0E-13	0.039	8.5E-02	-0.600	4.8E-03	-	-
rs11869286	G/C	-0.032	3.0E-17	-0.027	4.8E-04	0.250	2.4E-01	-	-
rs12145743	G/T	0.020	2.0E-08	0.015	2.3E-01	-	-	-	-
rs12328675	C/T	0.045	2.0E-15	-	-	1.840	4.7E-01	-	-
rs12678919	G/A	0.155	1.0E-149	0.163	9.6E-37	2.000	1.9E-09	-	-
rs12748152	T/C	-0.051	1.0E-15	-0.116	4.5E-02	-	-	-	-
rs12801636	A/G	0.024	3.0E-08	0.030	8.7E-04	-	-	-	-
rs12967135	A/G	-0.026	4.0E-08	-0.017	8.4E-02	-	-	-	-
rs13326165	A/G	0.029	9.0E-11	0.075	1.8E-01	-	-	-	-
rs1532085	A/G	0.107	1.0E-188	-	-	-1.330	2.0E-08	-	-
rs1689800	G/A	-0.034	5.0E-20	-0.026	3.5E-03	-	-	-	-
rs16942887	A/G	0.083	8.0E-54	0.160	1.4E-02	1.140	9.7E-02	-	-
rs17145738	T/C	0.041	5.0E-13	0.022	7.8E-02	0.200	5.7E-01	-	-
rs17173637	C/T	-0.036	2.0E-08	-0.052	3.3E-01	-	-	-	-
rs174546	T/C	-0.039	8.0E-28	-0.033	3.0E-04	-0.600	4.8E-03	-	-
rs17695224	A/G	-0.029	2.0E-13	-0.036	1.3E-04	-	-	-	-
rs1800961	T/C	-0.127	2.0E-34	-	-	0.190	8.2E-01	-	-
rs1883025	T/C	-0.070	2.0E-65	-	-	-1.330	2.0E-08	-	-
rs1936800	C/T	0.020	3.0E-10	0.007	3.8E-01	-	-	-	-
rs2013208	T/C	0.025	9.0E-12	0.025	1.7E-02	-	-	-	-
rs2290547	A/G	-0.030	4.0E-09	-0.009	4.8E-01	-	-	-	-
rs2293889	T/G	-0.031	4.0E-17	-0.038	3.2E-04	-	-	-	-
rs2602836	A/G	0.019	5.0E-08	0.000	9.9E-01	-	-	-	-
rs2606736	C/T	0.025	5.0E-08	-0.010	2.7E-01	-	-	-	-
rs2652834	A/G	-0.028	4.0E-11	-	-	0.021	8.2E-01	-	-
rs2923084	G/A	-0.026	5.0E-08	0.009	3.1E-01	-	-	-	-
rs2925979	T/C	-0.035	1.0E-19	-0.036	1.7E-04	-	-	-	-
rs2954029	T/A	0.040	3.0E-29	0.006	4.1E-01	0.170	4.2E-01	-	-
rs2972146	G/T	0.032	2.0E-17	0.023	8.4E-02	-	-	-	-
rs3136441	C/T	0.054	7.0E-29	0.023	5.7E-03	0.220	2.8E-01	-	-
rs3764261	A/C	0.241	1E-729	0.262	1.7E-74	3.390	1.0E-35	0.160	2.0E-26
rs3822072	A/G	-0.025	4.0E-12	-0.005	5.2E-01	-	-	-	-
rs386000	C/G	0.048	3.0E-23	0.029	5.3E-02	0.440	6.7E-01	-	-
rs4129767	G/A	-0.024	2.0E-11	-0.029	5.2E-04	-	-	-	-
rs4142995	T/G	-0.026	9.0E-12	-0.042	6.4E-08	-	-	-	-
rs4148008	G/C	-0.028	1.0E-12	-0.029	4.4E-04	-0.180	4.1E-01	-	-
rs4420638	G/A	-0.067	2.0E-21	-0.110	1.0E-16	-	-	-	-
rs4650994	G/A	0.021	7.0E-09	0.015	4.7E-02	-	-	-	-
rs4660293	G/A	-0.035	3.0E-18	-0.036	3.3E-03	-	-	-	-
rs4731702	T/C	0.029	5.0E-17	0.022	1.1E-02	-	-	-	-
rs4765127	T/G	0.032	8.0E-10	-0.011	4.3E-01	-	-	-	-
rs4846914	G/A	-0.048	4.0E-41	-	-	-0.650	7.2E-03	-	-
rs4917014	G/T	0.022	1.0E-08	0.028	5.8E-04	-	-	-	-
rs4983559	G/A	0.020	1.0E-08	0.010	4.7E-01	-	-	-	-
rs499974	A/C	-0.026	1.0E-08	-0.032	3.7E-04	-	-	-	-
rs581080	G/C	-0.042	1.0E-19	-0.003	8.5E-01	0.210	5.4E-01	-	-
rs605066	C/T	-0.028	3.0E-08	-0.015	7.2E-02	-	-	-	-
rs6065906	C/T	-0.059	5.0E-40	0.060	2.7E-01	0.180	7.8E-01	-	-
rs6450176	A/G	-0.025	7.0E-10	-0.010	1.8E-01	-	-	-	-
rs6805251	T/C	0.020	1.0E-08	0.007	3.7E-01	-	-	-	-

