

Causal associations between type 1 diabetes and COVID-19 infection and prognosis: a two-sample Mendelian randomization study

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ABSTRACT

Introduction It has been suggested that type 1 diabetes was associated with increased COVID-19 morbidity and mortality. However, their causal relationship is still unclear. Herein, we performed a two-sample Mendelian randomization (MR) to investigate the causal effect of type 1 diabetes on COVID-19 infection and prognosis.

Research design and methods The summary statistics of type 1 diabetes were obtained from two published genome-wide association studies of European population, one as a discovery sample including 15 573 cases and 158 408 controls, and the other data as a replication sample consisting of 5913 cases and 8828 controls. We first performed a two-sample MR analysis to evaluate the causal effect of type 1 diabetes on COVID-19 infection and prognosis. Then, reverse MR analysis was conducted to determine whether reverse causality exists.

Results MR analysis results showed that the genetically predicted type 1 diabetes was associated with higher risk of severe COVID-19 ($OR=1.073$, 95% CI: 1.034 to 1.114, $p_{FDR}=1.15\times10^{-3}$) and COVID-19 death ($OR=1.075$, 95% CI: 1.033 to 1.119, $p_{FDR}=1.15\times10^{-3}$). Analysis of replication dataset showed similar results, namely a positive association between type 1 diabetes and severe COVID-19 ($OR=1.055$, 95% CI: 1.029 to 1.081, $p_{FDR}=1.59\times10^{-4}$), and a positively correlated association with COVID-19 death ($OR=1.053$, 95% CI: 1.026 to 1.081, $p_{FDR}=3.50\times10^{-4}$). No causal association was observed between type 1 diabetes and COVID-19 positive, hospitalized COVID-19, the time to the end of COVID-19 symptoms in the colchicine treatment group and placebo treatment group. Reverse MR analysis showed no reverse causality.

Conclusions Type 1 diabetes had a causal effect on severe COVID-19 and death after COVID-19 infection. Further mechanistic studies are needed to explore the relationship between type 1 diabetes and COVID-19 infection and prognosis.

INTRODUCTION

COVID-19 is a highly infectious disease caused by SARS-CoV-2. Up to July 2022, the cumulative number of confirmed COVID-19 cases has reached over 540 million, and the death toll of COVID-19 has arrived at 6.3 million across 200 countries. Many factors could affect the

WHAT IS ALREADY KNOWN ON THIS TOPIC

→ COVID-19 poses a serious threat to human health and it is urgent to find the risk factors for COVID-19. At present, many studies have explored the relationship between type 1 diabetes and COVID-19. However, most of the studies are observational and lack causal inference. So we used a two-sample Mendelian randomization analysis to infer causality between them.

WHAT THIS STUDY ADDS

→ Type 1 diabetes was genetically associated with severe COVID-19 and COVID-19 death. On the other hand, type 1 diabetes did not have a causal relationship with COVID-19 positive and hospitalized COVID-19.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

→ Our study provides a new insight for the prevention of COVID-19, and the protection of patients with COVID-19 with type 1 diabetes should also be strengthened. Further mechanistic studies such as molecular mechanism analysis, mouse model construction and further therapeutic studies are needed to confirm our view.

severity of COVID-19 infection, including old age, smoking, pre-existing diseases and so on.^{1–4} Although the majority of patients with COVID-19 have mild symptoms, some of them will develop serious complications, such as acute respiratory distress syndrome⁵ or even death.⁶

Given the severity of COVID-19, many studies are currently focusing on risk factors for COVID-19. Retrospective observational studies have shown that patients with diabetes have higher rates of hospitalization, severe illness^{7–9} and mortality compared with patients without diabetes in the same situation with COVID-19 infection.^{5,10} COVID-19 infection may also cause ketosis in people with diabetes

and then may increase the length of hospital stays.¹¹ However, as most of the current studies of diabetes are about type 2 diabetes and COVID-19, there are very few studies on the association between type 1 diabetes and COVID-19.

Type 1 diabetes is a kind of autoimmune disease, whose pathogenesis is the destruction of islet β cells due to immune disorder.¹² The destruction of islet β cells leads to a lack of insulin production, which causes the poor control of blood glucose.¹³ In recent years, the incidence of type 1 diabetes rises consistently worldwide.¹⁴ Besides, it is reported that compared with people without type 1 diabetes, patients with type 1 diabetes have a higher incidence of various infections.¹⁵

According to observational studies, during the COVID-19 pandemic, the number of confirmed cases of type 1 diabetes in children has increased significantly¹⁶ and the prevalence of type 1 diabetes among patients with COVID-19 is 0.15%–28.98%.¹⁷ The TEDDY Study indicates that respiratory infections, including coronavirus infection, may lead to a greater risk of islet autoimmunity,¹⁸ which may in turn lead to the development of type 1 diabetes. Moreover, it is reported that patients with type 1 diabetes with poor blood glucose control is a risk factor for the infection of COVID-19.¹⁹ Different opinions have emerged in an observational study that the risk of severe prognosis is low among people with type 1 diabetes who require hospitalization due to COVID-19.²⁰

The above studies have shown that there are some connections between type 1 diabetes and COVID-19 infection and prognosis; however, these observational studies cannot infer a causal relationship due to various confounding factors. Mendelian randomization (MR) is a way to access the causal relationship using genetic variation as instruments. Due to an individual's genetic variation is randomly assorted at conception, it is usually unaffected by confounding factors such as environment. Therefore, an unconfounded estimate of causal inference could be made from MR analysis.

In the present study, we performed a bidirectional MR analysis to identify the causal relationship between type 1 diabetes and COVID-19 infection and prognosis, in which the genome-wide association study (GWAS) summary data were obtained from publicly available studies.

RESEARCH DESIGN AND METHODS

STROBE-MR (Strengthening the Reporting of Observational Studies in Epidemiology-MR) guidelines²¹ were used to strengthen the reporting of this study (online supplemental file 1). The research framework of this study is shown in figure 1.

GWAS summary statistics

We first extracted type 1 diabetes GWAS data from previously published study, which consisted of 15 573 cases and 158 408 controls.²² To validate our results, we chose another GWAS data as replication sample, which

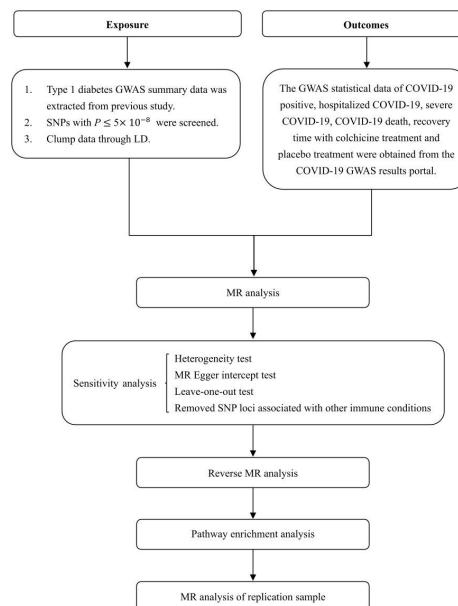


Figure 1 Outline of the MR analysis. GWAS, genome-wide association study; LD, linkage disequilibrium; MR, Mendelian randomization; SNPs, single-nucleotide polymorphisms.

included 5913 cases diagnosed before the age of 17 years and 8828 controls.²³ Both GWAS data of European population and potential population structure were already been adjusted by genetic principal components in the original analyses.

Six traits were selected to represent COVID-19 infection and prognosis. The GWAS summary statistics of these six traits were obtained from the COVID-19 GWAS results portal,²⁴ all of which were of European population. The first trait was 'positive versus negative (tested)', which included 16 551 COVID-19-positive cases and 81 826 COVID-19-negative controls. The second one contained 2884 hospitalized COVID-19-positive cases and 13 667 non-hospitalized COVID-19-positive controls, which was called 'hospitalized positive versus non-hospitalized positive'. The third one was called 'severe positive versus non-severe positive', which included 1120 severe COVID-19-positive cases and 14 695 non-severe COVID-19-positive controls. A severe positive COVID-19 case was defined as COVID-19 death or with inpatient diagnosis of both COVID-19 and dependence on respirator, or a COVID-19 case with advanced respiratory support. The fourth one contained 1001 COVID-19 deaths and 14 814 COVID-19-positive survivors, which were called 'positive and death versus positive survivor'. The fifth one was the time to the end of COVID-19 symptoms in 872 patients with COVID-19 treated with colchicine. The last one was the time to the end of COVID-19 symptoms in 851 patients with COVID-19 not treated with colchicine. For ease of description, the above six traits were abbreviated as COVID-19 positive, hospitalized COVID-19, severe COVID-19, COVID-19 death, recovery time with colchicine treatment and recovery time with placebo treatment.



Instrumental variables selection

The choice of instrumental variables (IVs) is based on three hypotheses: (1) IVs are closely related to exposure; (2) IVs are not correlated with any confounding factors; (3) IVs are not directly related to the outcome, and their effect on the outcome can only be reflected through exposure. To satisfy these three hypotheses statistically, we performed a series of quality control. First, we selected single-nucleotide polymorphisms (SNPs) at the genome-wide significance level ($p \leq 5 \times 10^{-8}$) so that they were strongly associated with exposure. Second, palindromic SNPs were discarded due to their ambiguous effect direction. Then, we conducted a linkage disequilibrium clumping to retain independent SNPs by setting the r^2 threshold as 0.01 and the clumping window size as 1000 kb. SNPs with r^2 greater than 0.01 with the lead SNP within 1000 kb were removed. Moreover, we tested the overall pleiotropy through MR-Pleiotropy RESidual Sum and Outlier (PRESSO) global test. If the global test p value is <0.05 , then we performed the MR-PRESSO outlier test and removed the pleiotropic SNPs with $p_{\text{outlier}} < 0.05$. Finally, we evaluated the strength of IVs by F statistic,²⁵ which was defined as $F = \frac{R^2(n-k-1)}{k(1-R^2)}$, where R^2 was the degree of exposure explained by IVs, n was the sample size of exposure, and k was the number of IVs. An F statistic ≥ 10 indicated that the IVs were strongly correlated with the exposure. SNPs after rigorous screening were used as IVs in subsequent MR analyses.

Bidirectional MR analysis and sensitivity analysis

We first evaluated the causal effect of type 1 diabetes on COVID-19 infection and prognosis in discovery sample. For exposures having only one IV, we used the Wald ratio test to perform the MR analysis. For exposures having two or more IVs, we conducted inverse variance weighted (IVW) model. OR, 95% CI and p values were used to estimate the causal effect.

Significant results discovered in the discovery sample were subjected to be replicated in the replication sample with the same analyses.

To estimate the robustness of MR findings, we performed a series of sensitivity analyses, including heterogeneity test, MR-Egger intercept test and leave-one-out test. The heterogeneity among different IVs was evaluated using the Cochran's Q statistic. The Cochran's Q statistic follows a χ^2 distribution with the number of IVs minus 1 df. When heterogeneity existed between IVs, we used the random-effects IVW model to evaluate causality; otherwise, we used the fixed-effects IVW model. MR-Egger regression was performed by a simple modification to the IVW method. Rather than constraining the intercept term to be zero, the term was estimated and a non-zero intercept suggesting possibility of directional pleiotropy.²⁶ The leave-one-out analysis was performed by re-estimating the MR association after removing an SNP. These techniques addressed potential concerns on the causal estimate due to weak violation of MR assumption.

As another sensitivity analysis, we searched the associations of the IVs being used in this study with other autoimmune diseases via the web tool PhenoScanner V.2.^{27 28} Associated IVs ($p < 5 \times 10^{-8}$) were removed and the MR analysis was redone with the remaining IVs.

Finally, to determine whether there was a reverse causal relationship between identified significant COVID-19 traits and type 1 diabetes, we conducted a reverse MR analysis and chose IVs at significance of $p \leq 1 \times 10^{-5}$.

All statistical analyses were performed by using *TwoSampleMR* package in R (V.4.1.3). The false discovery rate (FDR) correction was used to adjust for multiple testing.

Pathway enrichment analysis

To identify the pathways through which IVs may influence outcomes, we performed pathway enrichment analysis. Specifically, the SNPs from the significant MR results were mapped to genes, and then the metabolic pathways of these genes were investigated. The original g:SCS (set counts and sizes) correction method was used by default and those with adjusted p value of < 0.05 were screened for further investigation of their relationship with COVID-19. The pathway enrichment analysis was conducted in g:Profiler (<https://biit.cs.ut.ee/gprofiler/>).²⁹

Data and resource availability

Type 1 diabetes GWAS summary statistics used in this study were obtained from the GWAS catalog (study accession GCST90013791) (from Crouch *et al*²²) and Dryad repository, doi:10.5061/dryad.ns8q3 (from Cooper *et al*²³). The GWAS summary statistics of COVID-19 infection and prognosis are publicly accessible at <https://grasp.ncbi.nih.gov/Covid19GWASResults.aspx>.

RESULTS

Causal effects of type 1 diabetes on COVID-19 infection and prognosis

124 independent SNPs that were associated with type 1 diabetes were selected as IVs to assess the causal relationship between type 1 diabetes and COVID-19 positive, and a total of 123 IVs were selected to estimate the causal effects of type 1 diabetes on hospitalized COVID-19, severe COVID-19 and COVID-19 death. Besides, we chose 72 and 73 IVs to assess the causal effect of type 1 diabetes on recovery time with colchicine treatment and placebo treatment. The F statistics of these IVs were all greater than 159, indicating no evidence of weak instrument bias. Details of IVs are shown in online supplemental table 1.

As shown in table 1, results of IVW method showed that the genetically predicted type 1 diabetes was associated with an increased risk of severe COVID-19 (OR=1.073, 95% CI: 1.034 to 1.114, $p_{\text{FDR}} = 1.15 \times 10^{-3}$). The genetically predicted type 1 diabetes was also associated with higher risk of COVID-19 death (OR=1.075, 95% CI: 1.033 to 1.119, $p_{\text{FDR}} = 1.15 \times 10^{-3}$). Moreover, results showed that type 1 diabetes had no causal relationship with COVID-19 positive, hospitalized COVID-19, or the recovery time

**Table 1** MR analysis results of type 1 diabetes and COVID-19 infection and prognosis

Exposure	Outcome	Significance level of the selected IVs	nSNP	β	SE	P value	P-adjusted
Type 1 diabetes (from Crouch et al ²²)	COVID-19 positive	p≤5×10 ⁻⁸	124	0.004	0.005	0.433	0.470
	Hospitalized COVID-19	p≤5×10 ⁻⁸	123	0.010	0.013	0.417	0.470
	Severe COVID-19	p≤5×10 ⁻⁸	123	0.071	0.019	2.11×10⁻⁴	1.15×10⁻³
	COVID-19 death	p≤5×10 ⁻⁸	123	0.072	0.020	3.83×10⁻⁴	1.15×10⁻³
	Recovery time with colchicine treatment	p≤5×10 ⁻⁸	72	-0.023	0.032	0.470	0.470
	Recovery time with placebo treatment	p≤5×10 ⁻⁸	73	0.025	0.033	0.443	0.470
Type 1 diabetes (from Cooper et al ²³)	COVID-19 positive	p≤5×10 ⁻⁸	83	-0.001	0.004	0.772	0.772
	Hospitalized COVID-19	p≤5×10 ⁻⁸	83	0.009	0.008	0.264	0.396
	Severe COVID-19	p≤5×10 ⁻⁸	83	0.053	0.013	2.66×10⁻⁵	1.59×10⁻⁴
	COVID-19 death	p≤5×10 ⁻⁸	83	0.052	0.013	1.17×10⁻⁴	3.50×10⁻⁴
	Recovery time with colchicine treatment	p≤5×10 ⁻⁸	46	-0.017	0.024	0.461	0.554
	Recovery time with placebo treatment	p≤5×10 ⁻⁸	45	-0.032	0.022	0.141	0.283

nSNP is the number of SNPs used as IVs; β is the estimated effect coefficient; SE is the standard error of β ; p-adjusted is the p value that has been corrected by false discovery rate.

P_{FDR}<0.05 is marked in bold.

IVs, instrumental variables; MR, Mendelian randomization; SNP, single-nucleotide polymorphism.

in patients with COVID-19 treated with colchicine and placebo.

Sensitivity analysis

Detailed sensitivity analysis results are provided in online supplemental table 2. No heterogeneity was detected by the heterogeneity test. No evidence suggested the existence of pleiotropy through MR-Egger intercept test (all $p>0.05$). The leave-one-out test showed that none of the identified causal associations were driven by any single SNP ([figures 2 and 3](#)).

To determine whether the causal relationship between type 1 diabetes and COVID-19 was specific, we removed IVs associated with the following autoimmune diseases: rheumatoid arthritis, inflammatory bowel disease, self-reported psoriasis, primary sclerosing cholangitis, primary biliary cirrhosis, celiac disease, self-reported multiple sclerosis and primary biliary cholangitis. We removed 61 SNPs that were associated with other immune conditions. MR analysis of the remaining SNPs showed no change in the association between type 1 diabetes and severe COVID-19 (OR=1.126, 95% CI: 1.036 to 1.223, $p=0.005$), and the association with COVID-19 death was also consistent with the above results (OR=1.131, 95% CI: 1.037 to 1.234, $p=0.005$). Specific SNP exclusion information is detailed in online supplemental table 3.

To mitigate the potential impact of reverse causality of COVID-19 infection and prognosis on type 1 diabetes, we conducted reverse MR analyses. The 15, 11, 8, 4, 13 and 15 IVs were, respectively, chosen to represent six

phenotypes of COVID-19 infection and prognosis (online supplemental table 4). The F statistics were all larger than 25, which indicated that the IVs were strongly correlated with COVID-19-related phenotypes. MR results showed that six phenotypes of COVID-19 infection and prognosis had no causal effects on type 1 diabetes. Detailed results are shown in [table 2](#).

Pathway analysis results

The IVs used in the significant MR results were mapped to 68 corresponding genes. GO biological process results showed 45 possible metabolic pathways. By eliminating duplicate metabolic pathways as well as metabolic pathways unrelated to severe COVID-19 and COVID-19 death, one metabolic pathway remained, namely GO:0002682 (online supplemental table 5).

Replication sample results

In replication phase, 83 IVs were chosen to assess the causal relationship between type 1 diabetes and COVID-19 positive, hospitalized COVID-19, severe COVID-19, and COVID-19 death. In addition, 46 and 45 IVs were, respectively, obtained to evaluate the causal effects of type 1 diabetes on the recovery time with colchicine treatment and placebo treatment. All of the F statistics were also more than 357. Details of IVs are shown in online supplemental table 6.

MR results for replicate sample were in accordance with the discovery sample, that is, type 1 diabetes and severe COVID-19 were positively causally related

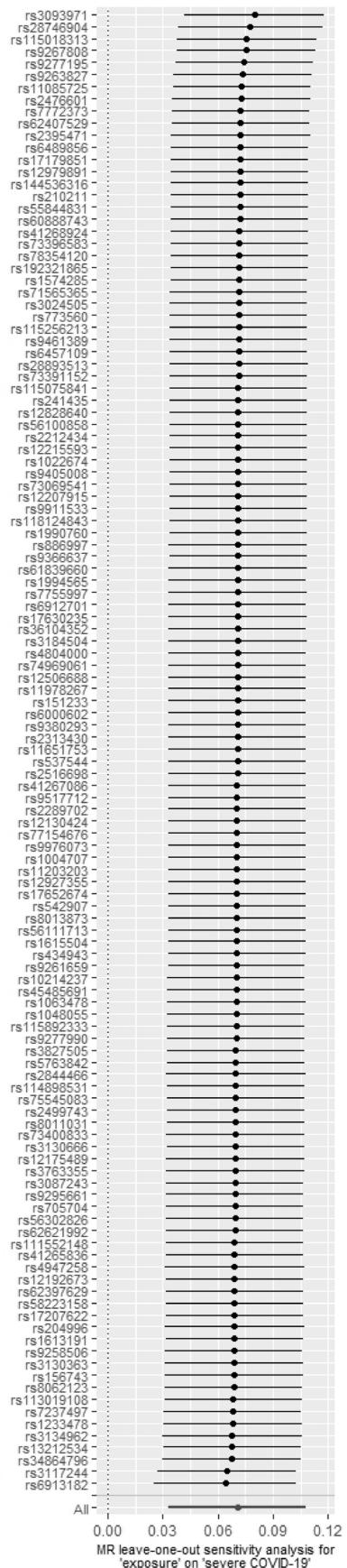


Figure 2 Result of leave-one-out test of type 1 diabetes on severe COVID-19. The bottom black line represents the estimated value of the IVW analysis. IVW, inverse variance weighted; MR, Mendelian randomization.