rs702485	G/A	0.024	7.0E-12	0.052	5.1E-05	-	-	-	-
rs7134375	A/C	0.021	1.0E-08	0.020	8.5E-02	-	-	-	-
rs7134594	C/T	-0.035	2.0E-13	-0.037	2.2E-05	-	-	-	-
rs7241918	G/T	-0.090	1.0E-44	-0.043	3.8E-04	-	-	-	-
rs7255436	C/A	-0.032	2.0E-08	-0.005	7.8E-01	-	-	-	-
rs731839	G/A	-0.022	3.0E-09	-0.001	8.9E-01	-	-	-	-
rs737337	C/T	-0.056	5.0E-17	-0.058	5.5E-08	-	-	-	-
rs838880	C/T	0.048	6.0E-32	0.047	3.3E-05	0.820	5.4E-05	-	-
rs970548	C/A	0.026	2.0E-10	-0.001	9.4E-01	-	-	-	-
rs998584	A/C	-0.026	2.0E-11	-0.020	3.1E-02	-	-	-	-
rs9987289	A/G	-0.082	2.0E-41	0.123	9.3E-02	-1.580	8.1E-02	-	-
rs17404153	T/G	0.028	5.0E-09	0.004	7.5E-01	-	-	-	-
rs10019888	G/A	−.027	5.0E-08	-	-	-	-	-	-
rs1047891	A/C	−.027	9.0E-10	-	-	-	-	-	-
rs13107325	T/C	-0.071	1.0E-15	-	-	-	-	-	-
rs181362	T/C	-0.038	4.0E-18	-	-	-	-	-	-
rs4759375	T/C	0.056	3.0E-08	-	-	-	-	-	-
rs7941030	C/T	0.027	1.0E-14	-	-	-	-	-	-
rs964184	C/G	0.106	6.0E-48	-	-	-	-	-	-
LDL									
rs10102164	A/G	0.032	4.0E-11	0.012	2.0E-01	-	-	-	-
rs10401969	C/T	-0.118	3.0E-54	-0.033	3.4E-02	-0.860	4.0E-01	-	-
rs11136341	G/A	0.045	7.0E-12	0.033	3.3E-02	-	-	-	-
rs11220462	A/G	0.059	7.0E-21	0.024	5.2E-03	0.870	2.3E-01	-	-
rs11563251	T/C	0.034	5.0E-08	0.022	3.2E-01	-	-	-	-
rs1169288	C/A	0.032	4.0E-17	0.032	3.1E-03	-	-	-	-
rs12027135	A/T	-0.030	2.0E-14	-0.028	2.3E-03	1.460	3.3E-02	-	-
rs1250229	T/C	-0.024	3.0E-08	-0.035	1.3E-02	-	-	-	-
rs12670798	C/T	0.034	5.0E-14	0.001	9.2E-01	-	-	-	-
rs12748152	T/C	0.050	3.0E-12	0.059	3.1E-01	-	-	-	-
rs12916	C/T	0.073	8.0E-78	0.077	1.0E-21	2.810	4.4E-06	-	-
rs1367117	A/G	0.119	1.0E-182	0.078	4.1E-07	3.240	3.1E-04	-	-
rs17404153	T/G	-0.034	2.0E-09	-0.017	1.6E-01	-	-	-	-
rs174546	T/C	-0.051	2.0E-39	-0.048	3.9E-07	-1.350	3.2E-02	-	-
rs2000999	A/G	0.065	4.0E-41	0.052	1.7E-06	2.860	9.6E-05	-	-
rs2030746	T/C	0.021	9.0E-09	0.013	2.3E-01	-	-	-	-
rs2072183	C/G	0.039	7.0E-16	0.001	9.7E-01	-	-	-	-
rs2081687	T/C	0.031	1.0E-07	0.025	1.8E-02	-	-	-	-
rs2131925	G/T	-0.049	3.0E-32	-0.015	1.2E-01	-	-	-	-
rs2255141	A/G	0.030	1.0E-13	0.027	3.6E-03	-	-	-	-
rs2328223	C/A	0.030	6.0E-09	0.038	6.2E-03	-	-	-	-
rs2479409	G/A	0.064	3.0E-50	-0.001	9.1E-01	0.000	1.0E+00	-	-
rs2642442	C/T	-0.036	5.0E-11	-0.047	3.3E-04	-	-	-	-
rs267733	G/A	-0.033	5.0E-09	0.018	5.4E-01	-	-	-	-
rs2710642	G/A	-0.024	6.0E-09	-0.024	7.7E-03	-	-	-	-
rs2902940	G/A	-0.027	2.0E-11	0.006	5.4E-01	0.560	4.0E-01	-	-
rs2954029	T/A	-0.056	2.0E-50	-0.047	1.1E-08	-0.840	1.7E-01	-	-
rs314253	C/T	-0.024	3.0E-10	-0.012	2.1E-01	-	-	-	-
rs3177928	A/G	0.045	3.0E-17	0.029	2.0E-01	-	-	-	-
rs364585	A/G	-0.025	4.0E-10	-0.020	1.8E-02	-	-	-	-
rs3757354	T/C	-0.038	2.0E-17	0.000	9.7E-01	0.600	3.5E-01	-	-
rs3764261	A/C	-0.053	2.0E-34	-0.003	8.2E-01	1.070	1.9E-01	-	-
rs3780181	G/A	-0.044	7E-10/2E-9	-0.024	7.9E-02	-	-	-	-
rs4299376	G/T	0.081	4.0E-72	-	-	7.880	8.7E-02	-	-
rs4420638	G/A	0.225	2.0E-178	0.127	1.9E-19	-	-	-	-
rs4530754	G/A	-0.028	4.0E-12	-0.014	1.0E-01	-	-	-	-
rs4942486	T/C	0.024	2.0E-11	0.031	1.8E-04	-	-	-	-
rs514230	A/T	-0.036	9.0E-12	0.018	1.3E-01	-	-	-	-
rs5763662	T/C	0.077	1.0E-08	0.027	5.9E-02	-	-	-	-
rs629301	G/T	-0.167	5.0E-241	-0.197	4.2E-24	-	-	-	-

rs6511720	T/G	-0.221	4.0E-262	-	-	-3.110	3.0E-01	-	-
rs6882076	T/C	-0.046	3.0E-31	-0.035	1.2E-04	-1.870	6.3E-03	-	-
rs8017377	A/G	0.030	3.0E-15	0.015	5.6E-01	-	-	-	-
rs964184	C/G	-0.086	2.0E-26	0.007	4.9E-01	-	-	-	-
rs9987289	A/G	-0.071	9.0E-24	0.064	3.8E-01	-2.810	2.9E-01	-	-
rs6831256	G/A	-0.025	2.0E-08	0.012	2.6E-01	-	-	-	-
rs10490626	A/G	-0.015	2.0E-12	-	-	-	-	-	-
rs11065987	G/A	-0.027	1.0E-11	-	-	-	-	-	-
rs1564348	C/T	0.048	3.0E-21	-	-	-	-	-	-
rs1800562	A/G	-0.062	8.0E-14	-	-	-	-	-	-
rs1801689	C/A	0.103	1E−11	-	-	-	-	-	-
rs4253772	T/C	−0.031	3.0E-08	-	-	-	-	-	-
rs4722551	C/T	0.039	4E−14	-	-	-	-	-	-
rs6029526	A/T	0.044	5.0E-18	-	-	-	-	-	-
rs7206971	A/G	0.029	3.0E-07	-	-	-	-	-	-
rs7640978	T/C	-0.039	1E−8	-	-	-	-	-	-
rs9411489	T/C	0.077	2.0E-41	-	-	-	-	-	-
rs9488822	T/A	0.031	2.0E-07	-	-	-	-	-	-
Total Cholesterol									
rs10102164	A/G	0.030	5.0E-11	0.004	6.5E-01	-	-	-	-
rs10128711	T/C	-0.031	1.0E-11	-0.005	5.2E-01	-	-	-	-
rs10401969	C/T	-0.137	4.0E-77	-0.053	5.3E-04	-	-	-	-
rs1077514	C/T	-0.030	6.0E-09	0.001	9.3E-01	-	-	-	-
rs10904908	G/A	0.025	3.0E-11	0.011	2.2E-01	-	-	-	-
rs11136341	G/A	0.038	6.0E-09	0.041	7.7E-03	-	-	-	-
rs11220462	A/G	0.047	6.0E-15	0.020	1.9E-02	-	-	-	-
rs11603023	T/C	0.022	1.0E-08	0.032	6.3E-03	-	-	-	-
rs1169288	C/A	0.038	6.0E-21	0.035	1.2E-03	-	-	-	-
rs11694172	G/A	0.028	2.0E-09	-0.008	5.6E-01	-	-	-	-
rs12027135	A/T	-0.027	5.0E-12	-0.029	1.4E-03	-	-	-	-
rs1260326	T/C	0.051	3.0E-42	0.036	3.8E-04	-	-	-	-
rs12670798	C/T	0.036	1.0E-16	0.001	8.9E-01	-	-	-	-
rs12916	C/T	0.068	5.0E-74	0.078	5.7E-22	-	-	-	-
rs1367117	A/G	0.100	3.0E-139	0.067	1.5E-05	-	-	-	-
rs138777	A/G	0.021	5.0E-08	0.016	1.0E-01	-	-	-	-
rs1495741	G/A	0.032	3.0E-08	0.015	7.7E-02	-	-	-	-
rs1532085	A/G	0.054	7.0E-47	0.058	3.3E-09	-	-	-	-
rs174546	T/C	-0.048	3.0E-37	-0.045	2.0E-06	-	-	-	-
rs1883025	T/C	-0.067	6.0E-53	-0.074	1.5E-14	-	-	-	-
rs2000999	A/G	0.062	7.0E-41	0.051	2.0E-06	-	-	-	-
rs2030746	T/C	0.020	4.0E-08	0.005	6.0E-01	-	-	-	-
rs2072183	C/G	0.036	4.0E-15	-0.006	6.8E-01	-	-	-	-
rs2081687	T/C	0.038	9.0E-12	0.033	1.7E-03	-	-	-	-
rs2131925	G/T	-0.075	4.0E-80	-0.043	4.6E-06	-	-	-	-
rs2255141	A/G	0.031	7.0E-16	0.030	1.1E-03	-	-	-	-
rs2277862	T/C	-0.035	5.0E-11	-0.019	1.0E-01	-	-	-	-
rs2287623	G/A	0.027	4.0E-12	0.021	2.6E-02	-	-	-	-
rs2479409	G/A	0.054	2.0E-39	-0.004	6.3E-01	-	-	-	-
rs2642442	C/T	-0.035	3.0E-11	-0.057	9.9E-06	-	-	-	-
rs2814982	T/C	-0.044	4.0E-15	0.004	8.2E-01	-	-	-	-
rs2954029	T/A	-0.062	2.0E-65	-0.066	3.8E-16	-	-	-	-
rs3177928	A/G	0.048	1.0E-21	0.047	3.8E-02	-	-	-	-
rs3757354	T/C	-0.035	2.0E-15	0.008	4.4E-01	-	-	-	-
rs3764261	A/C	0.050	4.0E-31	0.080	4.8E-08	-	-	-	-
rs4420638	G/A	0.197	1.0E-149	0.091	6.1E-11	-	-	-	-
rs4530754	G/A	-0.023	2.0E-09	-0.010	2.4E-01	-	-	-	-
rs4883201	G/A	-0.035	2.0E-09	-0.030	3.2E-03	-	-	-	-
rs514230	A/T	-0.039	5.0E-14	0.023	5.1E-02	-	-	-	-
rs581080	G/C	-0.038	1.0E-13	-0.007	6.0E-01	-	-	-	-
rs629301	G/T	-0.134	2.0E-170	-0.176	5.8E-20	-	-	-	-