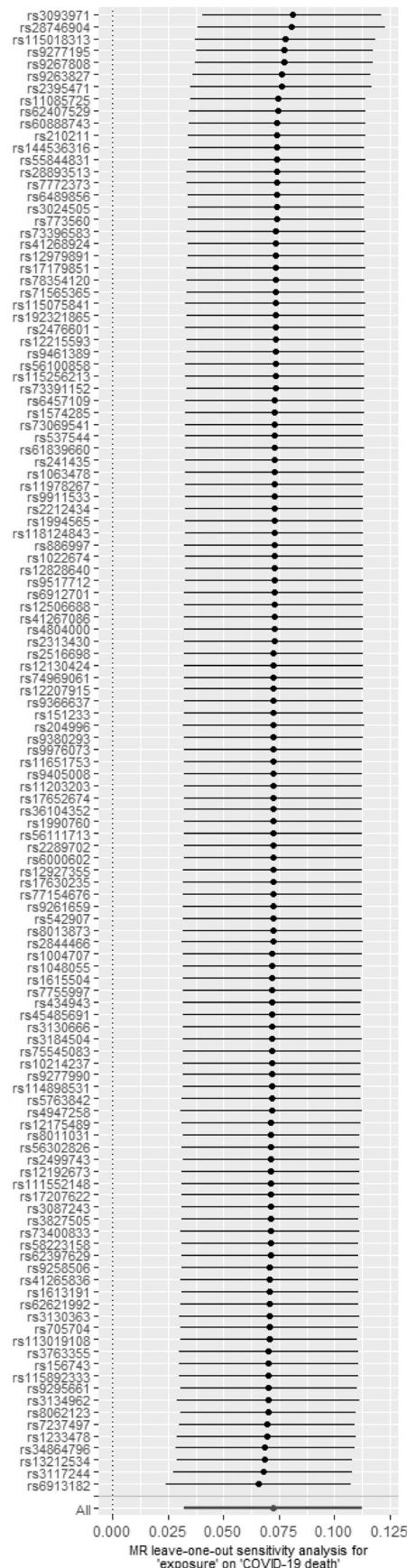


Figure 3 Result of leave-one-out test of type 1 diabetes on COVID-19 death. The bottom black line represents the estimated value of the IVW analysis. IVW, inverse variance weighted; MR, Mendelian randomization.

**Table 2** Reverse MR analysis results

Exposure	Outcome	Significance level of the selected IVs	nSNP	β	SE	P value
COVID-19 positive	Type 1 diabetes	$p \leq 1 \times 10^{-5}$	15	0.038	0.071	0.595
Hospitalized COVID-19		$p \leq 1 \times 10^{-5}$	11	0.002	0.043	0.971
Severe COVID-19		$p \leq 1 \times 10^{-5}$	8	0.014	0.021	0.506
COVID-19 death		$p \leq 1 \times 10^{-5}$	4	0.053	0.043	0.217
Recovery time with colchicine treatment		$p \leq 1 \times 10^{-5}$	13	0.028	0.017	0.090
Recovery time with placebo treatment		$p \leq 1 \times 10^{-5}$	15	0.010	0.016	0.548

nSNP is the number of SNPs used as IVs; β is the estimated effect coefficient; SE is the standard error of β . IVs, instrumental variables; MR, Mendelian randomization; SNP, single-nucleotide polymorphism.

(OR=1.055, 95% CI: 1.029 to 1.081, $p_{FDR}=1.59 \times 10^{-4}$). Type 1 diabetes and COVID-19 death have a positive relationship in causality (OR=1.053, 95% CI: 1.026 to 1.081, $p_{FDR}=3.50 \times 10^{-4}$).

DISCUSSION

In the present study, we used two separate sets of GWAS data to identify the relationship between type 1 diabetes and COVID-19 infection and prognosis. Our results showed that type 1 diabetes had a causal effect on severe COVID-19 and COVID-19 death.

Type 1 diabetes is caused by an extreme lack of insulin that causes hyperglycemia. The virus of COVID-19, namely SARS-CoV-2, enters the body and interacts with ACE2, thus causing infection. An animal study has shown that the non-obese diabetic mouse model, that is, the autoimmune diabetic model similar to human type 1 diabetes, has increased ACE2 activity.³⁰ Therefore, it may be the case that patients with type 1 diabetes are more susceptible to COVID-19 infection. Although patients with type 1 diabetes may themselves be more susceptible to COVID-19, their infection rates are similar to those of the general population, possibly due to their higher hygiene standards, such as less travel to densely populated areas and greater care to protect themselves. A study has also shown no difference in the incidence of COVID-19 among people with type 1 diabetes compared with the general population,³¹ which is consistent with our findings.

Our results showed that type 1 diabetes was not causally related to hospitalized COVID-19. A retrospective observational study showed no increase in COVID-19 hospitalization among patients with type 1 diabetes.³² It is reported that baseline glycemic control and prompt access to treatment are important factors that can alter the risk of COVID-19 hospitalization.³³ Besides, whether or not to be hospitalized after COVID-19 infection is not only affected by the symptoms of the disease, but also by the economic and health conditions of the region. In a word, it is difficult to objectively evaluate the relationship

between type 1 diabetes and hospitalized patients with COVID-19.

A prospective analysis demonstrated that compared with patients without type 1 diabetes, patients with COVID-19 with type 1 diabetes had a higher risk of developing more severe disease.³⁴ Besides, as we all know, patients with type 1 diabetes are prone to hyperglycemia; previous studies showed patients with COVID-19 who have hyperglycemia may develop more severe COVID-19 because hyperglycemia itself leads to changes in immune cell function and regulation of cytokines such as interleukin 6, as well as abnormalities in the coagulation system.^{35 36} Moreover, it is reported that patients with type 1 diabetes have an increased risk of intensive care unit admission compared with patients without type 1 diabetes.^{37 38}

It was reported that after contracting COVID-19, patients with type 1 diabetes experienced poor blood glucose control, leading to increased mortality.^{39–41} Besides, after adjusting for several confounders, the OR for in-hospital COVID-19-related deaths in patients with type 1 diabetes compared with those without type 1 diabetes was 2.86,⁴² and patients with type 1 diabetes had a 5% higher risk of death than patients without type 1 diabetes.³⁷ An observational study also shows patients with type 1 diabetes have a significantly increased risk of fatal COVID-19 compared with those without type 1 diabetes.³⁸

After removal of SNPs associated with other autoimmune diseases, our findings were unchanged, suggesting that IVs of type 1 diabetes independently influence COVID-19 infection and prognosis, which provides a basis for later use of these IVs as well as genes as drug targets.

Reverse MR analysis showed that six COVID-19-related phenotypes were not associated with type 1 diabetes. As mentioned in the Introduction section, some observational studies suggested that COVID-19 may be a risk factor for type 1 diabetes. However, our results did not show the causal relationship between COVID-19 positive and type 1 diabetes. An observational study suggested

that the increased incidence of type 1 diabetes observed during the first 18 months of the COVID-19 pandemic may not be a direct effect of COVID-19 infection, but rather a result of confinement and physical distance.⁴³ Besides, during the pandemic of COVID-19, diagnosis of type 1 diabetes may be delayed due to limited access to healthcare. A previous study showed that there is no conclusive evidence that COVID-19 spontaneously induces type 1 diabetes.¹⁹ Moreover, disease progression in type 1 diabetes is a more chronic and long-term process than in COVID-19 infection, so drawing a definitive conclusion on whether COVID-19 is capable of causing type 1 diabetes is difficult and will require longer-term observation at a later date.⁴⁴

The results of the pathway analysis study showed one metabolic pathway may be associated with severe COVID-19 and COVID-19 death, namely regulation of immune system process. It has been shown in the literature that high expression of the monocyte–macrophage chemotactic receptor CCR2 is associated with severe COVID-19 using transcriptome-wide association in lung tissue.⁴⁵ Observational studies have demonstrated a dysregulated immune response in patients with COVID-19, characterized by lymphopenia and cytokine storm. The subsequent dysregulated immune response can lead to septic shock, acute respiratory distress syndrome and/or multiorgan failure, which can result in increased severity and mortality in patients with COVID-19 infection.⁴⁶

Two GWAS summary datasets were used in this study. The discovery dataset included both adolescents and adults with type 1 diabetes, and the replication dataset included patients with type 1 diabetes who were diagnosed at an age younger than 17 years. Results from discovery data showed that type 1 diabetes was a risk factor for COVID-19 severity and mortality. This result was further confirmed by replicate sample. By comparing the results of the two samples, the age of patients with type 1 diabetes was found to have no effect on COVID-19 infection or the severity of post-infection. An available MR analysis study has shown that age is not a risk factor for the severity of COVID-19.⁴⁷

Our study has some advantages. First, we comprehensively analyzed the causal relationship between type 1 diabetes and six COVID-19 infection and prognosis-related traits. Second, the GWAS data used in this study were obtained from published studies with open and reliable data, and the persuasive power to infer causality was relatively strong. Lastly, we conducted a series of sensitivity analyses and reverse MR analysis to validate the robust of our MR results, which makes our results more convincing.

There are also some disadvantages in our study. On one hand, our study focused on European population, lacking studies of other populations, and results may differ somewhat when extrapolated to other populations. On the other hand, as the data we used were summarized and individual information was not available, it was not

possible to estimate the degree of overlap between participants with exposure and outcome data, and in addition, the summary data lacked the patient's level of glycemic control at the time of diagnosis and the specific time of diagnosis, all of which may affect the extrapolation of results to some extent. Besides, GWAS summary data on treatment are currently limited and only available for colchicine treatment and its control group, and further studies will continue if additional data on COVID-19 treatment are available. Finally, the lack of detailed data on the genotype and phenotype of COVID-19 in our study allows us to speculate only on the time of publication of GWAS data that the mutant strains of COVID-19 virus include mainly Alpha, Beta and Delta, which may partially affect the results.

CONCLUSIONS

In summary, our study used a two-sample MR to investigate the causal relationship between type 1 diabetes and COVID-19 infection and prognosis. Our results suggested that the genetically predicted type 1 diabetes was potentially associated with higher risk of severe COVID-19 and COVID-19 death. Further mechanistic studies such as molecular mechanism analysis, mouse model construction and further therapeutic studies are needed to explore the relationship between type 1 diabetes and COVID-19 infection and prognosis.

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Competing interests None declared.

Patient consent for publication Not required.

Ethics approval This study involves human participants. The GWAS summary statistics used in the present study were obtained from published studies. The ethics approval for GWAS was obtained from the original publications. No new ethics approval or informed consent was required. Participants gave informed consent to participate in the study before taking part.

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Data availability statement Data are available in a public, open access repository.



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Supplementary Table 1. Selected IVs in MR analysis

exposure	outcome	F-value	SNP	A1	A2	exposure						outcome					
						eaf	beta	se	pval	samplesize	eaf	beta	se	pval	samplesize		
Type 1 diabetes	COVID-19 positive	199.98	rs1004707	T	C	0.225	0.107	0.019	4.31E-08	173981	0.222	0.012	0.015	0.435	98377		
			rs10214237	C	T	0.274	-0.107	0.016	2.32E-11	173981	0.275	-0.007	0.014	0.607	98377		
			rs1022674	C	A	0.226	0.107	0.017	4.61E-10	173981	0.242	0.012	0.015	0.423	98377		
			rs1048055	A	C	0.340	-0.110	0.016	1.03E-11	173981	0.335	0.005	0.013	0.734	98377		
			rs1063478	T	C	0.120	-0.365	0.024	3.15E-51	173981	0.119	0.021	0.019	0.272	98377		
			rs11085725	T	C	0.294	-0.126	0.017	5.86E-14	173981	0.293	0.010	0.014	0.482	98377		
			rs111552148	G	A	0.042	-0.328	0.039	4.97E-17	173981	0.039	-0.022	0.033	0.493	98377		
			rs11203203	A	G	0.365	0.129	0.015	3.25E-17	173981	0.367	-0.010	0.013	0.454	98377		
			rs1130191108	T	C	0.019	-0.544	0.055	5.03E-23	173981	0.017	-0.015	0.048	0.762	98377		
			rs114898531	G	A	0.049	-0.211	0.035	9.03E-10	173981	0.048	-0.036	0.030	0.221	98377		
			rs115018313	C	T	0.020	1.496	0.036	1.00E-200	173981	0.023	-0.054	0.042	0.196	98377		
			rs115075841	T	C	0.072	-0.560	0.044	5.79E-38	173981	0.073	0.008	0.024	0.746	98377		
			rs115256213	G	A	0.013	-0.586	0.090	6.60E-11	173981	0.014	-0.027	0.054	0.612	98377		
			rs115892333	A	G	0.056	-0.583	0.041	7.37E-45	173981	0.058	0.029	0.027	0.283	98377		
			rs11651753	T	C	0.428	-0.093	0.015	3.24E-10	173981	0.429	-0.010	0.013	0.445	98377		
			rs118124843	T	C	0.017	-0.372	0.063	3.36E-09	173981	0.017	-0.079	0.048	0.102	98377		
			rs11978267	G	A	0.282	-0.089	0.016	3.10E-08	173981	0.277	-0.011	0.014	0.424	98377		
			rs12130424	C	T	0.073	0.166	0.026	2.12E-10	173981	0.080	-0.006	0.023	0.789	98377		
			rs12175489	A	G	0.123	-0.354	0.022	2.09E-58	173981	0.119	0.045	0.020	0.024	98377		
			rs12192673	G	T	0.046	-0.372	0.033	5.93E-30	173981	0.043	-0.072	0.031	0.019	98377		
			rs12207915	C	T	0.057	-0.361	0.031	1.01E-30	173981	0.054	0.014	0.028	0.610	98377		
			rs12215593	G	A	0.367	-0.158	0.016	3.37E-24	173981	0.364	-0.021	0.013	0.108	98377		
			rs1233478	T	G	0.192	0.405	0.018	1.44E-108	173981	0.196	0.022	0.016	0.157	98377		
			rs12506688	T	C	0.300	0.101	0.016	1.44E-10	173981	0.304	-0.007	0.014	0.584	98377		
			rs12828640	A	G	0.416	0.104	0.015	2.80E-12	173981	0.421	-0.015	0.013	0.241	98377		
			rs12927355	T	C	0.323	-0.155	0.016	7.29E-23	173981	0.322	0.008	0.013	0.567	98377		
			rs12979891	C	T	0.468	-0.094	0.015	2.25E-10	173981	0.462	0.011	0.013	0.387	98377		
			rs13212534	A	G	0.093	0.313	0.029	4.27E-27	173981	0.097	0.008	0.021	0.711	98377		
			rs13523213	G	T	0.291	-0.135	0.021	6.60E-11	173981	0.285	0.030	0.014	0.030	98377		
			rs144536316	A	G	0.016	0.452	0.055	3.40E-16	173981	0.017	-0.119	0.050	0.018	98377		
			rs151233	T	C	0.131	0.164	0.024	7.46E-12	173981	0.130	0.004	0.019	0.821	98377		
			rs1567473	C	T	0.147	0.413	0.022	2.48E-77	173981	0.145	0.019	0.018	0.288	98377		
			rs1574285	G	T	0.408	0.103	0.015	1.69E-12	173981	0.400	0.006	0.013	0.639	98377		
			rs1613191	A	G	0.017	0.579	0.052	2.78E-28	173981	0.017	-0.001	0.050	0.987	98377		
			rs1615504	T	C	0.472	0.103	0.015	1.22E-12	173981	0.475	0.021	0.013	0.091	98377		
			rs17179851	C	T	0.102	0.364	0.022	2.89E-63	173981	0.105	0.012	0.021	0.574	98377		
			rs17207622	T	G	0.027	-0.625	0.061	1.48E-24	173981	0.026	-0.039	0.039	0.316	98377		
			rs17630235	A	G	0.409	0.191	0.015	4.14E-38	173981	0.410	0.009	0.013	0.489	98377		
			rs17652674	A	C	0.194	0.100	0.018	2.20E-08	173981	0.196	0.012	0.016	0.430	98377		
			rs192321865	T	C	0.065	0.225	0.039	7.53E-09	173981	0.064	-0.049	0.026	0.057	98377		
			rs1990760	C	T	0.395	-0.119	0.015	1.83E-15	173981	0.392	-0.010	0.013	0.450	98377		
			rs1994565	G	T	0.293	-0.096	0.017	1.84E-08	173981	0.297	-0.013	0.014	0.339	98377		
			rs204996	T	C	0.057	-0.969	0.058	9.32E-62	173981	0.060	-0.035	0.026	0.188	98377		
			rs210211	G	A	0.104	-0.311	0.028	1.16E-29	173981	0.103	0.007	0.021	0.752	98377		
			rs2212434	T	C	0.458	0.080	0.015	3.54E-08	173981	0.449	-0.002	0.013	0.884	98377		
			rs2289702	T	C	0.101	-0.171	0.026	7.08E-11	173981	0.104	-0.004	0.020	0.854	98377		
			rs2313430	C	T	0.482	-0.085	0.015	5.75E-09	173981	0.484	-0.005	0.012	0.695	98377		
			rs2395471	A	G	0.355	-0.519	0.017	1.00E-200	173981	0.360	0.008	0.013	0.556	98377		
			rs2414145	A	G	0.031	-0.783	0.074	5.05E-26	173981	0.033	-0.042	0.035	0.233	98377		
			rs2476601	A	G	0.094	0.544	0.022	4.54E-135	173981	0.101	0.027	0.021	0.194	98377		
			rs2499743	A	C	0.225	0.128	0.019	1.37E-11	173981	0.220	-0.008	0.016	0.613	98377		
			rs2516698	A	G	0.052	-0.278	0.045	6.67E-10	173981	0.053	0.006	0.028	0.832	98377		
			rs2844466	C	T	0.360	0.487	0.015	1.00E-200	173981	0.356	0.000	0.013	0.976	98377		
			rs28746904	C	T	0.228	-0.944	0.024	1.00E-200	173981	0.242	-0.004	0.015	0.767	98377		
			rs2893513	G	A	0.120	-0.467	0.026	1.28E-69	173981	0.123	0.002	0.019	0.912	98377		
			rs3024505	A	G	0.159	-0.124	0.021	1.80E-09	173981	0.156	0.005	0.017	0.732	98377		
			rs3087243	A	G	0.453	-0.148	0.015	3.70E-23	173981	0.450	0.003	0.013	0.819	98377		
			rs3093971	A	G	0.103	0.765	0.026	6.25E-188	173981	0.101	0.040	0.021	0.052	98377		
			rs3117244	A	G	0.127	-0.609	0.024	4.59E-142	173981	0.124	-0.004	0.019	0.850	98377		
			rs3130363	G	A	0.141	0.560	0.022	3.00E-149	173981	0.142	0.008	0.018	0.673	98377		
			rs3130666	A	G	0.041	-0.353	0.058	1.51E-09	173981	0.043	0.024	0.031	0.438	98377		
			rs3134962	A	G	0.169	0.686	0.021	1.00E-200	173981	0.171	-0.010	0.017	0.528	98377		
			rs3184504	T	C	0.487	0.218	0.015	4.62E-49	173981	0.484	-0.003	0.012	0.790	98377		
			rs34864796	A	G	0.125	0.461	0.024	8.74E-82	173981	0.122	0.020	0.019	0.301	98377		
			rs36104352	C	A	0.123	-0.155	0.025	6.17E-10	173981	0.121	-0.018	0.019	0.340	98377		
			rs3763355	C	T	0.065	0.606	0.027	4.95E-113	173981	0.062	-0.029	0.026	0.262	98377		
			rs3827505	C	T	0.167	-0.143	0.020	8.39E-13	173981	0.167	0.009	0.017	0.589	98377		
			rs41265836	G	A	0.046	0.478	0.035	8.53E-42	173981	0.047	-0.01					