rs6882076	T/C	-0.051	5.0E-04	-0.038	3.1E-05	-	-	-	-
rs7241918	G/T	-0.058	4.0E-18	-0.004	7.6E-01	-	-	-	-
rs7515577	C/A	-0.037	2.0E-08	-0.004	9.3E-01	-	-	-	-
rs9376090	T/C	-0.025	3.0E-09	0.058	1.3E-09	-	-	-	-
rs964184	C/G	-0.121	3.0E-55	-0.045	4.3E-06	-	-	-	-
rs970548	C/A	-0.026	8.0E-09	-0.001	9.5E-01	-	-	-	-
rs9987289	A/G	-0.084	2.0E-36	0.091	2.1E-01	-	-	-	-
rs6831256	G/A	-0.022	1.0E-10	0.015	2.4E-01	-	-	-	-
rs11065987	G/A	-0.031	2.0E-16	-	-	-	-	-	-
rs11563251	T/C	0.037	1E−9	-	-	-	-	-	-
rs13315871	A/G	−0.036	4E−8	-	-	-	-	-	-
rs1564348	C/T	0.049	3.0E-23	-	-	-	-	-	-
rs1800562	A/G	-0.056	2.0E-12	-	-	-	-	-	-
rs1800961	T/C	-0.106	1.0E-24	-	-	-	-	-	-
rs1997243	G/A	0.033	3E−10	-	-	-	-	-	-
rs2290159	C/G	-0.037	2.0E-09	-	-	-	-	-	-
rs2758886	A/G	0.023	3E−8	-	-	-	-	-	-
rs2902940	G/A	-0.024	9E-10/	-	-	-	-	-	-
rs314253	C/T	−0.023	3E−10	-	-	-	-	-	-
rs3780181	G/A	−0.044	7E−10	-	-	-	-	-	-
rs4253772	T/C	0.032	1.0E-08	-	-	-	-	-	-
rs4299376	G/T	0.079	3.0E-73	-	-	-	-	-	-
rs4722551	C/T	0.023	7.0E−9	-	-	-	-	-	-
rs492602	G/A	0.031	1.0E-16	-	-	-	-	-	-
rs6029526	A/T	0.040	1.0E-16	-	-	-	-	-	-
rs6511720	T/G	-0.185	5.0E-202	-	-	-	-	-	-
rs7206971	A/G	0.030	1.0E-07	-	-	-	-	-	-
rs7570971	A/C	0.030	1.0E-13	-	-	-	-	-	-
rs7640978	T/C	-0.038	1E−8	-	-	-	-	-	-
rs7941030	C/T	0.028	2.0E-14	-	-	-	-	-	-
rs9411489	T/C	0.069	3.0E-35	-	-	-	-	-	-
rs9488822	T/A	0.034	1.0E-09	-	-	-	-	-	-
rs10490626	A/G	0.042	6.0E-09	-	-	-	-	-	-
Triglycerides									
rs10401969	C/T	-0.121	1.0E-69	-0.067	4.0E-05	0.060	6.3E-06	-	-
rs1121980	A/G	-0.021	3.0E-08	0.007	5.3E-01	-	-	-	-
rs11613352	T/C	-0.028	9.0E-14	-0.025	2.7E-01	0.010	6.9E-01	-	-
rs11776767	C/G	0.022	3.0E-11	0.018	1.1E-01	0.000	7.2E-01	-	-
rs1260326	T/C	0.115	2.0E-239	0.105	3.2E-21	0.050	4.8E-16	-	-
rs12678919	G/A	-0.170	2.0E-199	-0.150	2.6E-26	-0.100	6.0E-16	-	-
rs12748152	T/C	0.037	1.0E-09	0.026	6.6E-01	-	-	-	-
rs1495741	G/A	0.040	3.0E-12	0.038	1.8E-05	-	-	-	-
rs1532085	A/G	0.031	2.0E-18	0.058	9.9E-08	0.020	3.7E-03	-	-
rs17145738	T/C	-0.115	9.0E-99	-0.112	8.5E-16	-0.060	3.1E-06	-	-
rs174546	T/C	0.045	7.0E-38	0.035	6.5E-04	0.020	2.4E-02	-	-
rs1832007	G/A	-0.033	2.0E-12	-0.050	9.2E-04	-	-	-	-
rs2068888	A/G	-0.024	2.0E-11	-0.032	3.9E-02	-	-	-	-
rs2131925	G/T	-0.066	3.0E-74	-0.065	9.5E-11	-	-	-	-
rs2929282	T/A	0.072	2.0E-09	0.011	6.7E-01	-	-	-	-
rs2954029	T/A	-0.076	1.0E-107	-0.061	2.1E-12	-0.040	5.9E-06	-	-
rs2972146	G/T	-0.028	3.0E-15	-0.008	5.7E-01	-	-	-	-
rs3764261	A/C	-0.040	2.0E-25	-0.054	1.4E-03	-0.030	1.1E-02	-	-
rs38855	G/A	-0.019	2.0E-08	-0.017	5.4E-02	-	-	-	-
rs442177	G/T	-0.031	1.0E-18	-0.024	2.4E-02	-0.030	7.0E-05	-	-
rs4765127	T/G	-0.029	2.0E-08	-0.005	7.6E-01	-	-	-	-
rs4846914	G/A	0.040	7.0E-31	0.028	3.1E-02	0.020	3.6E-02	-	-
rs5756931	C/T	-0.020	3.0E-08	-0.016	3.2E-01	-	-	-	-
rs6065906	C/T	0.053	2.0E-34	-	-	0.000	9.1E-01	-	-
rs645040	G/T	-0.029	2.0E-12	-0.020	1.2E-01	-	-	-	-
rs6831256	G/A	0.026	2.0E-12	0.050	2.8E-05	-	-	-	-