rs6489856	A	C	0.309	0.112	0.016	2.54E-12	173981	0.309	-0.009	0.014	0.515	98377			
rs6912701	T	C	0.012	-0.518	0.075	4.67E-12	173981	0.014	0.096	0.054	0.077	98377			
rs6913182	T	C	0.170	-0.921	0.029	1.00E-200	173981	0.173	0.001	0.016	0.946	98377			
rs705704	A	G	0.339	0.196	0.015	1.89E-37	173981	0.342	-0.038	0.013	0.003	98377			
rs71565365	A	G	0.073	-0.201	0.028	1.29E-12	173981	0.075	0.052	0.024	0.028	98377			
rs7237497	T	C	0.165	0.177	0.020	1.17E-18	173981	0.165	-0.009	0.017	0.577	98377			
rs73069541	G	A	0.236	-0.107	0.018	3.07E-09	173981	0.235	0.013	0.015	0.367	98377			
rs73391152	T	G	0.055	-0.209	0.038	3.27E-08	173981	0.056	-0.005	0.027	0.846	98377			
rs73396583	C	T	0.102	-0.296	0.031	1.80E-21	173981	0.105	-0.005	0.020	0.795	98377			
rs73400833	T	C	0.020	-0.658	0.050	1.02E-39	173981	0.023	0.045	0.041	0.279	98377			
rs74969061	A	G	0.020	-0.286	0.049	7.29E-09	173981	0.022	0.050	0.043	0.246	98377			
rs75545083	T	C	0.053	-0.267	0.041	6.14E-11	173981	0.056	0.013	0.027	0.643	98377			
rs77154676	C	T	0.171	-0.134	0.023	6.60E-09	173981	0.168	0.027	0.017	0.107	98377			
rs773560	A	G	0.270	0.148	0.016	3.13E-19	173981	0.278	-0.001	0.014	0.964	98377			
rs775597	G	A	0.412	0.221	0.015	2.87E-51	173981	0.409	0.001	0.013	0.965	98377			
rs7772373	G	A	0.077	-0.406	0.042	1.44E-22	173981	0.075	-0.016	0.024	0.493	98377			
rs78354120	T	C	0.014	-0.429	0.071	1.16E-09	173981	0.013	0.054	0.055	0.329	98377			
rs8011031	G	A	0.276	0.090	0.015	5.95E-09	173981	0.282	-0.008	0.014	0.560	98377			
rs8013873	T	C	0.185	-0.163	0.023	4.77E-13	173981	0.181	0.000	0.016	0.976	98377			
rs8062123	T	G	0.315	0.114	0.017	3.60E-11	173981	0.320	-0.017	0.014	0.223	98377			
rs886997	T	C	0.093	-0.346	0.029	2.98E-33	173981	0.093	0.001	0.021	0.951	98377			
rs9258506	C	T	0.040	-0.374	0.039	7.90E-22	173981	0.038	-0.008	0.033	0.818	98377			
rs9261659	G	A	0.109	-0.161	0.027	4.74E-09	173981	0.112	0.002	0.020	0.933	98377			
rs9263827	T	C	0.044	0.724	0.033	1.13E-104	173981	0.049	0.043	0.029	0.141	98377			
rs9267808	A	G	0.013	1.421	0.042	1.00E-200	173981	0.015	0.070	0.051	0.173	98377			
rs9277195	C	T	0.492	-0.326	0.015	2.29E-101	173981	0.506	-0.004	0.013	0.764	98377			
rs9277990	G	A	0.190	0.180	0.023	7.88E-15	173981	0.189	-0.009	0.016	0.561	98377			
rs9295661	C	A	0.087	0.282	0.030	7.52E-21	173981	0.085	0.022	0.022	0.320	98377			
rs9366637	T	C	0.052	-0.182	0.027	1.06E-11	173981	0.054	-0.002	0.028	0.950	98377			
rs9380293	T	C	0.016	-0.774	0.057	1.94E-41	173981	0.017	-0.040	0.048	0.409	98377			
rs9405008	G	A	0.038	-0.238	0.041	5.31E-09	173981	0.035	-0.011	0.034	0.746	98377			
rs9461389	A	G	0.108	-0.161	0.022	1.68E-13	173981	0.107	-0.002	0.020	0.922	98377			
rs9517712	T	C	0.246	0.096	0.016	4.26E-09	173981	0.250	0.006	0.014	0.700	98377			
rs9911533	C	T	0.371	-0.087	0.015	5.14E-09	173981	0.365	0.002	0.013	0.892	98377			
rs9976073	C	T	0.262	-0.094	0.017	1.13E-08	173981	0.262	-0.011	0.014	0.448	98377			
type 1 diabetes	hospitalized COVID-19	201.15	rs1004707	T	C	0.225	0.107	0.019	4.31E-08	173981	0.222	0.047	0.037	0.203	16551
rs10214237	C	T	0.274	-0.107	0.016	2.32E-11	173981	0.273	-0.003	0.034	0.938	16551			
rs1022674	C	A	0.226	0.107	0.017	4.61E-10	173981	0.244	-0.068	0.036	0.060	16551			
rs1048055	A	C	0.340	-0.110	0.016	1.03E-11	173981	0.337	0.023	0.033	0.488	16551			
rs1063478	T	C	0.120	-0.365	0.024	3.51E-51	173981	0.121	-0.041	0.047	0.383	16551			
rs11085725	T	C	0.294	-0.126	0.017	5.86E-14	173981	0.295	0.013	0.034	0.700	16551			
rs111552148	G	A	0.042	-0.328	0.039	4.97E-17	173981	0.039	-0.080	0.082	0.330	16551			
rs11203203	A	G	0.365	0.129	0.015	3.25E-17	173981	0.365	0.046	0.032	0.151	16551			
rs113019108	T	C	0.019	-0.544	0.055	5.03E-23	173981	0.017	-0.232	0.120	0.053	16551			
rs114898531	G	A	0.049	-0.211	0.035	9.03E-10	173981	0.046	0.020	0.074	0.794	16551			
rs115018313	C	T	0.020	1.496	0.036	1.00E-200	173981	0.022	-0.136	0.105	0.193	16551			
rs115075841	T	C	0.072	-0.560	0.044	5.79E-38	173981	0.073	-0.030	0.059	0.617	16551			
rs115256213	G	A	0.013	-0.586	0.090	6.60E-11	173981	0.013	-0.016	0.135	0.903	16551			
rs115892333	A	G	0.056	-0.583	0.041	7.37E-45	173981	0.059	0.044	0.066	0.505	16551			
rs11651753	C	T	0.428	-0.093	0.015	3.24E-10	173981	0.427	0.025	0.031	0.414	16551			
rs118124843	T	C	0.017	-0.372	0.063	3.36E-09	173981	0.016	0.117	0.121	0.336	16551			
rs11978267	G	A	0.282	-0.089	0.016	3.10E-08	173981	0.275	-0.004	0.034	0.914	16551			
rs12130424	C	T	0.073	0.166	0.026	2.12E-10	173981	0.080	0.048	0.057	0.396	16551			
rs12175489	A	G	0.123	-0.354	0.022	2.09E-58	173981	0.122	0.050	0.048	0.302	16551			
rs12192673	G	T	0.046	-0.372	0.033	5.93E-30	173981	0.041	-0.094	0.079	0.235	16551			
rs12207915	C	T	0.057	-0.361	0.031	1.01E-30	173981	0.055	0.021	0.068	0.758	16551			
rs12215593	G	A	0.367	-0.158	0.016	3.37E-24	173981	0.360	0.006	0.032	0.857	16551			
rs1233478	T	G	0.192	0.405	0.018	1.44E-108	173981	0.200	0.033	0.039	0.395	16551			
rs12506688	T	C	0.300	0.101	0.016	1.44E-10	173981	0.303	0.043	0.033	0.200	16551			
rs12828640	A	G	0.416	0.104	0.015	2.80E-12	173981	0.417	-0.010	0.032	0.750	16551			
rs12927355	T	C	0.323	-0.155	0.016	7.29E-23	173981	0.323	-0.002	0.033	0.953	16551			
rs12979891	C	T	0.468	-0.094	0.015	2.25E-10	173981	0.464	0.025	0.031	0.417	16551			
rs13212534	A	G	0.093	0.313	0.029	4.27E-27	173981	0.098	-0.016	0.051	0.757	16551			
rs144536316	A	G	0.016	0.452	0.055	3.40E-16	173981	0.016	-0.018	0.130	0.892	16551			
rs151233	T	C	0.131	0.164	0.024	7.46E-12	173981	0.130	0.024	0.046	0.594	16551			
rs156743	C	T	0.147	0.413	0.022	2.48E-77	173981	0.149	-0.002	0.043	0.972	16551			
rs1574285	G	T	0.408	0.103	0.015	1.69E-12	173981	0.401	-0.056	0.032	0.078	16551			
rs1613191	A	G	0.017	0.579	0.052	2.78E-28	173981	0.017	0.235	0.125	0.060	16551			
rs1615504	T	C	0.472	0.103	0.015	1.22E-12	173981	0.479	0.070	0.031	0.023	16551			
rs17179851	C	T	0.102	0.364	0.022	2.89E-63	173981	0.106	-0.001	0.051	0.990	16551			
rs17207622	T	G	0.027	-0.625	0.061	1.48E-24	173981	0.026	-0.096	0.096	0.320	16551			
rs17630235	A	G	0.409	0.191	0.015	4.14E-38	173981	0.410	0.033	0.031	0.295	16551			
rs17652674	A	C	0.194	0.100	0.018	2.20E-08	173981	0.197	0.069	0.039	0.072	16551			
rs192321865	T	C	0.065	0.225	0.039	7.53E-09	173981	0.062	-0.049	0.065	0.453	16551			
rs1990760	C	T	0.395	-0.119	0.015	1.83E-15	173981	0.390	-0.029	0.032	0.366	16551			
rs1994565	G	T	0.293	-0.096	0.017	1.84E-08	173981	0.295	-0.010	0.034	0.760	16551			
rs204996	T	C	0.057	-0.969	0.058	9.32E-62	173981	0.058	-0.061	0.066	0.353	16551			
rs210211	G	A	0.104	-0.311	0.028	1.16E-29	173981	0.104	0.087	0.050	0.083	16551			
rs2121434	T	C	0.458	0.080	0.015	3.54E-08	173981	0.449	0.034	0.031	0.268	16551			
rs2289702	T	C	0.101	-0.171	0.026	7.08E-11	173981	0.104	0.020	0.051	0.694	16551			
rs2313430	C	T	0.482	-0.085	0.015	7.57E-09	173981	0.483	0.004	0.031	0.907	16551			
rs2395471	A	G	0.355	-0.519	0.017	1.00E-200	173981	0.360	-0.014	0.032	0.654	16551			
rs241435	A	G	0.031	-0.783	0.074	5.05E-26	173981	0.031	-0.121	0.090	0.179	16551			
rs2476601	A	G	0.094	0.544	0.022	4.54E-135	173981	0.103	0.028	0.050	0.570	16551			
rs2499743	A	C	0.225	0.128	0.019	1.37E-11	173981	0.219	0.002	0.039	0.961	16551			
rs2516698	A	G	0.052	-0.278	0.045	6.67E-10	173981	0.053	-0.047	0.069	0.496	16551			
rs2844466	C	T	0.360	0.487	0.015	1.00E-200	173981	0.357	-0.004	0.032	0.894	16551			
rs28746904	C	T	0.228	-0.944	0.024	1.00E-200	173981	0.241	-0.024	0.036	0.500	16551			
rs28893513	G	A	0.120	-0.467	0.026	1.28E-69	173981	0.123	0.053	0.047	0.263	16551			
rs3024505	A	G	0.159	-0.124	0.021	1.80E-09	173981	0.157	0.040	0.042	0.347	16551			
rs3087243	A	G	0.453	-0.148	0.015	3.70E-23	173981	0.451	-0.015	0.031	0.637	16551			
rs3093971	A	G													

type 1 diabetes	severe COVID-19	201.15	rs3117244	A	G	0.127	-0.609	0.024	4.59E-142	173981	0.124	-0.072	0.047	0.126	16551
			rs3130363	G	A	0.141	0.560	0.022	3.00E-149	173981	0.144	0.011	0.044	0.800	16551
type 1 diabetes	severe COVID-19	201.15	rs3130666	A	G	0.041	-0.353	0.058	1.51E-09	173981	0.043	-0.101	0.076	0.183	16551
			rs3134962	A	G	0.169	0.686	0.021	1.00E-200	173981	0.171	0.039	0.041	0.349	16551
type 1 diabetes	severe COVID-19	201.15	rs3184504	T	C	0.487	0.218	0.015	4.62E-49	173981	0.483	0.003	0.031	0.929	16551
			rs34864796	A	G	0.125	0.461	0.024	8.74E-82	173981	0.125	0.000	0.047	0.999	16551
type 1 diabetes	severe COVID-19	201.15	rs36104352	C	A	0.123	-0.155	0.025	6.17E-10	173981	0.119	0.031	0.047	0.508	16551
			rs3763355	C	T	0.065	0.606	0.027	4.95E-113	173981	0.060	-0.007	0.065	0.915	16551
type 1 diabetes	severe COVID-19	201.15	rs3827505	C	T	0.167	-0.143	0.020	8.39E-13	173981	0.167	-0.060	0.041	0.146	16551
			rs41265836	G	A	0.046	0.478	0.035	8.53E-42	173981	0.046	0.008	0.076	0.921	16551
type 1 diabetes	severe COVID-19	201.15	rs41267086	A	G	0.049	-0.277	0.035	1.54E-15	173981	0.047	-0.122	0.072	0.091	16551
			rs41268924	A	G	0.061	0.211	0.038	1.96E-08	173981	0.058	-0.010	0.067	0.878	16551
type 1 diabetes	severe COVID-19	201.15	rs434943	A	G	0.331	-0.099	0.017	8.22E-09	173981	0.335	-0.006	0.032	0.858	16551
			rs45485691	A	G	0.275	0.107	0.016	5.53E-12	173981	0.269	-0.021	0.035	0.539	16551
type 1 diabetes	severe COVID-19	201.15	rs4804000	A	G	0.188	-0.131	0.019	1.27E-11	173981	0.192	-0.052	0.039	0.183	16551
			rs4947258	G	A	0.121	0.705	0.023	1.00E-200	173981	0.122	-0.011	0.047	0.823	16551
type 1 diabetes	severe COVID-19	201.15	rs537544	C	T	0.384	0.087	0.015	8.37E-09	173981	0.375	-0.032	0.032	0.317	16551
			rs542907	A	G	0.439	-0.081	0.015	3.96E-08	173981	0.446	-0.028	0.031	0.366	16551
type 1 diabetes	severe COVID-19	201.15	rs55844831	G	A	0.041	0.588	0.031	3.09E-82	173981	0.038	-0.034	0.081	0.677	16551
			rs56100858	T	C	0.011	0.728	0.047	2.92E-55	173981	0.013	-0.032	0.133	0.809	16551
type 1 diabetes	severe COVID-19	201.15	rs56111713	T	G	0.008	0.493	0.081	9.84E-10	173981	0.008	0.233	0.177	0.189	16551
			rs56302826	G	T	0.032	-0.403	0.046	1.82E-18	173981	0.031	0.019	0.090	0.829	16551
type 1 diabetes	severe COVID-19	201.15	rs5763842	A	G	0.383	0.150	0.015	1.49E-23	173981	0.396	0.064	0.032	0.043	16551
			rs58223158	G	A	0.034	0.329	0.038	3.48E-18	173981	0.037	-0.013	0.082	0.878	16551
type 1 diabetes	severe COVID-19	201.15	rs6000602	A	C	0.237	0.102	0.018	6.16E-09	173981	0.230	0.008	0.036	0.826	16551
			rs60888743	G	A	0.252	-0.137	0.017	9.82E-16	173981	0.264	0.020	0.035	0.565	16551
type 1 diabetes	severe COVID-19	201.15	rs61839660	T	C	0.102	-0.371	0.031	3.49E-32	173981	0.097	-0.021	0.052	0.685	16551
			rs62397629	A	C	0.052	-0.217	0.034	1.31E-10	173981	0.054	-0.173	0.070	0.013	16551
type 1 diabetes	severe COVID-19	201.15	rs62407529	T	C	0.060	-0.344	0.036	1.12E-21	173981	0.053	0.050	0.071	0.481	16551
			rs62621992	T	C	0.016	0.675	0.055	1.21E-34	173981	0.018	0.192	0.119	0.105	16551
type 1 diabetes	severe COVID-19	201.15	rs6457109	C	T	0.090	0.173	0.023	4.41E-14	173981	0.094	-0.015	0.053	0.782	16551
			rs6489856	A	C	0.309	0.112	0.016	2.54E-12	173981	0.307	0.009	0.033	0.795	16551
type 1 diabetes	severe COVID-19	201.15	rs6912701	T	C	0.012	-0.518	0.075	4.67E-12	173981	0.015	0.013	0.129	0.922	16551
			rs6913182	T	C	0.170	-0.921	0.029	1.00E-200	173981	0.173	0.062	0.041	0.133	16551
type 1 diabetes	severe COVID-19	201.15	rs705704	A	G	0.339	0.196	0.015	1.89E-37	173981	0.334	0.014	0.033	0.666	16551
			rs71565365	A	G	0.073	-0.201	0.028	1.29E-12	173981	0.077	0.041	0.057	0.466	16551
type 1 diabetes	severe COVID-19	201.15	rs7237497	T	C	0.165	0.177	0.020	1.17E-18	173981	0.164	0.056	0.042	0.184	16551
			rs73069541	G	A	0.236	-0.107	0.018	3.07E-09	173981	0.237	-0.004	0.036	0.910	16551
type 1 diabetes	severe COVID-19	201.15	rs73391152	T	G	0.055	-0.209	0.038	3.27E-08	173981	0.056	-0.037	0.067	0.576	16551
			rs73396583	C	T	0.102	-0.296	0.031	1.80E-21	173981	0.105	-0.005	0.050	0.918	16551
type 1 diabetes	severe COVID-19	201.15	rs73400833	T	C	0.020	-0.658	0.050	1.02E-39	173981	0.024	-0.179	0.101	0.076	16551
			rs74969061	A	G	0.020	-0.286	0.049	7.29E-09	173981	0.023	0.031	0.104	0.765	16551
type 1 diabetes	severe COVID-19	201.15	rs75545083	T	C	0.053	-0.267	0.041	6.14E-11	173981	0.057	-0.012	0.067	0.859	16551
			rs77154676	C	T	0.171	-0.134	0.023	6.60E-09	173981	0.171	0.026	0.041	0.530	16551
type 1 diabetes	severe COVID-19	201.15	rs7733560	A	G	0.270	0.148	0.016	3.13E-19	173981	0.278	-0.006	0.034	0.860	16551
			rs7755997	G	A	0.412	0.221	0.015	2.87E-51	173981	0.409	-0.015	0.031	0.640	16551
type 1 diabetes	severe COVID-19	201.15	rs7772373	G	A	0.077	-0.406	0.042	1.44E-22	173981	0.074	0.029	0.058	0.614	16551
			rs78354120	T	C	0.014	-0.429	0.071	1.16E-09	173981	0.014	0.187	0.132	0.155	16551
type 1 diabetes	severe COVID-19	201.15	rs8011031	G	A	0.276	0.090	0.015	5.95E-09	173981	0.281	-0.042	0.035	0.224	16551
			rs8013873	T	C	0.185	-0.163	0.023	4.77E-13	173981	0.181	-0.007	0.040	0.872	16551
type 1 diabetes	severe COVID-19	201.15	rs8062123	T	G	0.315	0.114	0.017	3.60E-11	173981	0.317	0.034	0.034	0.315	16551
			rs886997	T	C	0.093	-0.346	0.029	2.98E-33	173981	0.093	0.006	0.053	0.908	16551
type 1 diabetes	severe COVID-19	201.15	rs9258506	T	C	0.040	-0.374	0.039	7.90E-22	173981	0.037	-0.047	0.081	0.563	16551
			rs9261659	G	A	0.109	-0.161	0.027	4.74E-09	173981	0.112	0.014	0.050	0.777	16551
type 1 diabetes	severe COVID-19	201.15	rs9263827	T	C	0.044	0.724	0.033	1.13E-104	173981	0.051	0.035	0.070	0.618	16551
			rs9267808	A	G	0.013	1.421	0.042	1.00E-200	173981	0.016	-0.061	0.119	0.610	16551
type 1 diabetes	severe COVID-19	201.15	rs9277195	C	T	0.492	-0.326	0.015	2.29E-101	173981	0.506	0.036	0.031	0.244	16551
			rs9277990	G	A	0.190	0.180	0.023	7.88E-15	173981	0.187	0.024	0.040	0.542	16551
type 1 diabetes	severe COVID-19	201.15	rs9295661	C	A	0.087	0.282	0.030	7.52E-21	173981	0.087	-0.068	0.054	0.212	16551
			rs9366637	T	C	0.052	-0.182	0.027	1.06E-11	173981	0.054	0.064	0.069	0.351	16551
type 1 diabetes	severe COVID-19	201.15	rs9380293	T	C	0.016	-0.774	0.057	1.94E-41	173981	0.016	0.083	0.122	0.497	16551

rs12979891	C	T	0.468	-0.094	0.015	2.25E-10	173981	0.464	0.081	0.047	0.083	15815
rs13212534	A	G	0.093	0.313	0.029	4.27E-27	173981	0.098	0.176	0.077	0.022	15815
rs144536316	A	G	0.016	0.452	0.055	3.40E-16	173981	0.015	-0.277	0.197	0.159	15815
rs151233	T	C	0.131	0.164	0.024	7.46E-12	173981	0.130	0.001	0.069	0.986	15815
rs156743	C	T	0.147	0.413	0.022	2.48E-77	173981	0.149	0.079	0.065	0.223	15815
rs1574285	G	T	0.408	0.103	0.015	1.69E-12	173981	0.401	-0.048	0.047	0.314	15815
rs1613191	A	G	0.017	0.579	0.052	2.78E-28	173981	0.017	0.324	0.188	0.084	15815
rs1615504	T	C	0.472	0.103	0.015	1.22E-12	173981	0.478	0.025	0.047	0.592	15815
rs17179851	C	T	0.102	0.364	0.022	2.89E-63	173981	0.106	-0.039	0.077	0.616	15815
rs17207622	T	G	0.027	-0.625	0.061	1.48E-24	173981	0.026	-0.185	0.142	0.193	15815
rs17630235	A	G	0.409	0.191	0.015	4.14E-38	173981	0.410	0.007	0.047	0.878	15815
rs17652674	A	C	0.194	0.100	0.018	2.20E-08	173981	0.198	0.027	0.058	0.637	15815
rs192321865	T	C	0.065	0.225	0.039	7.53E-09	173981	0.061	-0.107	0.099	0.278	15815
rs1990760	C	T	0.395	-0.119	0.015	1.83E-15	173981	0.390	0.008	0.048	0.870	15815
rs1994565	G	T	0.293	-0.096	0.017	1.84E-08	173981	0.295	0.011	0.051	0.833	15815
rs204996	T	C	0.057	-0.969	0.058	9.32E-62	173981	0.059	-0.114	0.100	0.255	15815
rs210211	G	A	0.104	-0.311	0.028	1.16E-29	173981	0.103	0.043	0.076	0.568	15815
rs2212434	T	C	0.458	0.080	0.015	3.54E-08	173981	0.449	-0.032	0.047	0.492	15815
rs2289702	T	C	0.101	-0.171	0.026	7.08E-11	173981	0.103	-0.020	0.076	0.789	15815
rs2313430	C	T	0.482	-0.085	0.015	5.75E-09	173981	0.482	-0.004	0.046	0.924	15815
rs2395471	A	G	0.355	-0.519	0.017	1.00E-200	173981	0.362	-0.015	0.048	0.757	15815
rs241435	A	G	0.031	-0.783	0.074	5.05E-26	173981	0.031	-0.018	0.137	0.892	15815
rs2476601	A	G	0.094	0.544	0.022	4.54E-135	173981	0.103	-0.025	0.075	0.736	15815
rs2499743	A	C	0.225	0.128	0.019	1.37E-11	173981	0.219	0.079	0.058	0.177	15815
rs2516698	A	G	0.052	-0.278	0.045	6.67E-10	173981	0.053	-0.025	0.105	0.813	15815
rs2844466	C	T	0.360	0.487	0.015	1.00E-200	173981	0.357	0.045	0.049	0.350	15815
rs28746904	C	T	0.228	-0.944	0.024	1.00E-200	173981	0.241	-0.010	0.055	0.848	15815
rs28893513	G	A	0.120	-0.467	0.026	1.28E-69	173981	0.124	-0.013	0.071	0.857	15815
rs3024505	A	G	0.159	-0.124	0.021	1.80E-09	173981	0.156	0.067	0.063	0.290	15815
rs3087243	A	G	0.453	-0.148	0.015	3.70E-23	173981	0.451	-0.056	0.047	0.231	15815
rs3093971	A	G	0.103	0.765	0.026	6.25E-188	173981	0.104	-0.132	0.076	0.080	15815
rs3117244	A	G	0.127	-0.609	0.024	4.59E-142	173981	0.124	-0.165	0.071	0.020	15815
rs3130363	G	A	0.141	0.560	0.022	3.00E-149	173981	0.144	0.077	0.066	0.243	15815
rs3130666	A	G	0.041	-0.353	0.058	1.51E-09	173981	0.043	-0.130	0.115	0.260	15815
rs3134962	A	G	0.169	0.686	0.021	1.00E-200	173981	0.170	0.091	0.062	0.144	15815
rs3184504	T	C	0.487	0.218	0.015	4.62E-49	173981	0.482	0.010	0.047	0.826	15815
rs34864796	A	G	0.125	0.461	0.024	8.74E-82	173981	0.125	0.122	0.069	0.080	15815
rs36104352	C	A	0.123	-0.155	0.025	6.17E-10	173981	0.119	0.006	0.071	0.932	15815
rs3763355	C	T	0.065	0.606	0.027	4.95E-113	173981	0.060	0.089	0.098	0.364	15815
rs3827505	C	T	0.167	-0.143	0.020	8.39E-13	173981	0.167	-0.064	0.062	0.301	15815
rs41265836	G	A	0.046	0.478	0.035	8.53E-42	173981	0.045	0.144	0.115	0.213	15815
rs41267086	A	G	0.049	-0.277	0.035	1.54E-15	173981	0.047	-0.027	0.108	0.802	15815
rs41268924	A	G	0.061	0.211	0.038	1.96E-08	173981	0.057	-0.125	0.100	0.213	15815
rs434943	A	G	0.331	-0.099	0.017	8.22E-09	173981	0.335	-0.032	0.049	0.519	15815
rs45485691	A	G	0.275	0.107	0.016	5.53E-12	173981	0.269	0.043	0.052	0.413	15815
rs4804000	A	G	0.188	-0.131	0.019	1.27E-11	173981	0.191	0.004	0.059	0.943	15815
rs4947258	G	A	0.121	0.705	0.023	1.00E-200	173981	0.122	0.079	0.071	0.269	15815
rs537544	C	T	0.384	0.087	0.015	8.37E-09	173981	0.375	0.007	0.048	0.880	15815
rs542907	A	G	0.439	-0.081	0.015	3.96E-08	173981	0.445	-0.025	0.047	0.586	15815
rs55844831	G	A	0.041	0.588	0.031	3.09E-82	173981	0.038	-0.045	0.121	0.708	15815
rs56100858	T	C	0.011	0.728	0.047	2.92E-55	173981	0.013	-0.026	0.198	0.894	15815
rs56111713	T	G	0.008	0.493	0.081	9.84E-10	173981	0.008	0.156	0.270	0.564	15815
rs56302826	G	T	0.032	-0.403	0.046	1.82E-18	173981	0.031	-0.195	0.136	0.151	15815
rs5763842	A	G	0.383	0.150	0.015	1.49E-23	173981	0.396	0.043	0.048	0.364	15815
rs58223158	G	A	0.034	0.329	0.038	3.48E-18	173981	0.037	0.222	0.123	0.072	15815
rs6000602	A	C	0.237	0.102	0.018	6.16E-09	173981	0.230	-0.002	0.054	0.967	15815
rs60888743	G	A	0.252	-0.137	0.017	9.82E-16	173981	0.264	0.061	0.053	0.247	15815
rs61839660	T	C	0.102	-0.371	0.031	3.49E-32	173981	0.097	-0.013	0.080	0.868	15815
rs62397629	A	C	0.052	-0.217	0.034	1.31E-10	173981	0.053	-0.233	0.105	0.026	15815
rs62407529	T	C	0.060	-0.344	0.036	1.12E-21	173981	0.053	0.139	0.106	0.189	15815
rs62621992	T	C	0.016	0.675	0.055	1.21E-34	173981	0.018	0.222	0.178	0.213	15815
rs6457109	C	T	0.090	0.173	0.023	4.41E-14	173981	0.094	-0.063	0.080	0.436	15815
rs6489856	A	C	0.309	0.112	0.016	2.54E-12	173981	0.306	-0.090	0.051	0.076	15815
rs6912701	T	C	0.012	-0.518	0.075	4.67E-12	173981	0.014	0.007	0.194	0.971	15815
rs6913182	T	C	0.170	-0.921	0.029	1.00E-200	173981	0.173	-0.136	0.062	0.030	15815
rs705704	A	G	0.339	0.196	0.015	1.89E-37	173981	0.334	0.058	0.049	0.243	15815
rs71565365	A	G	0.073	-0.201	0.028	1.29E-12	173981	0.077	0.073	0.086	0.396	15815
rs7237497	T	C	0.165	0.177	0.020	1.17E-18	173981	0.164	0.163	0.063	0.010	15815
rs73069541	G	A	0.236	-0.107	0.018	3.07E-09	173981	0.237	0.027	0.055	0.627	15815
rs73391152	T	G	0.055	-0.209	0.038	3.27E-08	173981	0.056	0.067	0.101	0.506	15815
rs73396583	C	T	0.102	-0.296	0.031	1.80E-21	173981	0.105	0.035	0.075	0.647	15815
rs73400833	T	C	0.020	-0.658	0.050	1.02E-39	173981	0.024	-0.140	0.149	0.349	15815
rs74969061	A	G	0.020	-0.286	0.049	7.29E-09	173981	0.023	0.020	0.156	0.896	15815
rs75545083	T	C	0.053	-0.267	0.041	6.14E-11	173981	0.057	-0.120	0.102	0.239	15815
rs77154676	C	T	0.171	-0.134	0.023	6.60E-09	173981	0.171	-0.020	0.062	0.743	15815
rs7733560	A	G	0.270	0.148	0.016	3.13E-19	173981	0.277	-0.031	0.051	0.550	15815
rs7755997	G	A	0.412	0.221	0.015	2.87E-51	173981	0.409	0.009	0.047	0.841	15815
rs7772373	G	A	0.077	-0.406	0.042	1.44E-22	173981	0.074	0.071	0.088	0.423	15815
rs78354120	T	C	0.014	-0.429	0.071	1.16E-09	173981	0.014	0.227	0.197	0.248	15815
rs8011031	G	A	0.276	0.090	0.015	5.95E-09	173981	0.280	0.087	0.052	0.096	15815
rs8013873	T	C	0.185	-0.163	0.023	4.77E-13	173981	0.182	-0.028	0.061	0.640	15815
rs8062123	T	G	0.315	0.114								

type 1 diabetes	COVID-19 death	201.15	rs9405008	G	A	0.038	-0.238	0.041	5.31E-09	173981	0.034	0.069	0.130	0.593	15815
			rs9461389	A	G	0.108	-0.161	0.022	1.68E-13	173981	0.107	0.067	0.076	0.375	15815
type 1 diabetes	COVID-19 death	201.15	rs9517712	T	C	0.246	0.096	0.016	4.26E-09	173981	0.251	0.014	0.053	0.798	15815
			rs9911533	C	T	0.371	-0.087	0.015	5.14E-09	173981	0.365	0.019	0.048	0.686	15815
type 1 diabetes	COVID-19 death	201.15	rs9976073	C	T	0.262	-0.094	0.017	1.13E-08	173981	0.261	-0.019	0.053	0.726	15815
			rs1004707	T	C	0.225	0.107	0.019	4.31E-08	173981	0.223	0.041	0.059	0.483	15815
type 1 diabetes	COVID-19 death	201.15	rs10214237	C	T	0.274	-0.107	0.016	2.32E-11	173981	0.273	-0.057	0.055	0.296	15815
			rs1022674	C	A	0.226	0.107	0.017	4.61E-10	173981	0.243	-0.015	0.057	0.788	15815
type 1 diabetes	COVID-19 death	201.15	rs1048055	A	C	0.340	-0.110	0.016	1.03E-11	173981	0.337	-0.034	0.052	0.510	15815
			rs1063478	T	C	0.120	-0.365	0.024	3.15E-51	173981	0.121	-0.007	0.074	0.921	15815
type 1 diabetes	COVID-19 death	201.15	rs11085725	T	C	0.294	-0.126	0.017	5.86E-14	173981	0.294	0.112	0.054	0.038	15815
			rs111552148	G	A	0.042	-0.328	0.039	4.97E-17	173981	0.039	-0.187	0.131	0.154	15815
type 1 diabetes	COVID-19 death	201.15	rs11203203	A	G	0.365	0.129	0.015	3.25E-17	173981	0.365	0.013	0.051	0.794	15815
			rs113019108	T	C	0.019	-0.544	0.055	5.03E-23	173981	0.017	-0.387	0.194	0.046	15815
type 1 diabetes	COVID-19 death	201.15	rs114898531	G	A	0.049	-0.211	0.035	9.03E-10	173981	0.047	-0.138	0.116	0.235	15815
			rs115018313	C	T	0.020	1.496	0.036	1.00E-200	173981	0.022	-0.131	0.166	0.429	15815
type 1 diabetes	COVID-19 death	201.15	rs115075841	T	C	0.072	-0.560	0.044	5.79E-38	173981	0.073	-0.004	0.094	0.970	15815
			rs115256213	G	A	0.013	-0.586	0.090	6.60E-11	173981	0.014	0.104	0.219	0.633	15815
type 1 diabetes	COVID-19 death	201.15	rs115892333	A	G	0.056	-0.583	0.041	7.37E-45	173981	0.059	-0.145	0.106	0.173	15815
			rs11651753	T	C	0.428	-0.093	0.015	3.24E-10	173981	0.427	-0.009	0.049	0.851	15815
type 1 diabetes	COVID-19 death	201.15	rs118124843	T	C	0.017	-0.372	0.063	3.36E-09	173981	0.016	0.055	0.190	0.773	15815
			rs11978267	G	A	0.282	-0.089	0.016	3.10E-08	173981	0.275	0.033	0.054	0.550	15815
type 1 diabetes	COVID-19 death	201.15	rs12130424	C	T	0.073	0.166	0.026	2.12E-10	173981	0.080	-0.005	0.091	0.959	15815
			rs12175489	A	G	0.123	-0.354	0.022	2.09E-58	173981	0.123	-0.065	0.077	0.397	15815
type 1 diabetes	COVID-19 death	201.15	rs12192673	G	T	0.046	-0.372	0.033	5.93E-30	173981	0.041	-0.159	0.126	0.207	15815
			rs12207915	C	T	0.057	-0.361	0.031	1.01E-30	173981	0.054	-0.017	0.109	0.878	15815
type 1 diabetes	COVID-19 death	201.15	rs12215593	G	A	0.367	-0.158	0.016	3.37E-24	173981	0.360	0.024	0.052	0.645	15815
			rs1233478	T	G	0.192	0.405	0.018	1.44E-108	173981	0.199	0.098	0.061	0.108	15815
type 1 diabetes	COVID-19 death	201.15	rs12506688	T	C	0.300	0.101	0.016	1.44E-10	173981	0.303	-0.006	0.053	0.904	15815
			rs12828640	A	G	0.416	0.104	0.015	2.80E-12	173981	0.418	-0.010	0.051	0.836	15815
type 1 diabetes	COVID-19 death	201.15	rs1297355	T	C	0.323	-0.155	0.016	7.29E-23	173981	0.324	-0.023	0.053	0.657	15815
			rs12979891	C	T	0.468	-0.094	0.015	2.25E-10	173981	0.464	0.063	0.050	0.202	15815
type 1 diabetes	COVID-19 death	201.15	rs13212534	A	G	0.093	0.313	0.029	4.27E-27	173981	0.098	0.240	0.081	0.003	15815
			rs144536316	A	G	0.016	0.452	0.055	3.40E-16	173981	0.015	-0.319	0.207	0.124	15815
type 1 diabetes	COVID-19 death	201.15	rs151233	T	C	0.131	0.164	0.024	7.46E-12	173981	0.130	0.008	0.073	0.932	15815
			rs156743	C	T	0.147	0.413	0.022	2.48E-77	173981	0.149	0.090	0.069	0.189	15815
type 1 diabetes	COVID-19 death	201.15	rs1574285	G	T	0.408	0.103	0.015	1.69E-12	173981	0.401	-0.034	0.050	0.503	15815
			rs1613191	A	G	0.017	0.579	0.052	2.78E-28	173981	0.017	0.321	0.199	0.107	15815
type 1 diabetes	COVID-19 death	201.15	rs1615504	T	C	0.472	0.103	0.015	1.22E-12	173981	0.478	0.037	0.050	0.457	15815
			rs17179851	C	T	0.102	0.364	0.022	2.89E-63	173981	0.106	-0.022	0.082	0.787	15815
type 1 diabetes	COVID-19 death	201.15	rs17207622	T	G	0.027	-0.625	0.061	1.48E-24	173981	0.026	-0.157	0.150	0.296	15815
			rs17630235	A	G	0.409	0.191	0.015	4.14E-38	173981	0.410	0.024	0.050	0.637	15815
type 1 diabetes	COVID-19 death	201.15	rs17652674	A	C	0.194	0.100	0.018	2.20E-08	173981	0.198	0.016	0.061	0.791	15815
			rs192321865	T	C	0.065	0.225	0.039	7.53E-09	173981	0.061	-0.092	0.104	0.379	15815
type 1 diabetes	COVID-19 death	201.15	rs1990760	C	T	0.395	-0.119	0.015	1.83E-15	173981	0.390	-0.016	0.051	0.759	15815
			rs1994565	G	T	0.293	-0.096	0.017	1.84E-08	173981	0.295	0.020	0.054	0.703	15815
type 1 diabetes	COVID-19 death	201.15	rs204996	T	C	0.057	-0.969	0.058	9.32E-62	173981	0.059	-0.069	0.105	0.510	15815
			rs210211	G	A	0.104	-0.311	0.028	1.16E-29	173981	0.103	0.055	0.080	0.496	15815
type 1 diabetes	COVID-19 death	201.15	rs2212434	T	C	0.458	0.080	0.015	3.54E-08	173981	0.449	-0.023	0.049	0.636	15815
			rs2289702	T	C	0.101	-0.171	0.026	7.08E-11	173981	0.103	-0.026	0.080	0.749	15815
type 1 diabetes	COVID-19 death	201.15	rs2313430	C	T	0.482	-0.085	0.015	5.75E-09	173981	0.482	0.004	0.049	0.930	15815
			rs2395471	A	G	0.355	-0.519	0.017	1.00E-200	173981	0.362	0.000	0.051	0.910	15815
type 1 diabetes	COVID-19 death	201.15	rs2414135	A	G	0.031	-0.783	0.074	5.05E-26	173981	0.031	-0.018	0.144	0.899	15815
			rs2476601	A	G	0.094	0.544	0.022	4.54E-135	173981	0.103	0.015	0.079	0.855	15815
type 1 diabetes	COVID-19 death	201.15	rs2499743	A	C	0.225	0.128	0.019	1.37E-11	173981	0.219	0.089	0.062	0.148	15815
			rs2516698	A	G	0.052	-0.278	0.045	6.67E-10	173981	0.053	-0.005	0.111	0.967	15815
type 1 diabetes	COVID-19 death	201.15	rs2844466	C	T	0.360	0.487	0.015	1.00E-200	173981	0.357	0.040	0.051	0.431	15815
			rs28746904	C	T	0.228	-0.944	0.024	1.00E-200	173981	0.241	-0.005	0.058	0.931	15815
type 1 diabetes	COVID-19 death	201.15	rs28893513	G	A	0.120	-0.467	0.026	1.28E-69	173981	0.124	0.007	0.075	0.928	15815
			rs3024505	A	G	0.159	-0.124	0.021	1.80E-09	173981	0.156	0.108	0.067	0.106	15815
type 1 diabetes	COVID-19 death	201.15	rs3087243	A	G	0.453	-0.148	0.015	3.70E-23	173981	0.451	-0.063	0.049	0.203	15815
			rs3093971	A											