rs6882076	T/C	-0.029	2.0E-15	-0.022	2.4E-02	-0.030	5.2E-04	-	-
rs7248104	A/G	-0.022	5.0E-10	-0.012	1.9E-01	-	-	-	-
rs731839	G/A	0.022	3.0E-09	0.012	2.7E-01	-	-	-	-
rs964184	C/G	-0.234	7.0E-224	-0.211	1.5E-92	-	-	0.210	1.6E-40
rs9686661	T/C	0.038	3.0E-16	0.029	9.7E-02	0.020	1.1E-01	-	-
rs998584	A/C	0.029	3.0E-15	0.021	6.8E-02	-	-	-	-
rs1936800	C/T	-0.020	3.0E-08	-0.009	2.9E-01	-	-	-	-
rs10761731	T/A	-0.031	8.0E-12	-	-	-	-	-	-
rs11649653	G/C	-0.027	2.0E-07	-	-	-	-	-	-
rs13238203	T/C	-0.059	3.0E-06	-	-	-	-	-	-
rs2412710	A/G	0.099	2.0E-11	-	-	-	-	-	-
rs3198697	T/C	−0.020	2E−8	-	-	-	-	-	-
rs8077889	C/A	0.025	1E−8	-	-	-	-	-	-
rs4722551	C/T	0.029	9E−11	-	-	-	-	-	-

Purple cells indicate effects in the same direction as the GLGC study.
Green cells indicate significant P-Values ($P < 0.05$)
EA = effect allele; RA = reference allele

Supplementary Table 11. Comparison of results for lipid-associated SNPs in Caucasians identified by the Global Lipids Genetic Consortium (GLGC) to findings from genetic studies of lipid levels in non-Caucasians: Information on covariates and sample sizes for each study.

	Sample Size	Covariates	BMI adjusted?
GLGC [1]	188,578	age, sex	NO
Hispanic			
Zubair et al [2]	19829	age, sex, PCs, and study cite	NO
Wang et al [3]	1450	age, gender, BMI, smoking, study canter, genetic ancestry, Mexican/Non-Mexican status	YES
Coram et a l[4]	3,587	age, BMI, smoking history, all lipid traits, fasting status (LDL)	YES
Below et al[5]	4,383	sex, age, BMI first PC, diabetes status	-
African Americans			
Zubair et al	21304	age, sex, and PCs and some study cite	NO
Wang et al	1677	age, gender, BMI, smoking, study center, genetic ancestry	YES
Asian			
Zubair et al	12,456	age, sex, and PCs and some study cite	NO
Wang et al	775	age, gender, BMI, smoking, study cite, genetic ancestry	YES
AGEN[6]	69,414	age, sex	NO
Braun et al [7]	6,530	age, gender, BMI, disease status	YES

1. Willer, C.J., et al., *Discovery and Refinement of Loci Associated with Lipid Levels.* Nat Genet, 2013. **45**(11): p. 1274-83.
2. Zubair, N., et al., *Fine-mapping of lipid regions in global populations discovers ethnic-specific signals and refines previously identified lipid loci.* Hum Mol Genet, 2016. **25**(24): p. 5500-5512.
3. Wang, Z., et al., *Genetic associations with lipoprotein subfraction measures differ by ethnicity in the multi-ethnic study of atherosclerosis (MESA).* Hum Genet, 2017. **136**(6): p. 715-726.
4. Coram, M.A., et al., *Genome-wide characterization of shared and distinct genetic components that influence blood lipid levels in ethnically diverse human populations.* Am J Hum Genet, 2013. **92**(6): p. 904-16.
5. Below, J.E., et al., *Meta-analysis of lipid-traits in Hispanics identifies novel loci, population-specific effects, and tissue-specific enrichment of eQTLs.* Sci Rep, 2016. **6**: p. 19429.
6. Spracklen, C.N., et al., *Association analyses of East Asian individuals and trans-ancestry analyses with European individuals reveal new loci associated with cholesterol and triglyceride levels.* Hum Mol Genet, 2017. **26**(9): p. 1770-1784.
7. Braun, T.R., et al., *A replication study of GWAS-derived lipid genes in Asian Indians: the chromosomal region 11q23.3 harbors loci contributing to triglycerides.* PLoS One, 2012. **7**(5): p. e37056.