rs6457109	C	T	0.090	0.173	0.023	4.41E-14	173981	0.094	-0.058	0.085	0.496	15815							
rs6489856	A	C	0.309	0.112	0.016	2.54E-12	173981	0.306	-0.077	0.053	0.146	15815							
rs6912701	T	C	0.012	-0.518	0.075	4.67E-12	173981	0.014	0.010	0.206	0.961	15815							
rs6913182	T	C	0.170	-0.921	0.029	1.00E-200	173981	0.173	-0.137	0.066	0.038	15815							
rs705704	A	G	0.339	0.196	0.015	1.89E-37	173981	0.334	0.079	0.052	0.130	15815							
rs71563365	A	G	0.073	-0.201	0.028	1.29E-12	173981	0.077	0.084	0.090	0.351	15815							
rs7237497	T	C	0.165	0.177	0.020	1.17E-18	173981	0.164	0.188	0.067	0.005	15815							
rs73069541	G	A	0.236	-0.107	0.018	3.07E-09	173981	0.237	0.041	0.058	0.480	15815							
rs73391152	T	G	0.055	-0.209	0.038	3.27E-08	173981	0.056	0.081	0.106	0.445	15815							
rs73396583	C	T	0.102	-0.296	0.031	1.80E-21	173981	0.105	0.044	0.080	0.581	15815							
rs73400833	T	C	0.020	-0.658	0.050	1.02E-39	173981	0.024	-0.180	0.157	0.253	15815							
rs74969061	A	G	0.020	-0.286	0.049	7.29E-09	173981	0.023	0.007	0.165	0.966	15815							
rs75545083	T	C	0.053	-0.267	0.041	6.14E-11	173981	0.057	-0.088	0.108	0.416	15815							
rs77154676	C	T	0.171	-0.134	0.023	6.60E-09	173981	0.171	-0.034	0.065	0.598	15815							
rs773560	A	G	0.270	0.148	0.016	3.13E-19	173981	0.277	-0.051	0.054	0.347	15815							
rs7755997	G	A	0.412	0.221	0.015	2.87E-51	173981	0.409	0.030	0.050	0.546	15815							
rs7772373	G	A	0.077	-0.406	0.042	1.44E-22	173981	0.074	0.043	0.093	0.644	15815							
rs78354120	T	C	0.014	-0.429	0.071	1.16E-09	173981	0.014	0.227	0.207	0.273	15815							
rs8011031	G	A	0.276	0.090	0.015	5.95E-09	173981	0.280	0.089	0.055	0.110	15815							
rs8013873	T	C	0.185	-0.163	0.023	4.77E-13	173981	0.182	-0.035	0.064	0.581	15815							
rs8062123	T	G	0.315	0.114	0.017	3.60E-11	173981	0.317	0.156	0.054	0.004	15815							
rs886997	T	C	0.093	-0.346	0.029	2.98E-33	173981	0.093	-0.009	0.084	0.916	15815							
rs9258506	T	C	0.040	-0.374	0.039	7.90E-22	173981	0.037	-0.194	0.129	0.132	15815							
rs9261659	G	A	0.109	-0.161	0.027	4.74E-09	173981	0.111	-0.042	0.079	0.596	15815							
rs9263827	T	C	0.044	0.724	0.033	1.13E-104	173981	0.051	-0.097	0.110	0.380	15815							
rs9267808	A	G	0.013	1.421	0.042	1.00E-200	173981	0.016	-0.170	0.183	0.353	15815							
rs9277195	C	T	0.492	-0.326	0.015	2.29E-101	173981	0.506	0.070	0.050	0.160	15815							
rs9277990	G	A	0.190	0.180	0.023	7.88E-15	173981	0.188	0.054	0.063	0.395	15815							
rs9295661	C	A	0.087	0.282	0.030	7.52E-21	173981	0.087	0.162	0.086	0.058	15815							
rs9366637	T	C	0.052	-0.182	0.027	1.06E-11	173981	0.054	0.004	0.112	0.972	15815							
rs9380293	T	C	0.016	-0.774	0.057	1.94E-41	173981	0.017	-0.056	0.193	0.771	15815							
rs9405008	G	A	0.038	-0.238	0.041	5.31E-09	173981	0.034	-0.028	0.137	0.841	15815							
rs9461389	A	G	0.108	-0.161	0.022	1.68E-13	173981	0.107	0.069	0.080	0.387	15815							
rs9517712	T	C	0.246	0.096	0.016	4.26E-09	173981	0.251	-0.015	0.056	0.790	15815							
rs9911533	C	T	0.371	-0.087	0.015	5.14E-09	173981	0.365	0.025	0.051	0.619	15815							
rs9976073	C	T	0.262	-0.094	0.017	1.13E-08	173981	0.261	-0.007	0.056	0.898	15815							
type 1 diabetes recovery time with colchicine	159.80						rs10134419	T	C	0.276	0.090	0.015	6.25E-09	173981	0.760	-0.041	0.067	0.530	872
rs10214273	G	T	0.274	-0.107	0.016	2.72E-11	173981	0.230	-0.091	0.070	0.190	872							
rs1022674	C	A	0.226	0.107	0.017	4.61E-10	173981	0.280	-0.006	0.063	0.920	872							
rs10484404	T	C	0.096	-0.201	0.028	1.57E-12	173981	0.110	0.120	0.092	0.190	872							
rs11065979	T	C	0.441	0.203	0.015	2.47E-42	173981	0.450	-0.097	0.057	0.090	872							
rs11203203	G	A	0.365	0.129	0.015	3.25E-17	173981	0.360	0.011	0.060	0.860	872							
rs115530337	T	G	0.039	0.300	0.030	3.15E-23	173981	0.050	0.110	0.130	0.400	872							
rs11878908	C	T	0.468	-0.094	0.015	2.37E-10	173981	0.540	-0.021	0.058	0.710	872							
rs12148472	C	T	0.126	-0.153	0.024	1.91E-10	173981	0.120	0.075	0.090	0.400	872							
rs12204338	G	A	0.117	-0.168	0.022	4.00E-14	173981	0.150	0.100	0.079	0.190	872							
rs1264691	T	C	0.063	-0.312	0.039	1.88E-15	173981	0.086	0.082	0.110	0.460	872							
rs12828640	A	G	0.416	0.104	0.015	2.80E-12	173981	0.540	-0.026	0.059	0.660	872							
rs12928537	A	G	0.323	-0.154	0.016	1.10E-22	173981	0.360	-0.023	0.059	0.700	872							
rs13215	A	C	0.052	-0.298	0.035	1.32E-17	173981	0.060	-0.110	0.130	0.380	872							
rs13216195	T	C	0.077	-0.195	0.027	4.32E-13	173981	0.089	0.260	0.099	0.009	872							
rs138925279	A	C	0.039	0.207	0.031	5.45E-11	173981	0.051	0.021	0.130	0.870	872							
rs141615002	C	T	0.053	-0.331	0.041	5.65E-16	173981	0.056	0.110	0.120	0.350	872							
rs15123	T	C	0.131	0.164	0.024	7.46E-12	173981	0.130	-0.082	0.091	0.370	872							
rs156743	C	T	0.147	0.413	0.022	2.48E-77	173981	0.099	0.069	0.094	0.460	872							
rs1592410	T	C	0.455	0.269	0.015	4.58E-76	173981	0.390	-0.010	0.059	0.870	872							
rs1702877	T	C	0.339	0.196	0.015	2.46E-37	173981	0.340	0.025	0.061	0.680	872							
rs17600959	G	A	0.437	-0.115	0.015	3.83E-15	173981	0.440	0.036	0.058	0.530	872							
rs17652674	A	C	0.194	0.100	0.018	2.20E-08	173981	0.180	-0.089	0.078	0.250	872							
rs1790946	C	T	0.473	0.103	0.015	1.51E-12	173981	0.530	-0.041	0.059	0.500	872							
rs210215	A	C	0.446	0.194	0.015	4.30E-39	173981	0.500	-0.009	0.058	0.880	872							
rs2111485	A	G	0.396	-0.118	0.015	4.12E-15	173981	0.580	-0.064	0.059	0.280	872							
rs2174281	C	T	0.460	0.105	0.015	1.51E-12	173981	0.480	-0.013	0.057	0.820	872							
rs2243471	G	A	0.214	0.257	0.017	2.78E-54	173981	0.790	0.045	0.069	0.510	872							
rs2393664	T	C	0.179	-0.105	0.018	1.44E-08	173981	0.790	0.032	0.069	0.640	872							
rs2542151	G	T	0.167	0.173	0.020	1.92E-18	173981	0.840	0.000	0.076	1.000	872							
rs2859059	A	G	0.170	-0.570	0.024	9.88E-129	173981	0.280	-0.022	0.065	0.730	872							
rs28743267	G	T	0.110	-0.158	0.027	8.78E-09	173981	0.084	0.110	0.100	0.270	872							
rs2952140	T	C	0.482	-0.084	0.015	7.63E-09	173981	0.490	0.015	0.058	0.790	872							
rs3024493	A	C	0.159	-0.123	0.021	2.52E-09	173981	0.140	-0.009	0.087	0.920	872							
rs3093971	A	G	0.103	0.765	0.026	6.25E-188	173981	0.110	0.001	0.089	1.000	872							
rs3094035	T	G	0.141	0.555	0.022	7.40E-145	173981	0.082	0.000	0.110	1.000	872							
rs3094090	C	T	0.053	0.499	0.031	5.56E-60	173981	0.668	0.110	0.110	0.320	872							
rs3128932	T	C	0.201	0.161	0.018	1.96E-19	173981	0.220	0.003	0.071	0.960	872							
rs3131854	T	C	0.215	0.231	0.019	3.94E-35	173981	0.800	0.000	0.076	1.000	872							
rs3135352	C	A	0.143	-1.368	0.042	1.00E-200	173981	0.890	0.074	0.096	0.440	872							
rs35251378	A	G	0.294	-0.124	0.017	1.25E-13	173981	0.290	0.068	0.063	0.280	872							
rs3749946	A	C	0.060	-0.221	0.030	3.60E-13	173981	0.097	-0.004	0.099	0.970	872							
rs3788992	G	A	0.188	-0.136	0.018	9.42E-13	173981	0.200	-0.100	0.075	0.170	872							
rs3842753	T	G	0.299	-0.565	0.023	1.72E-135	173981	0.710	-0.001	0.065	0.980	872							
rs3957111	A	G	0.100	0.384	0.026	3.02E-48	173981	0.140	-0.013	0.088	0.880	872							
rs41266860	T	C	0.076	0.329	0.025	2.24E-38	173981	0.065	-0.150										

rs6925683	G	T	0.236	0.098	0.017	1.37E-08	173981	0.230	0.044	0.068	0.520	872
rs6930138	G	A	0.426	0.196	0.015	1.27E-40	173981	0.560	0.130	0.061	0.033	872
rs7226035	C	T	0.358	-0.087	0.015	6.81E-09	173981	0.600	0.130	0.058	0.023	872
rs7383258	T	C	0.052	-0.889	0.062	1.27E-46	173981	0.060	0.068	0.120	0.570	872
rs773554	T	C	0.270	0.147	0.016	3.15E-19	173981	0.260	0.045	0.063	0.470	872
rs7922058	G	A	0.216	-0.133	0.018	9.81E-14	173981	0.200	0.025	0.074	0.730	872
rs7931848	A	C	0.119	-0.141	0.025	2.07E-08	173981	0.120	0.048	0.087	0.580	872
rs7956202	G	T	0.171	-0.111	0.020	1.44E-08	173981	0.170	0.027	0.075	0.720	872
rs9258550	G	A	0.100	-0.448	0.027	1.52E-61	173981	0.091	0.053	0.097	0.590	872
rs9260233	C	T	0.078	-0.321	0.029	4.08E-28	173981	0.110	-0.240	0.099	0.016	872
rs9262155	G	A	0.080	-0.227	0.032	8.41E-13	173981	0.099	0.110	0.098	0.280	872
rs9378182	G	A	0.208	-0.486	0.020	5.48E-133	173981	0.250	0.094	0.068	0.170	872
rs9393826	C	A	0.110	-0.157	0.022	3.92E-13	173981	0.880	-0.007	0.088	0.940	872
rs9501234	G	A	0.069	0.181	0.024	9.55E-14	173981	0.062	-0.061	0.120	0.620	872
rs9585056	C	T	0.244	0.095	0.017	1.06E-08	173981	0.770	0.097	0.066	0.140	872
rs9976073	C	T	0.262	-0.094	0.017	1.13E-08	173981	0.260	0.086	0.063	0.180	872
type 1 diabetes recovery time with placebo	159.78											
rs10134419	T	C	0.276	0.090	0.015	6.25E-09	173981	0.730	-0.052	0.066	0.430	851
rs10214273	G	T	0.274	-0.107	0.016	2.72E-11	173981	0.230	0.011	0.068	0.870	851
rs1022674	C	A	0.226	0.107	0.017	4.61E-10	173981	0.280	-0.034	0.066	0.600	851
rs10484404	T	C	0.096	-0.201	0.028	1.57E-12	173981	0.100	0.009	0.100	0.930	851
rs11065979	T	C	0.441	0.203	0.015	2.47E-42	173981	0.440	0.040	0.059	0.500	851
rs11203203	A	G	0.365	0.129	0.015	3.25E-17	173981	0.370	0.032	0.059	0.590	851
rs11878908	C	T	0.468	-0.094	0.015	2.37E-10	173981	0.530	-0.018	0.057	0.750	851
rs12148472	C	T	0.126	-0.153	0.024	1.91E-10	173981	0.130	-0.011	0.088	0.900	851
rs12204338	G	A	0.117	-0.168	0.022	4.00E-14	173981	0.160	0.046	0.078	0.560	851
rs1264691	T	C	0.063	-0.312	0.039	1.88E-15	173981	0.080	-0.160	0.110	0.160	851
rs12828640	A	G	0.416	0.104	0.015	2.80E-12	173981	0.560	-0.052	0.059	0.380	851
rs12928537	A	G	0.323	-0.154	0.016	1.10E-22	173981	0.340	-0.110	0.061	0.067	851
rs13215	A	C	0.052	-0.298	0.035	1.32E-17	173981	0.066	-0.100	0.120	0.390	851
rs13216195	T	C	0.077	-0.195	0.027	4.32E-13	173981	0.088	-0.083	0.110	0.430	851
rs138925279	A	C	0.039	0.207	0.031	5.45E-11	173981	0.051	0.003	0.130	0.980	851
rs141615002	C	T	0.053	-0.331	0.041	5.65E-16	173981	0.050	0.028	0.130	0.830	851
rs151233	T	C	0.131	0.164	0.024	7.46E-12	173981	0.150	-0.180	0.089	0.039	851
rs156743	C	T	0.147	0.413	0.022	2.48E-77	173981	0.110	-0.033	0.099	0.740	851
rs1592410	T	C	0.455	0.269	0.015	4.58E-76	173981	0.410	-0.007	0.059	0.900	851
rs1702877	T	C	0.339	0.196	0.015	2.46E-37	173981	0.330	-0.030	0.062	0.630	851
rs17600959	G	A	0.437	-0.115	0.015	3.83E-15	173981	0.430	-0.004	0.057	0.940	851
rs17652674	A	C	0.194	0.100	0.018	2.20E-08	173981	0.200	-0.039	0.074	0.600	851
rs1790946	C	T	0.473	0.103	0.015	1.51E-12	173981	0.510	-0.083	0.059	0.150	851
rs210215	A	C	0.446	0.194	0.015	4.30E-39	173981	0.490	-0.065	0.058	0.260	851
rs2111485	A	G	0.396	-0.118	0.015	4.12E-15	173981	0.580	0.089	0.060	0.140	851
rs2174281	C	T	0.460	0.105	0.015	1.51E-12	173981	0.500	-0.036	0.058	0.540	851
rs2243471	G	A	0.214	0.257	0.017	2.78E-54	173981	0.770	0.048	0.069	0.490	851
rs2267644	A	G	0.039	0.296	0.030	8.06E-23	173981	0.052	-0.190	0.130	0.160	851
rs2393664	T	C	0.179	-0.105	0.018	1.44E-08	173981	0.770	-0.140	0.068	0.046	851
rs2542151	G	T	0.167	0.173	0.020	1.92E-18	173981	0.860	-0.140	0.082	0.078	851
rs2859059	A	G	0.170	-0.570	0.024	9.88E-129	173981	0.280	-0.072	0.065	0.270	851
rs28743267	G	T	0.110	-0.158	0.027	7.87E-09	173981	0.082	-0.180	0.110	0.100	851
rs2952140	T	C	0.482	-0.084	0.015	7.63E-09	173981	0.480	-0.039	0.056	0.490	851
rs3024493	A	C	0.159	-0.123	0.021	2.52E-09	173981	0.120	0.086	0.081	0.290	851
rs3093971	A	G	0.103	0.765	0.026	6.25E-188	173981	0.110	0.180	0.094	0.062	851
rs3094035	T	G	0.141	0.555	0.022	7.40E-145	173981	0.093	-0.027	0.110	0.810	851
rs3094090	C	T	0.053	0.499	0.031	5.56E-60	173981	0.071	-0.017	0.110	0.880	851
rs3128932	T	C	0.201	0.161	0.018	1.96E-19	173981	0.220	-0.053	0.070	0.450	851
rs3131854	T	C	0.215	0.231	0.019	3.94E-35	173981	0.770	-0.010	0.070	0.890	851
rs3135352	C	A	0.143	-1.368	0.042	1.00E-200	173981	0.904	-0.055	0.100	0.600	851
rs35251378	A	G	0.294	-0.124	0.017	1.25E-13	173981	0.270	0.011	0.065	0.870	851
rs3749946	A	C	0.060	-0.221	0.030	3.60E-03	173981	0.099	-0.059	0.100	0.570	851
rs3788992	G	A	0.188	-0.136	0.019	9.42E-13	173981	0.170	0.011	0.075	0.880	851
rs3842753	T	G	0.299	-0.565	0.023	1.72E-135	173981	0.710	-0.017	0.064	0.790	851
rs3957111	A	G	0.100	0.384	0.026	3.02E-48	173981	0.140	0.033	0.085	0.700	851
rs41266860	T	C	0.076	0.329	0.025	2.24E-38	173981	0.059	-0.039	0.120	0.750	851
rs4766998	A	G	0.310	0.111	0.016	3.05E-12	173981	0.680	0.007	0.063	0.910	851
rs496160	T	C	0.436	-0.438	0.015	2.23E-180	173981	0.560	0.051	0.056	0.360	851
rs542097	A	G	0.439	-0.081	0.015	3.96E-08	173981	0.450	-0.130	0.059	0.027	851
rs5756652	T	C	0.237	0.101	0.018	7.66E-09	173981	0.210	0.057	0.071	0.420	851
rs58822580	G	T	0.139	0.301	0.022	7.50E-44	173981	0.110	0.054	0.095	0.570	851
rs59867199	T	C	0.275	0.105	0.016	1.29E-11	173981	0.270	-0.056	0.067	0.400	851
rs6043409	A	G	0.355	-0.104	0.016	4.35E-11	173981	0.650	0.110	0.058	0.065	851
rs60652743	G	A	0.162	-0.133	0.020	1.80E-11	173981	0.130	0.120	0.085	0.160	851
rs6448432	A	G	0.303	0.100	0.016	1.91E-10	173981	0.340	0.034	0.062	0.590	851
rs6456701	C	T	0.113	0.263	0.027	2.75E-23	173981	0.926	-0.098	0.120	0.410	851
rs6925683	G	T	0.236	0.098	0.017	1.37E-08	173981	0.230	0.100	0.068	0.130	851
rs6930138	G	A	0.426	0.196	0.015	1.27E-40	173981	0.580	-0.011	0.058	0.850	851
rs7226035	C	T	0.358	-0.087	0.015	6.81E-09	173981	0.610	-0.140	0.061	0.025	851
rs7383258	T	C	0.052	-0.889	0.062	1.27E-46	173981	0.664	-0.023	0.120	0.850	851
rs773554	T	C	0.270	0.147	0.016	3.15E-19	173981	0.280	-0.052	0.062	0.400	851
rs7922058	G	A	0.216	-0.133	0.018	9.81E-14	173981	0.210	0.063	0.074	0.390	851
rs7931848	A	C	0.119	-0.141	0.025	2.07E-08	173981	0.110	-0.019	0.096	0.840	851
rs7956202	G	T	0.171	-0.111	0.020	1.44E-08	173981	0.170	-0.062	0.077	0.420	851
rs9258550	G	A	0.100	-0.448	0.027	1.52E-61	173981	0.110	-0.089	0.095	0.350	851
rs9260233	C	T	0.078	-0.321	0.029	4.08E-28	173981	0.100	0.053	0.094	0.570	851
rs9262155	G	A	0.									