Supplementary Table 12. Comparison of findings for lipid-associated SNPs from the Global Lipids Genetic Consortium (GLGC) study and findings for lipid-associated SNPs in the exclusively diabetic population of the ACCORD study[8].

		GLGC Study								ACCORD Results							
		Total Cholesterol		LDL		HDL		Triglycerides		Total Cholesterol		LDL		HDL		Triglycerides	
SNP	Minor/major allele	β	-log10 (p-value)	β	-log10 (p-value)	β	-log10 (p-value)	β	-log10 (p-value)	β	-log10 (p-value)	β	-log10 (p-value)	β	-log10 (p-value)	β	-log10 (p-value)
rs1077514	C/T	-0.030	8.22							-0.052	2.50						
rs12027135	A/T	-0.027	11.30	-0.030	13.70					0.001	0.03	-0.004	0.10				
rs12748152	T/C			0.050	11.52	-0.051	15.00	0.037	9.00			-0.013	0.18	-0.003	0.04	-0.030	0.50
rs4660293	G/A					-0.035	17.52							-0.015	0.44		
rs2479409	G/A	0.054	38.70	0.064	49.52					0.016	0.58	0.010	0.30				
rs2131925	G/T	-0.075	79.40	-0.049	31.52			**-0.066**	**73.52**	-0.054	3.67	-0.003	0.09			**-0.093**	**9.31**
rs7515577	C/A	-0.037	7.70							-0.002	0.03						
rs629301	G/T	**-0.134**	**169.70**	**-0.167**	**240.30**					**-0.096**	**8.43**	**-0.135**	**14.63**				
rs267733	G/A			-0.033	8.30							-0.039	1.10				
rs12145743	G/T					0.020	7.70							0.017	0.58		
rs4650994	G/A					0.021	8.15							-0.003	0.07		
rs1689800	G/A					-0.034	19.30							-0.020	0.82		
rs2642442	C/T	-0.035	10.52	-0.036	10.30					-0.019	0.68	-0.014	0.41				
rs4846914	G/A					-0.048	40.40	0.040	30.15					0.037	1.95	-0.022	0.83
rs514230	A/T	-0.039	13.30	-0.036	11.05					-0.012	0.41	-0.018	0.63				
rs1367117	A/G	0.100	138.52	0.119	182.00					0.051	2.81	0.054	2.87				
rs1260326	T/C	0.051	41.52					**0.115**	**238.70**	0.045	2.60					**0.093**	**8.88**
rs4299376	G/T	0.079	72.52	0.081	71.40					-0.034	1.49	-0.038	1.68				
rs2710642	G/A			-0.024	8.22							0.006	0.17				
rs10490626	A/G	-0.042	8.22	-0.051	11.70					0.025	0.41	0.015	0.21				
rs2030746	T/C	0.020	7.40	0.021	8.05					0.034	1.78	0.042	2.37				
rs7570971	A/C	0.030	13.00							-0.018	0.61						
rs12328675	C/T					0.045	14.70							0.001	0.02		
rs2287623	G/A	0.027	11.40							0.020	0.77						
rs11694172	G/A	0.028	8.70							0.000	0.00						
rs1047891	A/C					-0.027	9.05							-0.013	0.41		
rs1250229	T/C			-0.024	7.52							-0.011	0.27				
rs2972146	G/T					0.032	16.70	-0.028	14.52					0.028	1.17	-0.031	1.28
rs11563251	T/C	0.037	9.00	0.034	7.30					0.044	1.59	0.068	3.00				
rs2606736	C/T					0.025	7.30							0.001	0.03		