Supplementary Table 2. Sensitivity analysis results between type 1 diabetes and COVID-19 infection and prognosis

Exposure	Outcome	nSNP	Cochran's Q		MR Egger		MRPRESSO Global Test	
			value	P value	intercept	intercept P value	value	P value
Type 1 diabetes	COVID-19 positive	124	129.100	0.340	-0.003	0.241	130.910	0.340
	Hospitalized COVID-19	123	108.220	0.810	0.006	0.335	110.220	0.810
	Severe COVID-19	123	121.370	0.500	0.000	0.999	123.710	0.500
	COVID-19 death	123	125.770	0.390	0.004	0.660	128.080	0.390
	Recovery time with colchicine treatment	72	68.020	0.580	-0.005	0.691	69.170	0.600
	Recovery time with placebo treatment	73	77.680	0.300	-0.016	0.254	79.120	0.330

Notes: nSNP is the number of SNPs used as instrumental variables (IVs).

Supplementary Table 3. SNP exclusion information after PhenoScanner V2

exposure	Number of removed SNPs	SNP	Trait	P
		rs1063478	Self-reported psoriasis	3.74E-52
		rs1063478	Rheumatoid arthritis	5.80E-13
		rs1085725	Self-reported psoriasis	3.01E-11
		rs1085725	Rheumatoid arthritis	1.10E-10
		rs11203203	Rheumatoid arthritis	8.70E-09
		rs11203203	Celiac disease or Rheumatoid arthritis	1.00E-08
		rs115018313	Rheumatoid arthritis	4.60E-162
		rs115018313	Rheumatoid arthritis	7.10E-162
		rs115892333	Self-reported multiple sclerosis	9.64E-10
		rs115892333	Rheumatoid arthritis	1.50E-08
		rs115892333	Rheumatoid arthritis	3.80E-08
		rs12192673	Rheumatoid arthritis	1.81E-09
		rs12192673	Rheumatoid arthritis	1.81E-09
		rs12207915	Rheumatoid arthritis	8.90E-38
		rs12207915	Rheumatoid arthritis	4.10E-30
		rs12207915	Self-reported psoriasis	1.09E-13
		rs12215593	Rheumatoid arthritis	6.00E-11
		rs1233478	Primary sclerosing cholangitis	6.28E-64
		rs12506688	Rheumatoid arthritis	2.20E-16
		rs12506688	Rheumatoid arthritis	2.20E-16
		rs12927355	Primary biliary cirrhosis	5.33E-13
		rs13212534	Primary sclerosing cholangitis	1.12E-63
		rs13212534	Primary sclerosing cholangitis	6.04E-74
		rs136743	Primary sclerosing cholangitis	6.04E-74
		rs17179851	Rheumatoid arthritis	3.20E-21
		rs17179851	Rheumatoid arthritis	1.20E-18
		rs17207622	Rheumatoid arthritis	6.90E-12
		rs17207622	Rheumatoid arthritis	3.40E-11
		rs17652674	Rheumatoid arthritis	2.20E-09
		rs17652674	Rheumatoid arthritis	9.00E-09
		rs1990760	Inflammatory bowel disease	4.00E-10
		rs1994565	Rheumatoid arthritis	1.60E-06
		rs204996	Rheumatoid arthritis	1.60E-34
		rs204996	Rheumatoid arthritis	5.40E-33
		rs2212434	Inflammatory bowel disease	8.17E-20
		rs2313430	Primary biliary cirrhosis	1.36E-13
		rs2313430	Inflammatory bowel disease	1.71E-13
		rs2395471	Self-reported psoriasis	4.61E-137
		rs241435	Rheumatoid arthritis	4.10E-30
		rs241435	Rheumatoid arthritis	4.40E-30
		rs2476601	Rheumatoid arthritis	1.00E-149
		rs2476601	Rheumatoid arthritis	1.60E-149
		rs2516698	Rheumatoid arthritis	3.21E-08
		rs2516698	Rheumatoid arthritis	3.21E-08
		rs2844466	Primary sclerosing cholangitis	4.34E-48
		rs28746904	Self-reported psoriasis	1.66E-32
		rs28746904	Rheumatoid arthritis	2.80E-30
		rs28893513	Self-reported psoriasis	7.40E-43
		rs3024505	Inflammatory bowel disease	6.66E-42
		rs3024505	Inflammatory bowel disease	7.00E-42
		rs3024505	Inflammatory bowel disease	6.00E-31
		rs3087243	Rheumatoid arthritis	1.70E-22
		rs3087243	Rheumatoid arthritis	4.00E-22
		rs3093971	Rheumatoid arthritis	5.50E-19
		rs3130363	Primary sclerosing cholangitis	7.08E-138
		rs3130666	Rheumatoid arthritis	2.80E-12
		rs3130666	Rheumatoid arthritis	2.90E-12
Severe COVID-19, COVID-19 death	61	rs3134962	Primary sclerosing cholangitis	1.32E-138
		rs3184504	Celiac disease	5.40E-21
		rs34864796	Primary sclerosing cholangitis	6.03E-69
		rs3763355	Primary biliary cholangitis	0.00E+00
		rs3763355	Rheumatoid arthritis	2.30E-95
		rs3763355	Rheumatoid arthritis	1.97E-50
		rs3763355	Rheumatoid arthritis	1.97E-50
		rs3763355	Rheumatoid arthritis	2.70E-34
		rs41265836	Rheumatoid arthritis	1.40E-60
		rs41265836	Rheumatoid arthritis	1.60E-60
		rs41267086	Rheumatoid arthritis	7.20E-41
		rs41267086	Rheumatoid arthritis	8.50E-40
		rs41268924	Rheumatoid arthritis	1.40E-226
		rs41268924	Rheumatoid arthritis	2.60E-226
		rs4947258	Primary sclerosing cholangitis	5.49E-149
		rs537544	Rheumatoid arthritis	8.00E-11
		rs55844831	Rheumatoid arthritis	7.60E-39
		rs55844831	Rheumatoid arthritis	8.50E-39
		rs56111713	Self-reported psoriasis	5.40E-16
		rs6912701	Primary biliary cholangitis	0.00E+00
		rs6912701	Rheumatoid arthritis	9.60E-27
		rs6912701	Rheumatoid arthritis	1.20E-26
		rs6913182	Self-reported multiple sclerosis	1.00E-88
		rs6913182	Rheumatoid arthritis	1.10E-66
		rs6913182	Rheumatoid arthritis	4.60E-58
		rs71565365	Self-reported psoriasis	3.41E-18
		rs71565365	Rheumatoid arthritis	1.00E-14
		rs71565365	Rheumatoid arthritis	2.00E-13
		rs7237497	Inflammatory bowel disease	1.24E-10
		rs7237497	Rheumatoid arthritis	1.30E-10
		rs7237497	Rheumatoid arthritis	4.60E-08
		rs73391152	Rheumatoid arthritis	6.90E-13
		rs73391152	Rheumatoid arthritis	1.40E-11
		rs73396583	Self-reported psoriasis	1.33E-21
		rs73396583	Rheumatoid arthritis	1.00E-19
		rs73396583	Rheumatoid arthritis	3.80E-13
		rs73396583	Rheumatoid arthritis	2.60E-08
		rs73400833	Rheumatoid arthritis	3.40E-38
		rs73400833	Rheumatoid arthritis	1.40E-33
		rs73400833	Primary sclerosing cholangitis	1.03E-16
		rs773560	Rheumatoid arthritis	9.20E-16
		rs773560	Rheumatoid arthritis	1.50E-11
		rs7755997	Primary sclerosing cholangitis	8.40E-16
		rs7772373	Self-reported psoriasis	6.00E-40
		rs78354120	Self-reported psoriasis	9.16E-37

rs9261659	Rheumatoid arthritis	1.20E-19
rs9261659	Rheumatoid arthritis	1.20E-19
rs9267808	Rheumatoid arthritis	2.80E-15
rs9267808	Rheumatoid arthritis	3.00E-15
rs9277195	Rheumatoid arthritis	9.80E-25
rs9277990	Rheumatoid arthritis	1.00E-16
rs9295661	Primary sclerosing cholangitis	1.65E-38
rs9380293	Rheumatoid arthritis	2.40E-89
rs9380293	Rheumatoid arthritis	8.20E-64
rs9380293	Rheumatoid arthritis	1.20E-29
rs9380293	Inflammatory bowel disease	5.08E-09

Supplementary Table 4. Selected IVs in reverse MR analysis

exposure	SNP	A1	A2	exposure				outcome					
				eaf	beta	se	pval	samplezise	eaf	beta	se		
COVID-19 positive	rs1015135	G	A	0.527	0.057	0.013	6.16E-06	98377	0.516	0.013	0.014	0.378	173981
	rs116126009	A	G	0.048	-0.132	0.029	7.26E-06	98377	0.052	-0.044	0.035	0.220	173981
	rs117103304	A	C	0.017	-0.218	0.048	6.24E-06	98377	0.016	-0.025	0.084	0.763	173981
	rs11721544	C	T	0.677	0.060	0.013	6.19E-06	98377	0.683	0.019	0.016	0.216	173981
	rs13130146	A	G	0.201	0.072	0.016	3.76E-06	98377	0.199	0.014	0.018	0.434	173981
	rs1595608	G	T	0.242	0.066	0.015	7.11E-06	98377	0.245	0.004	0.017	0.804	173981
	rs16968480	A	G	0.341	0.061	0.013	4.21E-06	98377	0.334	-0.010	0.017	0.558	173981
	rs558424269	A	G	0.153	-0.079	0.018	6.68E-06	98377	0.154	0.007	0.025	0.762	173981
	rs7202189	C	A	0.732	0.065	0.014	5.08E-06	98377	0.730	-0.013	0.017	0.452	173981
	rs73062389	A	G	0.061	0.183	0.026	2.32E-12	98377	0.056	0.032	0.046	0.484	173981
Hospitalized COVID-19	rs7545756	C	A	0.644	-0.059	0.013	6.48E-06	98377	0.645	0.010	0.015	0.509	173981
	rs76394096	A	G	0.144	-0.082	0.018	5.13E-06	98377	0.145	0.010	0.025	0.674	173981
	rs80269587	C	T	0.038	0.160	0.033	1.50E-06	98377	0.035	0.056	0.051	0.269	173981
	rs842225	A	G	0.463	0.059	0.013	3.56E-06	98377	0.464	0.005	0.016	0.776	173981
	rs9411378	A	C	0.224	0.104	0.016	2.44E-11	98377	0.230	-0.063	0.030	0.034	173981
	rs111805396	A	C	0.021	0.482	0.018	8.43E-06	16551	0.021	-0.027	0.063	0.664	173981
	rs11660443	T	C	0.185	-0.176	0.040	9.56E-06	16551	0.174	-0.009	0.021	0.678	173981
	rs11689857	T	C	0.482	-0.146	0.031	1.89E-06	16551	0.495	-0.024	0.014	0.099	173981
	rs11783271	T	G	0.065	0.288	0.064	7.82E-06	16551	0.065	-0.112	0.053	0.034	173981
	rs13078854	A	G	0.073	0.430	0.060	8.76E-13	16551	0.066	0.030	0.030	0.313	173981
Severe COVID-19	rs17100497	A	G	0.140	0.209	0.045	3.12E-06	16551	0.140	-0.040	0.022	0.065	173981
	rs3737997	G	A	0.056	-0.326	0.071	4.05E-06	16551	0.054	0.072	0.041	0.079	173981
	rs4233818	G	A	0.297	0.171	0.035	8.51E-07	16551	0.289	-0.003	0.019	0.883	173981
	rs4435454	A	G	0.190	-0.181	0.040	4.70E-06	16551	0.185	0.007	0.022	0.729	173981
	rs72841886	T	C	0.060	0.311	0.068	5.11E-06	16551	0.066	0.020	0.034	0.547	173981
	rs79405378	T	G	0.057	0.302	0.068	8.69E-06	16551	0.052	0.048	0.039	0.219	173981
	rs10891500	C	T	0.017	0.854	0.193	9.52E-06	15815	0.016	0.019	0.028	0.495	173981
	rs10906733	G	A	0.609	0.227	0.051	7.68E-06	15815	0.612	-0.004	0.017	0.815	173981
	rs11576687	T	C	0.143	0.294	0.066	9.32E-06	15815	0.143	-0.023	0.024	0.334	173981
	rs116862993	G	A	0.019	0.788	0.174	6.37E-06	15815	0.019	-0.052	0.055	0.350	173981
COVID-19 death	rs146375688	T	C	0.047	0.564	0.113	6.55E-07	15815	0.042	0.062	0.034	0.070	173981
	rs17402887	C	T	0.073	0.412	0.091	6.43E-06	15815	0.071	-0.034	0.031	0.283	173981
	rs71325088	C	T	0.073	0.523	0.092	1.15E-08	15815	0.066	0.031	0.030	0.307	173981
	rs822293	A	G	0.057	0.476	0.104	4.27E-06	15815	0.051	0.017	0.031	0.595	173981
	rs13141729	C	T	0.096	0.379	0.083	5.47E-06	15815	0.097	-0.039	0.022	0.084	173981
	rs28701638	C	T	0.162	-0.292	0.066	9.29E-06	15815	0.169	-0.013	0.019	0.494	173981
	rs4987280	T	C	0.276	0.249	0.055	6.70E-06	15815	0.273	-0.037	0.017	0.026	173981
	rs79143240	C	T	0.011	1.107	0.250	9.52E-06	15815	0.011	-0.009	0.066	0.891	173981
	rs10487763	G	T	0.085	0.450	0.099	5.30E-06	872	0.108	0.012	0.024	0.610	173981
	rs11043079	G	T	0.390	0.270	0.061	8.80E-06	872	0.411	-0.014	0.017	0.404	173981
Recovery time with colchicine treatment	rs115506471	T	C	0.053	0.570	0.130	4.90E-06	872	0.053	0.017	0.042	0.683	173981
	rs117872821	T	C	0.098	0.430	0.094	3.80E-06	872	0.122	-0.019	0.028	0.493	173981
	rs12616254	C	T	0.110	-0.440	0.086	2.60E-07	872	0.895	0.023	0.026	0.374	173981
	rs1989457	A	G	0.430	-0.280	0.063	6.80E-06	872	0.406	0.002	0.015	0.869	173981
	rs2969949	T	G	0.250	-0.290	0.065	1.00E-05	872	0.724	0.032	0.019	0.085	173981
	rs301958	C	T	0.160	-0.380	0.075	3.20E-07	872	0.853	0.027	0.023	0.244	173981
	rs35581380	A	G	0.092	0.510	0.110	5.90E-06	872	0.918	-0.015	0.035	0.671	173981
	rs7545951	C	T	0.092	-0.430	0.095	5.80E-06	872	0.882	0.001	0.022	0.970	173981
	rs77050502	T	C	0.061	-0.480	0.110	5.90E-06	872	0.921	-0.012	0.029	0.672	173981
	rs7781650	T	G	0.110	0.450	0.100	7.50E-06	872	0.898	-0.049	0.022	0.030	173981
Recovery time with placebo treatment	rs8037453	C	A	0.075	0.470	0.100	8.40E-06	872	0.057	0.031	0.033	0.342	173981
	rs10794057	G	A	0.430	0.280	0.058	1.40E-06	851	0.572	0.003	0.016	0.861	173981
	rs10964597	C	A	0.170	0.380	0.081	2.60E-06	851	0.804	0.004	0.023	0.849	173981
	rs11036883	G	A	0.330	-0.270	0.059	6.90E-06	851	0.622	0.001	0.015	0.945	173981
	rs11670095	T	C	0.063	0.550	0.110	1.40E-06	851	0.066	-0.009	0.035	0.803	173981
	rs12317844	T	C	0.320	0.270	0.060	5.40E-06	851	0.306	0.005	0.016	0.735	173981
	rs145670222	C	T	0.120	-0.440	0.100	9.70E-06	851	0.106	-0.021	0.027	0.432	173981
	rs2180291	A	C	0.190	0.380	0.083	6.30E-06	851	0.856	0.005	0.024	0.824	173981
	rs34651317	C	T	0.280	0.280	0.064	8.50E-06	851	0.288	0.008	0.016	0.627	173981
	rs4902234	C	T	0.110	0.490	0.110	4.40E-06	851	0.910	0.006	0.037	0.861	173981
Recovery time with placebo treatment	rs62036216	C	T	0.075	-0.520	0.110	1.60E-06	851	0.938	-0.012	0.037	0.753	173981
	rs67078535	G	A	0.110	-0.420	0.087	1.60E-06	851	0.882	0.013	0.030	0.655	173981
	rs7705685	G	A	0.100	0.440	0.096	4.80E-06	851	0.094	0.043	0.026	0.104	173981
	rs77348070	T	C	0.051	-0.550	0.120	5.50E-06	851	0.969	0.108	0.048	0.025	173981
	rs78488740	C	T	0.058	0.570	0.120	2.20E-06	851	0.058	0.018	0.036	0.605	173981
	rs7874333	G	A	0.310	-0.290	0.064	8.20E-06	851	0.300	0.004	0.015	0.802	173981

Notes: MR: mendelian randomization, A1: effect allele, A2: other allele, beta: estimate coefficient, se: standard error of coefficient estimate.