rs2290159	C/G	-0.037	8.70							-0.018	0.54						
rs7640978	T/C	-0.038	7.70	-0.039	8.00					-0.026	0.65	-0.037	1.01				
rs2290547	A/G					-0.030	8.40							-0.047	1.80		
rs2013208	T/C					0.025	11.05							0.010	0.35		
rs13326165	A/G					0.029	10.05							0.014	0.40		
rs13315871	A/G	-0.036	7.40							-0.076	2.46						
rs6805251	T/C					0.020	8.00							0.018	0.69		
rs17404153	T/G			-0.034	8.70	-0.028	8.30					-0.028	0.63	0.017	0.35		
rs645040	G/T							-0.029	11.70							-0.038	1.61
rs6831256	G/A	0.025	10.00	0.022	7.70			0.026	11.70	0.015	0.54	-0.001	0.01			0.020	0.79
rs10019888	G/A					-0.027	7.30							-0.007	0.17		
rs442177	G/T							-0.031	18.00							-0.013	0.46
rs3822072	A/G					-0.025	11.40							-0.008	0.27		
rs2602836	A/G					0.019	7.30							-0.013	0.46		
rs13107325	T/C					-0.071	15.00							-0.080	2.41		
rs6450176	A/G					-0.025	9.15							-0.014	0.46		
rs9686661	T/C							0.038	15.52							0.010	0.23
rs12916	C/T	0.068	73.30	0.073	77.10					0.039	2.22	0.045	2.57				
rs4530754	G/A	-0.023	8.70	-0.028	11.40					-0.027	1.23	-0.030	1.37				
rs6882076	T/C	-0.051	40.30	-0.046	30.52			-0.029	14.70	-0.012	0.40	-0.010	0.31			-0.014	0.48
rs3757354	T/C	-0.035	14.70	-0.038	16.70					-0.015	0.46	-0.024	0.81				
rs1800562	A/G	-0.056	11.70	-0.062	13.10					-0.025	0.34	-0.039	0.59				
rs3177928	A/G	0.048	21.00	0.045	16.52					0.024	0.61	0.019	0.43				
rs2814982	T/C	-0.044	14.40							0.002	0.04						
rs2758886	A/G	0.023	7.52							0.027	1.02						
rs998584	A/C					-0.026	10.70	0.029	14.52					-0.026	1.16	0.038	1.96
rs9488822	T/A	0.034	9.00	0.031	6.70					-0.011	0.33	-0.008	0.22				
rs1936800	C/T					0.020	9.52	-0.020	7.52					-0.032	1.76	-0.001	0.02
rs9376090	C/T	-0.025	8.52							-0.015	0.41						
rs605066	C/T					-0.028	7.52							0.020	0.81		
rs1564348	C/T	0.049	22.52	0.048	20.52					0.025	0.69	0.000	0.00				
rs1997243	G/A	0.033	9.52							0.014	0.29						
rs702485	G/A					0.024	11.22							-0.004	0.10		
rs4142995	T/G					-0.026	11.05							-0.009	0.30		
rs12670798	C/T	0.036	16.00	0.034	13.30					-0.008	0.21	0.003	0.06				
rs4722551	C/T	0.029	8.15	0.039	13.40			0.023	10.05	0.013	0.27	0.041	1.23			-0.021	0.46
rs2072183	C/G	0.036	14.40	0.039	15.15												

rs4917014	G/T					0.022	8.00							-0.011	0.33		
rs13238203	T/C							-0.059	5.52							-0.118	1.68
rs17145738	T/C					0.041	12.30	**-0.115**	**98.05**					0.054	1.96	**-0.137**	**8.95**
rs38855	G/A							-0.019	7.70							0.001	0.03
rs4731702	T/C					0.029	16.30							0.010	0.34		
rs17173637	C/T					-0.036	7.70							-0.044	1.14		
rs9987289	A/G	-0.084	35.70	-0.071	23.05	-0.082	40.70			-0.032	0.83	-0.014	0.27	-0.049	1.64		
rs11776767	C/G							0.022	10.52							0.017	0.57
rs1495741	G/A	0.032	7.52					0.040	11.52	0.012	0.36					0.013	0.39
rs12678919	G/A					**0.155**	**149.00**	**-0.170**	**198.70**					**0.200**	**17.26**	**-0.192**	**14.28**
rs10102164	A/G	0.030	10.30	0.032	10.40					0.009	0.23	0.025	0.77				
rs2081687	T/C	0.038	11.05	0.031	7.00					0.028	1.17	0.021	0.72				
rs2293889	T/G					-0.031	16.40							-0.038	2.01		
rs2954029	T/A	-0.062	64.70	-0.056	49.70	0.040	28.52	-0.076	107.00	-0.057	4.42	-0.036	1.89	0.028	1.44	-0.068	5.68
rs11136341	G/A	0.038	8.22	0.045	11.15					-0.011	0.35	0.004	0.11				
rs3780181	G/A	-0.044	9.15	-0.044	8.70					-0.045	1.16	-0.052	1.35				
rs581080	G/C	-0.038	13.00			-0.042	19.00			0.007	0.18			-0.014	0.42		
rs1883025	T/C	-0.067	52.22			-0.070	64.70			-0.034	1.55			-0.035	1.73		
rs9411489	T/C	0.069	34.52	0.077	40.70												
rs1832007	G/A							-0.033	11.70							0.021	0.49
rs10904908	G/A	0.025	10.52							0.013	0.44						
rs970548	C/A	0.025	8.10			0.026	9.70			0.020	0.62			0.032	1.34		
rs10761731	T/A							-0.031	11.10							-0.028	1.28
rs2068888	A/G							-0.024	10.70							-0.042	2.38
rs2255141	A/G	0.031	15.15	0.030	13.00					-0.011	0.29	-0.020	0.64				
rs2923084	G/A					-0.026	7.30							-0.005	0.12		
rs10128711	T/C	-0.031	11.00							-0.039	1.96						
rs3136441	C/T					0.054	28.15							0.005	0.08		
rs11246602	C/T					0.034	9.70							-0.018	0.39		
rs174546	T/C	-0.048	36.52	-0.051	38.70	-0.039	27.10	0.045	37.15	-0.005	0.12	-0.024	0.89	-0.061	4.41	0.066	4.43
rs12801636	A/G					0.024	7.52							0.016	0.51		
rs499974	A/C					-0.026	8.00							-0.017	0.51		
rs964184*	C/G	-0.121	54.52	-0.086	25.70	0.106	47.22	**-0.234**	**223.15**	0.084	5.05	-0.027	0.78	-0.072	4.09	**0.197**	**23.48**
rs11603023	T/C	0.022	8.00							0.019	0.76						
rs7941030	C/T	0.028	13.70			0.027	14.00			0.056	4.07			0.030	1.56		
rs11220462	A/G	0.047	14.22	0.059	20.15					0.039	1.17	0.036	0.99				
rs4883201	G/A	-0.035	8.70							0.004	0.07						