Supplementary Table 5. The results of pathway enrichment analysis

term_name	term_id	adjusted_p_value	intersections
regulation of immune system process	GO:0002682	1.57504E-06	SIRPG,TYK2,UBASH3A,HLA-DQA2,HLA-DMA,CD226,IFIH1,AGER,CTSH,IKZF3,GATA3,CCDC88B,HLA-E,HFE
regulation of leukocyte activation	GO:0002694	1.77729E-06	SIRPG,TYK2,HLA-DQA2,HLA-DMA,CD226,AGER,IKZF3,GATA3,CCDC88B,HLA-E,HFE
regulation of T cell activation	GO:0050863	2.6689E-06	SIRPG,TYK2,HLA-DQA2,HLA-DMA,AGER,GATA3,CCDC88B,HLA-E,HFE
regulation of leukocyte cell-cell adhesion	GO:1903037	2.92777E-06	SIRPG,TYK2,HLA-DQA2,HLA-DMA,AGER,GATA3,CCDC88B,HLA-E,HFE
positive regulation of T cell activation	GO:0050870	3.18715E-06	SIRPG,TYK2,HLA-DQA2,HLA-DMA,AGER,GATA3,CCDC88B,HLA-E
regulation of cell activation	GO:0050865	4.23448E-06	SIRPG,TYK2,HLA-DQA2,HLA-DMA,CD226,AGER,IKZF3,GATA3,CCDC88B,HLA-E,HFE
positive regulation of leukocyte cell-cell adhesion	GO:1903039	6.90747E-06	SIRPG,TYK2,HLA-DQA2,HLA-DMA,AGER,GATA3,CCDC88B,HLA-E
regulation of lymphocyte activation	GO:0051249	7.57579E-06	SIRPG,TYK2,HLA-DQA2,HLA-DMA,AGER,IKZF3,GATA3,CCDC88B,HLA-E,HFE
leukocyte cell-cell adhesion	GO:0007159	8.48522E-06	SIRPG,TYK2,HLA-DQA2,HLA-DMA,AGER,GATA3,CCDC88B,HLA-E,HFE
positive regulation of leukocyte activation	GO:0002696	2.07423E-05	SIRPG,TYK2,HLA-DQA2,HLA-DMA,CD226,AGER,GATA3,CCDC88B,HLA-E
immune system process	GO:0002376	2.38593E-05	SIRPG,TYK2,UBASH3A,HLA-DQA2,HLA-DMA,GNL1,TRIM38,CD226,IFIH1,AGER,CTSH,IKZF3,GATA3,CCDC88B,IL2RA,HLA-E,HFE
positive regulation of cell-cell adhesion	GO:0022409	2.72346E-05	SIRPG,TYK2,HLA-DQA2,HLA-DMA,AGER,GATA3,CCDC88B,HLA-E
positive regulation of cell adhesion	GO:0045785	2.75887E-05	SIRPG,TYK2,HLA-DQA2,HLA-DMA,AGER,CARMIL1,GATA3,CCDC88B,HLA-E
positive regulation of cell activation	GO:0050867	2.82397E-05	SIRPG,TYK2,HLA-DQA2,HLA-DMA,CD226,AGER,GATA3,CCDC88B,HLA-E
regulation of cell-cell adhesion	GO:0022407	3.6341E-05	SIRPG,TYK2,HLA-DQA2,HLA-DMA,AGER,GATA3,CCDC88B,HLA-E,HFE
T cell activation	GO:0042110	4.15657E-05	SIRPG,TYK2,HLA-DQA2,HLA-DMA,AGER,GATA3,CCDC88B,HLA-E,HFE
leukocyte activation	GO:0045321	9.82417E-05	SIRPG,TYK2,HLA-DQA2,HLA-DMA,CD226,AGER,IKZF3,GATA3,CCDC88B,HLA-E,HFE
positive regulation of lymphocyte activation	GO:0051251	0.00016551	SIRPG,TYK2,HLA-DQA2,HLA-DMA,AGER,GATA3,CCDC88B,HLA-E
regulation of cell adhesion	GO:0030155	0.000177624	SIRPG,TYK2,HLA-DQA2,HLA-DMA,AGER,CARMIL1,GATA3,CCDC88B,HLA-E,HFE
lymphocyte activation	GO:0046649	0.000191511	SIRPG,TYK2,HLA-DQA2,HLA-DMA,AGER,IKZF3,GATA3,CCDC88B,HLA-E,HFE
cell activation	GO:0001775	0.000430377	SIRPG,TYK2,HLA-DQA2,HLA-DMA,CD226,AGER,IKZF3,GATA3,CCDC88B,HLA-E,HFE
positive regulation of immune system process	GO:0002684	0.000522713	SIRPG,TYK2,UBASH3A,HLA-DQA2,HLA-DMA,CD226,IFIH1,AGER,GATA3,CCDC88B,HLA-E
adaptive immune response based on somatic recombination of immune receptors built from immunoglobulin superfamily domains	GO:0002460	0.000606839	TYK2,GNL1,CD226,AGER,CTSH,HLA-E,HFE
T cell mediated immunity	GO:0002456	0.000767274	GNL1,AGER,CTSH,HLA-E,HFE
antigen processing and presentation	GO:0019882	0.00113965	HLA-DQA2,HLA-DMA,CTSH,HLA-E,HFE
immune response	GO:0006955	0.001252137	TYK2,UBASH3A,HLA-DQA2,GNL1,TRIM38,CD226,IFIH1,AGER,CTS H,GATA3,IL2RA,HLA-E,HFE

adaptive immune response	GO:0002250	0.002437839	TYK2,GNL1,CD226,AGER,CTSH,HLA-E,HFE
regulation of adaptive immune response based on somatic recombination of immune receptors built from immunoglobulin superfamily domains	GO:0002822	0.006071685	TYK2,CD226,AGER,HLA-E,HFE
antigen processing and presentation of peptide antigen	GO:0048002	0.006205081	HLA-DQA2,HLA-DMA,HLA-E,HFE
cell-cell adhesion	GO:0098609	0.009888847	SIRPG,TYK2,HLA-DQA2,HLA-DMA,AGER,GATA3,CCDC88B,HLA-E,HFE
regulation of adaptive immune response	GO:0002819	0.010401117	TYK2,CD226,AGER,HLA-E,HFE
positive regulation of cytokine production	GO:0001819	0.011036203	TYK2,CD226,IFIH1,AGER,GATA3,CCDC88B,HLA-E
regulation of immune response	GO:0050776	0.011499416	TYK2,UBASH3A,CD226,IFIH1,AGER,CTSH,GATA3,HLA-E,HFE
cell adhesion	GO:0007155	0.011985623	SIRPG,TYK2,HLA-DQA2,HLA-DMA,CD226,AGER,CARMIL1,GATA3,CCDC88B,HLA-E,HFE
lymphocyte mediated immunity	GO:0002449	0.012552624	GNL1,CD226,AGER,CTSH,HLA-E,HFE
regulation of cytokine production	GO:0001817	0.017996927	TYK2,CD226,IFIH1,AGER,GATA3,CCDC88B,HLA-E,HFE
cytokine production	GO:0001816	0.019112397	TYK2,CD226,IFIH1,AGER,GATA3,CCDC88B,HLA-E,HFE
positive regulation of T cell proliferation	GO:0042102	0.020316181	TYK2,AGER,CCDC88B,HLA-E
regulation of lymphocyte proliferation	GO:0050670	0.022635044	TYK2,AGER,IKZF3,CCDC88B,HLA-E
positive regulation of multicellular organismal process	GO:0051240	0.023294149	SIRPG,TYK2,HLA-DQA2,HLA-DMA,CD226,IFIH1,AGER,CTSH,GATA3,CCDC88B,HLA-E
regulation of mononuclear cell proliferation	GO:0032944	0.023959438	TYK2,AGER,IKZF3,CCDC88B,HLA-E
regulation of alpha-beta T cell activation	GO:0046634	0.025999862	TYK2,AGER,HLA-E,HFE
regulation of leukocyte proliferation	GO:0070663	0.039796719	TYK2,AGER,IKZF3,CCDC88B,HLA-E
leukocyte mediated immunity	GO:0002443	0.04254617	GNL1,CD226,AGER,CTSH,HLA-E,HFE
antigen processing and presentation of exogenous peptide antigen	GO:0002478	0.048019857	HLA-DQA2,HLA-DMA,HLA-E

Notes: adjusted_p_value is the p-value that corrected by g:SCS (Set Counts and Sizes)

Supplementary Table 6. Selected IVs in MR analysis (replication phase)

exposure	outcome	<i>F</i> -value	SNP	A1	A2	exposure				outcome					
						eaf	beta	se	pval	samplesize	eaf	beta	se	pval	
Type 1 diabetes	COVID-19 positive	1403.56	rs10230978	A	G	0.685	-0.154	0.028	3.80E-08	14741	0.275	-0.012	0.014	0.373	98377
			rs1042136	C	A	0.789	0.330	0.032	6.19E-25	14741	0.162	-0.003	0.017	0.849	98377
			rs10774624	A	G	0.530	-0.291	0.025	2.58E-31	14741	0.512	0.006	0.013	0.620	98377
			rs10814917	G	A	0.527	-0.149	0.025	2.52E-09	14741	0.498	-0.015	0.013	0.225	98377
			rs10840595	T	C	0.843	0.225	0.035	1.29E-10	14741	0.167	-0.014	0.017	0.408	98377
			rs11042751	C	T	0.781	-0.335	0.039	8.72E-18	14741	0.242	0.014	0.015	0.341	98377
			rs111568057	T	C	0.972	0.814	0.088	2.24E-20	14741	0.022	-0.039	0.044	0.381	98377
			rs114355928	T	G	0.979	1.559	0.077	3.79E-91	14741	0.029	-0.020	0.037	0.597	98377
			rs114653220	C	T	0.976	-1.744	0.222	3.97E-15	14741	0.003	0.041	0.154	0.791	98377
			rs115008112	A	G	0.908	-0.622	0.069	1.98E-19	14741	0.075	0.042	0.024	0.080	98377
			rs11539216	A	G	0.950	-0.892	0.077	4.94E-31	14741	0.056	0.026	0.027	0.326	98377
			rs115469976	C	T	0.982	1.717	0.091	2.09E-79	14741	0.031	-0.044	0.036	0.218	98377
			rs11727369	G	A	0.623	0.161	0.025	1.19E-10	14741	0.361	-0.024	0.013	0.067	98377
			rs11758136	A	G	0.959	-0.632	0.090	2.18E-12	14741	0.026	0.065	0.040	0.099	98377
			rs1233478	T	G	0.840	0.558	0.030	3.21E-77	14741	0.196	0.022	0.016	0.157	98377
			rs1264622	C	T	0.842	0.373	0.029	7.36E-38	14741	0.200	-0.002	0.016	0.876	98377
			rs12722496	G	A	0.921	-0.438	0.044	2.41E-23	14741	0.110	-0.021	0.020	0.298	98377
			rs12919083	C	A	0.671	-0.218	0.027	6.80E-16	14741	0.323	0.007	0.013	0.600	98377
			rs13215	A	C	0.932	-0.378	0.066	1.02E-08	14741	0.051	0.022	0.028	0.441	98377
			rs13437000	C	T	0.812	-0.673	0.038	3.48E-70	14741	0.180	0.010	0.016	0.519	98377
			rs138522604	G	T	0.985	-1.246	0.198	3.12E-10	14741	0.011	0.028	0.060	0.640	98377
			rs143933760	T	C	0.989	1.613	0.127	5.85E-37	14741	0.008	-0.011	0.072	0.879	98377
			rs144112342	C	T	0.980	-1.231	0.142	4.36E-18	14741	0.025	-0.023	0.041	0.580	98377
			rs145130687	G	T	0.973	-0.684	0.082	7.34E-17	14741	0.045	-0.002	0.030	0.960	98377
			rs145568234	G	T	0.986	-0.932	0.129	5.02E-13	14741	0.025	-0.018	0.044	0.688	98377
			rs148347131	T	C	0.974	0.587	0.082	8.15E-13	14741	0.021	0.032	0.052	0.545	98377
			rs148571474	T	C	0.971	-0.633	0.105	1.65E-09	14741	0.026	0.072	0.040	0.073	98377
			rs148600179	C	T	0.828	0.446	0.043	3.32E-25	14741	0.158	-0.004	0.021	0.847	98377
			rs148759934	T	C	0.984	-0.958	0.148	9.19E-11	14741	0.015	-0.019	0.052	0.721	98377
			rs169504	A	C	0.852	1.021	0.032	1.00E-200	14741	0.185	0.002	0.016	0.907	98377
			rs17207622	T	G	0.971	-0.897	0.112	1.16E-15	14741	0.026	-0.039	0.039	0.316	98377
			rs17208209	A	G	0.981	-1.872	0.234	1.24E-15	14741	0.023	-0.004	0.045	0.935	98377
			rs184489107	T	C	0.984	1.338	0.110	4.85E-34	14741	0.010	0.177	0.061	0.004	98377
			rs209139	A	C	0.958	-0.556	0.063	1.09E-18	14741	0.058	0.002	0.027	0.946	98377
			rs210211	A	G	0.894	0.364	0.047	9.58E-15	14741	0.897	-0.007	0.021	0.752	98377
			rs2267633	G	A	0.894	-0.528	0.044	3.55E-33	14741	0.123	0.002	0.019	0.914	98377
			rs2269242	A	G	0.765	0.168	0.030	2.14E-08	14741	0.201	0.011	0.016	0.474	98377
			rs2383983	G	A	0.612	0.138	0.025	3.39E-08	14741	0.367	0.011	0.013	0.387	98377
			rs2516491	C	A	0.748	0.841	0.029	6.58E-185	14741	0.274	-0.020	0.014	0.158	98377
			rs2532924	C	T	0.568	0.359	0.029	3.38E-35	14741	0.567	-0.025	0.012	0.047	98377
			rs2596501	T	C	0.534	-0.404	0.025	9.66E-59	14741	0.470	0.006	0.013	0.631	98377
			rs2726039	A	G	0.586	0.147	0.026	1.57E-08	14741	0.401	-0.002	0.013	0.859	98377
			rs2734973	T	C	0.872	-0.453	0.043	5.97E-26	14741	0.122	0.014	0.019	0.458	98377
			rs2791332	T	C	0.749	0.328	0.026	1.74E-36	14741	0.288	0.001	0.014	0.924	98377
			rs2844697	T	C	0.670	0.633	0.027	1.51E-121	14741	0.370	0.008	0.013	0.532	98377
			rs2844746	C	T	0.633	0.483	0.026	4.94E-77	14741	0.629	-0.005	0.013	0.690	98377
			rs28752520	C	T	0.739	-1.242	0.041	1.00E-200	14741	0.251	0.010	0.014	0.506	98377
			rs2894233	G	A	0.985	-1.788	0.243	1.87E-13	14741	0.024	-0.059	0.046	0.202	98377
			rs3087243	A	G	0.530	-0.178	0.025	1.08E-12	14741	0.450	0.003	0.013	0.819	98377
			rs3180379	A	C	0.715	-0.829	0.042	1.02E-86	14741	0.265	-0.019	0.016	0.236	98377
			rs33998987	C	T	0.664	-0.198	0.028	1.53E-12	14741	0.329	-0.016	0.013	0.217	98377
			rs34302671	G	A	0.903	-0.249	0.043	7.01E-09	14741	0.106	-0.014	0.020	0.484	98377
			rs34569761	G	A	0.910	0.408	0.035	2.11E-31	14741	0.120	0.011	0.019	0.559	98377
			rs34613987	T	C	0.919	0.423	0.035	1.26E-33	14741	0.122	0.019	0.019	0.308	98377
			rs35029304	C	T	0.969	-0.468	0.070	2.30E-11	14741	0.052	-0.049	0.028	0.084	98377
			rs374532386	T	C	0.973	1.078	0.081	2.06E-40	14741	0.017	-0.010	0.072	0.888	98377
			rs4850921	T	G	0.619	-0.146	0.026	1.96E-08	14741	0.360	-0.016	0.013	0.208	98377
			rs4959027	G	A	0.793	2.094	0.061	1.00E-200	14741	0.765	-0.006	0.015	0.668	98377
			rs499716	A	C	0.897	0.550	0.040	5.09E-43	14741	0.094	0.033	0.022	0.134	98377
			rs56376830	G	A	0.686	-0.392	0.034	9.38E-31	14741	0.340	0.005	0.013	0.727	98377
			rs58540156	T	C	0.979	0.818	0.114	7.21E-13	14741	0.014	0.005	0.061	0.935	98377
			rs6043405	C	T	0.662	0.144	0.026	3.05E-08	14741	0.649	-0.004	0.013	0.748	98377
			rs62395766	C	A	0.989	-1.077	0.164	5.13E-11	14741	0.016	0.044	0.050	0.376	98377
			rs6679677	A	C	0.909	0.695	0.038	1.00E-74	14741	0.101	0.028	0.021	0.183	98377
			rs6902536	G	A	0.901	-1.451	0.083	1.97E-68	14741	0.079	0.000	0.025	0.990	98377
			rs6908626	T	G	0.823	0.216	0.034	2.11E-10	14741	0.176	-0.011	0.017	0.513	98377
			rs6926599	A	G	0.973	0.357	0.059	1.44E-09	14741	0.036	0.006	0.033	0.851	98377
			rs7226035	T	C	0.600	0.162	0.026	4.64E-10	14741	0.647	-0.007	0.013	0.599	98377
			rs7297175	C	T	0.588	-0.246	0.025	7.57E-23	14741	0.569	0.035	0.013	0.005	98377
			rs74598819	G	A	0.982	0.986	0.117	3.54E-17	14741	0.020	-0.038	0.046	0.407	98377
			rs7481173	G	T	0.674	0.242	0.029	7.13E-17	14741	0.341	-0.010	0.013	0.453	98377
			rs767896	T	C	0.653	-0.282	0.029	2.38E-22	14741	0.301	-0.021	0.014	0.119	98377
			rs7766015	C	T										