rs7134375	A/C					0.021	8.00							0.028	1.38		
rs11613352	T/C					0.028	12.70	-0.028	13.05					0.007	0.17	-0.019	0.53
rs7134594	C/T					-0.035	12.70							-0.051	3.67		
rs11065987	G/A	-0.031	15.70	-0.027	11.00					-0.039	1.93	-0.034	1.46				
rs1169288	C/A	0.032	16.40	0.038	20.22					0.048	2.66	0.048	2.55				
rs4759375	T/C					0.056	7.52							0.028	0.73		
rs4765127	T/G					0.032	9.10	-0.029	7.70					0.017	0.63	-0.011	0.32
rs838880	C/T					0.048	31.22							0.024	1.02		
rs4942486	T/C			0.024	10.70							0.017	0.60				
rs8017377	A/G			0.030	14.52							0.031	1.31				
rs4983559	G/A					0.020	8.00							0.010	0.32		
rs2412710	A/G							0.099	10.70							0.043	0.50
rs2929282	T/A							0.072	8.70							0.051	1.37
rs1532085	A/G	0.054	46.15			0.107	188.00	0.031	17.70	-0.008	0.24			0.084	9.25	-0.018	0.66
rs2652834	A/G					-0.028	10.40							-0.016	0.47		
rs3198697	T/C							-0.020	7.70							-0.019	0.61
rs11649653	G/C							-0.027	6.70							-0.033	1.43
rs1121980	A/G					-0.020	8.15	0.021	7.52					-0.003	0.10	-0.014	0.46
rs3764261	A/C	0.050	30.40	-0.053	33.70	**0.241**	**769.00**	-0.040	24.70	0.048	2.84	0.001	0.03	**0.192**	**39.66**	-0.005	0.13
rs16942887	A/G					0.083	53.10							0.072	3.79		
rs2000999	A/G	0.062	40.15	0.065	40.40					0.057	2.86	0.061	3.03				
rs2925979	T/C					-0.035	19.00							-0.019	0.69		
rs314253	C/T	-0.023	9.52	-0.024	9.52					0.003	0.09	0.011	0.35				
rs11869286	G/C					-0.032	16.52							-0.014	0.50		
rs8077889	C/A							0.025	8.00							0.015	0.40
rs7206971	A/G	0.030	7.00	0.029	6.52					-0.018	0.68	-0.008	0.25				
rs1801689	C/A			0.103	11.00							0.029	0.29				
rs4148008	G/C					-0.028	12.00							-0.011	0.35		
rs4129767	G/A					-0.024	10.70							0.030	1.52		
rs7241918	G/T	-0.058	17.40			**-0.090**	**44.00**			0.009	0.18			**-0.120**	**8.70**		
rs12967135	A/G					-0.026	7.40							0.000	0.01		
rs7248104	A/G							-0.022	9.30							-0.028	1.22
rs7255436	C/A					-0.032	7.70							0.022	0.91		
rs6511720	T/G	-0.185	201.30	-0.221	261.40					-0.056	1.96	-0.065	2.37				
rs737337	C/T					-0.056	16.30							-0.048	1.92		
rs10401969	C/T	-0.137	76.40	-0.118	53.52			-0.121	69.00	-0.050	1.55	-0.015	0.28			-0.069	2.47
rs731839	G/A					-0.022	8.52	0.022	8.52					0.011	0.38	-0.004	0.10

rs4420638	G/A	0.197	149.00	0.225	177.70	-0.067	20.70			0.055	2.52	0.040	1.41	-0.094	6.78		
rs492602	G/A	0.031	16.00							0.021	0.82						
rs17695224	A/G					-0.029	12.70							-0.005	0.13		
rs386000	C/G					0.048	22.52							0.054	3.08		
rs364585	A/G			-0.025	9.40							-0.034	1.53				
rs2328223	C/A			0.030	8.22							-0.001	0.01				
rs2277862	T/C	-0.035	10.30							-0.025	0.74						
rs2902940	G/A	-0.024	9.05	-0.027	10.70					0.014	0.44	0.029	1.19				
rs6029526	A/T	0.040	16.00	0.044	17.30					-0.020	0.77	-0.031	1.47				
rs1800961	T/C	-0.106	24.00			-0.127	33.70			-0.083	1.29			-0.084	1.38		
rs6065906	C/T					-0.059	39.30	0.053	33.70					-0.030	0.99	0.029	0.88
rs181362	T/C					-0.038	17.40							-0.025	0.96		
rs5763662	T/C			0.077	8.00							0.011	0.11				
rs138777	A/G	0.021	7.30							0.005	0.15						
rs5756931	C/T							-0.020	7.52							-0.005	0.12
rs4253772	T/C	0.032	8.00	0.031	7.52					0.017	0.32	0.030	0.63				

Blue cells indicate effects in the same direction as the GLGC study.
Green cells indicate significant P-Values (P<0.05)

8. Marvel, S.W., et al., *Common and rare genetic markers of lipid variation in subjects with type 2 diabetes from the ACCORD clinical trial.* PeerJ, 2017. **5**: p. e3187.

Supplementary Table 13. List of Collaborators from the Asian Genetic Epidemiology Network (AGEN) Consortium

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