Type 1 diabetes	Severe COVID-19	1403.56	rs10230978	A	G	0.685	-0.154	0.028	3.80E-08	14741	0.273	0.012	0.052	0.824	15815
			rs1042136	C	A	0.789	0.330	0.032	6.19E-25	14741	0.161	0.021	0.042	0.618	16551
			rs10774624	A	G	0.530	-0.291	0.025	2.58E-31	14741	0.514	0.002	0.031	0.937	16551
			rs10814917	G	A	0.527	-0.149	0.025	2.52E-09	14741	0.496	0.042	0.031	0.172	16551
			rs10840595	T	C	0.843	0.225	0.035	1.29E-10	14741	0.166	0.023	0.042	0.581	16551
			rs11042751	C	T	0.781	-0.335	0.039	8.72E-18	14741	0.245	0.034	0.036	0.344	16551
			rs111568057	T	C	0.972	0.814	0.088	2.24E-20	14741	0.021	-0.054	0.109	0.621	16551
			rs114355928	T	G	0.979	1.559	0.077	3.79E-91	14741	0.028	-0.019	0.092	0.840	16551
			rs114653220	C	T	0.976	-1.744	0.222	3.97E-15	14741	0.003	-0.335	0.391	0.392	16551
			rs115008112	A	G	0.908	-0.622	0.069	1.98E-19	14741	0.077	0.008	0.059	0.888	16551
			rs11539216	A	G	0.950	-0.892	0.077	4.94E-31	14741	0.058	0.041	0.067	0.541	16551
			rs115469976	C	T	0.982	1.717	0.091	2.09E-79	14741	0.030	-0.076	0.090	0.402	16551
			rs117273369	A	G	0.623	0.161	0.025	1.19E-10	14741	0.356	-0.007	0.032	0.816	16551
			rs11758136	A	G	0.959	-0.632	0.090	2.18E-12	14741	0.027	-0.069	0.093	0.457	16551
			rs1233478	T	G	0.840	0.558	0.030	3.21E-77	14741	0.200	0.033	0.039	0.395	16551
			rs1264622	T	C	0.842	0.373	0.029	7.36E-38	14741	0.201	-0.017	0.038	0.665	16551
			rs12722496	G	A	0.921	-0.430	0.044	2.41E-23	14741	0.109	-0.041	0.050	0.414	16551
			rs12919083	C	A	0.671	-0.218	0.027	6.80E-16	14741	0.324	-0.005	0.033	0.879	16551
			rs13215	A	C	0.932	-0.378	0.066	1.02E-08	14741	0.051	0.126	0.070	0.070	16551
			rs13437000	C	T	0.812	-0.673	0.038	3.48E-70	14741	0.181	-0.082	0.040	0.042	16551
			rs138522604	G	T	0.985	-1.246	0.198	3.12E-10	14741	0.011	-0.263	0.148	0.076	16551
			rs143933760	T	C	0.989	1.613	0.127	5.85E-37	14741	0.008	-0.082	0.185	0.659	16551
			rs144112342	C	T	0.980	-1.231	0.142	4.36E-18	14741	0.025	0.124	0.103	0.229	16551
			rs145130687	G	T	0.973	-0.684	0.082	7.34E-17	14741	0.045	0.019	0.074	0.795	16551
			rs145568234	G	T	0.986	-0.932	0.129	5.02E-13	14741	0.024	-0.119	0.109	0.275	16551
			rs148347131	T	C	0.974	0.587	0.082	8.15E-13	14741	0.021	0.381	0.126	0.002	16551
			rs148571474	T	C	0.971	-0.633	0.105	1.65E-09	14741	0.027	0.013	0.096	0.896	16551
			rs148600179	C	T	0.828	0.446	0.043	3.32E-25	14741	0.157	-0.069	0.053	0.189	16551
			rs148759934	T	C	0.984	-0.959	0.148	9.19E-11	14741	0.015	0.002	0.129	0.990	16551
			rs169504	A	C	0.852	1.021	0.032	1.00E-200	14741	0.186	0.023	0.040	0.570	16551
			rs17207622	T	G	0.971	-0.897	0.112	1.16E-15	14741	0.026	-0.096	0.096	0.320	16551
			rs17208209	A	G	0.981	-1.872	0.234	1.24E-15	14741	0.023	-0.157	0.113	0.163	16551
			rs184489107	T	C	0.984	1.338	0.110	4.85E-34	14741	0.012	0.145	0.142	0.308	16551
			rs209139	A	C	0.958	-0.556	0.063	1.09E-18	14741	0.059	0.033	0.065	0.609	16551
			rs210211	A	G	0.894	0.364	0.047	9.58E-15	14741	0.896	-0.087	0.050	0.083	16551
			rs2267633	G	A	0.894	-0.528	0.044	3.55E-33	14741	0.123	0.053	0.047	0.263	16551
			rs2269242	A	G	0.765	0.168	0.030	2.14E-08	14741	0.203	-0.002	0.038	0.966	16551
			rs2383983	G	A	0.612	0.138	0.025	3.39E-08	14741	0.369	-0.019	0.032	0.557	16551
			rs2516491	C	A	0.748	0.841	0.029	6.58E-185	14741	0.272	-0.024	0.035	0.489	16551
			rs2532924	C	T	0.568	0.359	0.029	3.38E-35	14741	0.563	0.039	0.031	0.206	16551
			rs2596501	T	C	0.534	-0.404	0.025	9.66E-59	14741	0.469	-0.041	0.031	0.187	16551
			rs2726039	A	G	0.586	0.147	0.026	1.57E-08	14741	0.399	-0.008	0.032	0.789	16551
			rs2734973	T	C	0.872	-0.453	0.043	5.97E-26	14741	0.123	-0.044	0.047	0.349	16551
			rs2791332	T	C	0.749	0.328	0.026	1.74E-36	14741	0.289	0.004	0.034	0.900	16551
			rs2844697	T	C	0.670	0.633	0.027	1.51E-121	14741	0.372	0.019	0.031	0.546	16551
			rs2844746	C	T	0.633	0.483	0.026	4.94E-77	14741	0.628	0.007	0.032	0.829	16551
			rs28752520	C	T	0.739	-1.242	0.041	1.00E-200	14741	0.252	-0.053	0.036	0.138	16551
			rs2894233	G	A	0.985	-1.788	0.243	1.87E-13	14741	0.023	0.186	0.117	0.110	16551
			rs3087243	A	G	0.530	-0.178	0.025	1.08E-12	14741	0.451	-0.015	0.031	0.637	16551
			rs3180379	A	C	0.715	-0.829	0.042	1.02E-86	14741	0.262	-0.029	0.040	0.466	16551
			rs33998897	C	T	0.664	-0.198	0.028	1.53E-12	14741	0.326	-0.004	0.033	0.897	16551
			rs34302671	G	A	0.903	-0.249	0.043	7.01E-09	14741	0.105	0.063	0.050	0.213	16551
			rs34569761	G	A	0.910	0.408	0.035	2.11E-31	14741	0.122	-0.010	0.048	0.835	16551
			rs34613987	T	C	0.919	0.423	0.035	1.26E-33	14741	0.125	-0.001	0.047	0.982	16551
			rs35029304	C	T	0.969	-0.468	0.070	2.30E-11	14741	0.050	-0.100	0.073	0.170	16551
			rs374532386	T	C	0.973	1.078	0.081	2.06E-40	14741	0.017	0.086	0.176	0.626	16551
			rs4850921	G	T	0.619	-0.146	0.026	1.96E-08	14741	0.357	0.030	0.032	0.349	16551
			rs4959027	G	A	0.793	2.094	0.061	1.00E-200	14741	0.764	0.008	0.036	0.836	16551
			rs4999716	A	C	0.897	0.550	0.040	5.09E-43	14741	0.095	0.050	0.054	0.353	16551
			rs56376830	G	A	0.686	-0.392	0.034	9.38E-31	14741	0.342	0.018	0.032	0.581	16551
			rs58540156	T	C	0.979	0.818	0.114	7.21E-13	14741	0.014	0.175	0.151	0.244	16551
			rs6043405	C	T	0.662	0.144	0.026	3.05E-08	14741	0.648	-0.010	0.032	0.762	16551
			rs62395766	C	A	0.989	-1.077	0.164	5.13E-11	14741	0.016	-0.135	0.120	0.263	16551
			rs6679677	A	C	0.909	0.695	0.038	1.00E-74	14741	0.104	0.032	0.050	0.527	16551
			rs6902536	G	A	0.901	-1.451	0.083	1.97E-68	14741	0.078	-0.005	0.061	0.928	16551
			rs6908626	T	G	0.823	0.216	0.034	2.11E-10	14741	0.175	0.006	0.041	0.881	16551
			rs6926599	A	G	0.973	0.357	0.059	1.44E-09	14741	0.037	0.066	0.081	0.416	16551
			rs7226035	T	C	0.606	0.162	0.026	4.64E-10	14741	0.646	-0.021	0.032	0.525	16551
			rs7297175	C	T	0.588	-0.246	0.025	7.57E-23	14741	0.576	-0.009	0.031	0.783	16551
			rs74598819	G	A	0.982	0.986	0.117	3.54E-17	14741	0.018	-0.108	0.113	0.340	16551
			rs7481173	T	C	0.674	0.242	0.029	7.13E-17	14741	0.339	-0.007	0.033	0.827	16551
			rs767896	T	C	0.653	-0.282	0.029	2.38E-22	14741	0.297	-0.004	0.034	0.917	16551
			rs7766015	C	T	0.560	-0.266	0.025	1.94E-26	14741	0.576	0.024	0.031	0.438	16551
			rs7776597	G	A	0.973	0.363	0.066	3.80E-08	14741	0.953	-0.094	0.073	0.198	16551
			rs78037977	G	A	0.882	-0.249	0.042	3.06E-09	14					

Type 1 diabetes	COVID-19 death	1403.56	rs10230978	A	G	0.685	-0.154	0.028	3.80E-08	14741	0.273	0.039	0.055	0.472	15815
			rs1042136	C	A	0.789	0.330	0.032	6.19E-25	14741	0.162	-0.014	0.067	0.831	15815
			rs10774624	A	G	0.530	-0.291	0.025	2.58E-31	14741	0.515	0.001	0.050	0.989	15815
			rs10814917	G	A	0.527	-0.149	0.025	2.52E-09	14741	0.495	0.072	0.049	0.143	15815
			rs10840595	T	C	0.843	0.225	0.035	1.29E-10	14741	0.165	-0.009	0.067	0.890	15815
			rs11042751	C	T	0.781	-0.335	0.039	8.72E-18	14741	0.244	-0.001	0.054	0.980	15815
			rs111568057	T	C	0.972	0.814	0.088	2.24E-20	14741	0.021	0.010	0.164	0.950	15815
			rs114355928	T	G	0.979	1.559	0.077	3.79E-91	14741	0.028	0.010	0.136	0.942	15815
			rs114653220	C	T	0.976	-1.744	0.222	3.97E-15	14741	0.003	-0.781	0.600	0.193	15815
			rs115008112	A	G	0.908	-0.622	0.069	1.98E-19	14741	0.077	-0.179	0.087	0.041	15815
			rs11539216	A	G	0.950	-0.892	0.077	4.94E-31	14741	0.058	-0.064	0.102	0.526	15815
			rs115469976	C	T	0.982	1.717	0.091	2.09E-79	14741	0.030	0.040	0.135	0.768	15815
			rs11727369	A	G	0.623	0.161	0.025	1.19E-10	14741	0.356	-0.003	0.048	0.956	15815
			rs11758136	A	G	0.959	-0.632	0.090	2.18E-12	14741	0.027	-0.016	0.140	0.910	15815
			rs1233478	T	G	0.840	0.558	0.030	3.21E-77	14741	0.199	0.086	0.058	0.136	15815
			rs1264622	T	C	0.842	0.373	0.029	7.36E-38	14741	0.201	0.055	0.058	0.341	15815
			rs12722496	G	A	0.921	-0.438	0.044	2.41E-23	14741	0.109	0.007	0.075	0.921	15815
			rs12919083	C	A	0.671	-0.218	0.027	6.80E-16	14741	0.324	-0.023	0.050	0.639	15815
			rs13215	A	C	0.932	-0.378	0.066	1.02E-08	14741	0.051	-0.024	0.105	0.820	15815
			rs13437000	C	T	0.812	-0.673	0.038	3.48E-70	14741	0.182	-0.125	0.061	0.041	15815
			rs138522604	G	T	0.985	-1.246	0.198	3.12E-10	14741	0.012	-0.044	0.225	0.845	15815
			rs143933760	T	C	0.989	1.613	0.127	5.85E-37	14741	0.008	-0.042	0.278	0.880	15815
			rs144112342	C	T	0.980	-1.231	0.142	4.36E-18	14741	0.025	-0.044	0.153	0.772	15815
			rs145130687	G	T	0.973	-0.684	0.082	7.34E-17	14741	0.045	-0.003	0.111	0.981	15815
			rs145568234	G	T	0.986	-0.932	0.129	5.02E-13	14741	0.025	0.031	0.164	0.848	15815
			rs148347131	T	C	0.974	0.587	0.082	8.15E-13	14741	0.021	0.151	0.190	0.427	15815
			rs148571474	T	C	0.971	-0.633	0.105	1.65E-09	14741	0.027	0.315	0.142	0.027	15815
			rs148600179	C	T	0.828	0.446	0.043	3.32E-25	14741	0.157	-0.067	0.080	0.405	15815
			rs148759934	T	C	0.984	-0.959	0.148	9.19E-11	14741	0.015	0.082	0.199	0.680	15815
			rs169504	A	C	0.852	0.101	0.032	1.00E-200	14741	0.186	0.051	0.060	0.401	15815
			rs17207622	T	G	0.971	-0.897	0.112	1.16E-15	14741	0.026	-0.185	0.142	0.193	15815
			rs17208209	A	G	0.981	-1.872	0.234	1.24E-15	14741	0.023	-0.091	0.170	0.593	15815
			rs184489107	T	C	0.984	1.338	0.110	4.85E-34	14741	0.012	0.008	0.213	0.969	15815
			rs209139	A	C	0.958	-0.556	0.063	1.09E-18	14741	0.059	0.051	0.098	0.606	15815
			rs210211	A	G	0.894	0.364	0.047	9.58E-15	14741	0.897	-0.043	0.076	0.568	15815
			rs2267633	G	A	0.894	-0.528	0.044	3.55E-33	14741	0.124	-0.013	0.071	0.856	15815
			rs2269242	A	G	0.765	0.168	0.030	2.14E-08	14741	0.203	0.060	0.058	0.301	15815
			rs2383983	G	A	0.612	0.138	0.025	3.39E-08	14741	0.368	0.057	0.049	0.238	15815
			rs2516491	C	A	0.748	0.841	0.029	6.58E-185	14741	0.271	0.020	0.053	0.706	15815
			rs2532924	C	T	0.568	0.359	0.029	3.38E-35	14741	0.563	0.012	0.046	0.802	15815
			rs2596501	T	C	0.534	-0.404	0.025	9.66E-59	14741	0.470	-0.002	0.046	0.962	15815
			rs2726039	A	G	0.586	0.147	0.026	1.57E-08	14741	0.400	-0.021	0.048	0.668	15815
			rs2734973	T	C	0.872	-0.453	0.043	5.97E-26	14741	0.123	-0.123	0.070	0.079	15815
			rs2791332	T	C	0.749	0.328	0.026	1.74E-36	14741	0.289	0.052	0.051	0.310	15815
			rs2844697	T	C	0.670	0.633	0.027	1.51E-121	14741	0.371	0.002	0.047	0.969	15815
			rs2847476	C	T	0.633	0.483	0.026	4.94E-77	14741	0.627	0.000	0.049	0.996	15815
			rs28752520	C	T	0.739	-1.242	0.041	1.00E-200	14741	0.252	-0.034	0.054	0.524	15815
			rs2894233	G	A	0.985	-1.788	0.243	1.87E-13	14741	0.024	-0.358	0.175	0.041	15815
			rs3087243	A	G	0.530	-0.178	0.025	1.08E-12	14741	0.451	-0.056	0.047	0.231	15815
			rs3180379	A	C	0.715	-0.829	0.042	1.02E-86	14741	0.262	-0.122	0.060	0.041	15815
			rs33998987	C	T	0.664	-0.198	0.028	1.53E-12	14741	0.326	0.031	0.050	0.534	15815
			rs34302671	G	A	0.903	-0.249	0.043	7.01E-09	14741	0.105	0.057	0.075	0.453	15815
			rs34569761	G	A	0.910	0.408	0.035	2.11E-31	14741	0.122	0.179	0.071	0.012	15815
			rs34613987	T	C	0.919	0.423	0.035	1.26E-33	14741	0.125	0.121	0.069	0.081	15815
			rs35029304	C	T	0.969	-0.468	0.070	2.30E-11	14741	0.050	-0.002	0.110	0.987	15815
			rs374532386	T	C	0.973	1.078	0.081	2.06E-40	14741	0.017	-0.190	0.266	0.475	15815
			rs4850921	T	G	0.619	-0.146	0.026	1.96E-08	14741	0.358	-0.003	0.048	0.946	15815
			rs4959027	G	A	0.793	2.094	0.061	1.00E-200	14741	0.764	0.170	0.055	0.002	15815
			rs4999716	A	C	0.897	0.550	0.040	5.09E-43	14741	0.096	-0.057	0.081	0.482	15815
			rs56376830	G	A	0.686	-0.392	0.034	9.38E-31	14741	0.341	0.066	0.049	0.174	15815
			rs58540156	T	C	0.979	0.818	0.114	7.21E-13	14741	0.013	0.043	0.231	0.853	15815
			rs6043405	C	T	0.662	0.144	0.026	3.05E-08	14741	0.647	0.027	0.049	0.577	15815
			rs62395766	C	A	0.989	-1.077	0.164	5.13E-11	14741	0.016	-0.334	0.183	0.068	15815
			rs6676977	A	C	0.909	0.695	0.038	1.00E-74	14741	0.103	-0.026	0.075	0.725	15815
			rs6902536	G	A	0.901	-1.451	0.083	1.97E-68	14741	0.079	-0.027	0.093	0.775	15815
			rs6908626	T	G	0.823	0.216	0.034	2.11E-10	14741	0.175	0.011	0.062	0.854	15815
			rs6926599	A	G	0.973	0.357	0.059	1.44E-09	14741	0.037	0.142	0.120	0.238	15815
			rs7226035	T	C	0.606	0.162	0.026	4.64E-10	14741	0.645	-0.032	0.049	0.515	15815
			rs7297175	C	T	0.588	-0.246	0.025	7.57E-23	14741	0.576	-0.007	0.047	0.881	15815
			rs74598819	G	A	0.982	0.986	0.117	3.54E-17	14741	0.019	-0.007	0.170	0.969	15815
			rs7481173	T	G	0.674	0.242	0.029	7.13E-17	14741	0.339	-0.014	0.049	0.772	15815
			rs767896	T	C	0.653	-0.282	0.029	2.38E-22	14741	0.297	-0.003	0.051	0.959	15815
			rs7766015	C	T	0.560	-0.266	0.025	1.94E-26	14741	0.576	0.059	0.047	0.208	15815
			rs7776597	G	A	0.973	0.363	0.066	3.80E-08	14741	0.953	0.003	0.109	0.975	15815
			rs78037977	G	A	0.882	-0.249	0.042	3.06E-09	14741					

Type 1 diabetes	COVID-19 recovery time with colchicine treatment	357.72	rs115008112	A	G	0.908	-0.622	0.069	1.98E-19	14741	0.077	-0.154	0.092	0.096	15815
			rs11539216	A	G	0.950	-0.892	0.077	4.94E-31	14741	0.058	-0.141	0.107	0.187	15815
			rs115469976	C	T	0.982	1.717	0.091	2.09E-79	14741	0.030	-0.014	0.142	0.922	15815
			rs11727369	A	G	0.623	0.161	0.025	1.19E-10	14741	0.356	-0.005	0.051	0.914	15815
			rs11758136	A	G	0.959	-0.632	0.090	2.18E-12	14741	0.027	-0.037	0.148	0.801	15815
			rs1233478	T	G	0.840	0.558	0.030	3.21E-77	14741	0.199	0.098	0.061	0.108	15815
			rs1264622	T	C	0.842	0.373	0.029	7.36E-38	14741	0.201	0.065	0.061	0.285	15815
			rs12722496	G	A	0.921	-0.438	0.044	2.41E-23	14741	0.109	0.012	0.080	0.882	15815
			rs12919083	C	A	0.671	-0.218	0.027	6.80E-16	14741	0.324	-0.026	0.052	0.615	15815
			rs13215	A	C	0.932	-0.378	0.066	1.02E-08	14741	0.051	-0.056	0.111	0.615	15815
			rs13437000	C	T	0.812	-0.673	0.038	3.48E-70	14741	0.182	-0.117	0.064	0.070	15815
			rs138522604	G	T	0.985	-1.246	0.198	3.12E-10	14741	0.012	0.041	0.237	0.862	15815
			rs143933760	T	C	0.988	1.613	0.127	5.85E-37	14741	0.008	-0.078	0.292	0.790	15815
			rs144112342	C	T	0.980	-1.231	0.142	4.36E-18	14741	0.025	-0.034	0.161	0.834	15815
			rs145130687	G	T	0.973	-0.684	0.082	7.34E-17	14741	0.045	-0.022	0.117	0.851	15815
			rs145568234	G	T	0.986	-0.932	0.129	5.02E-13	14741	0.025	0.060	0.172	0.726	15815
			rs148347131	T	C	0.974	0.587	0.082	8.15E-13	14741	0.021	0.264	0.200	0.186	15815
			rs148571474	T	C	0.971	-0.633	0.105	1.65E-09	14741	0.027	0.274	0.150	0.067	15815
			rs148600179	C	T	0.828	0.446	0.043	3.32E-25	14741	0.157	-0.027	0.084	0.751	15815
			rs148759934	T	C	0.984	-0.959	0.148	9.19E-11	14741	0.015	0.067	0.211	0.749	15815
			rs169504	A	C	0.852	1.021	0.032	1.00E-200	14741	0.186	0.022	0.064	0.734	15815
			rs17207622	T	G	0.971	-0.897	0.112	1.16E-15	14741	0.026	-0.157	0.150	0.296	15815
			rs17208209	G	A	0.981	-1.872	0.234	1.24E-15	14741	0.023	-0.175	0.179	0.329	15815
			rs184489107	T	C	0.984	1.338	0.110	4.85E-34	14741	0.012	-0.144	0.224	0.521	15815
			rs209139	A	C	0.958	-0.556	0.063	1.09E-18	14741	0.059	0.026	0.104	0.806	15815
			rs210211	A	G	0.894	0.364	0.047	9.58E-15	14741	0.897	-0.055	0.080	0.496	15815
			rs2267633	G	A	0.894	-0.528	0.044	3.55E-33	14741	0.124	0.007	0.075	0.928	15815
			rs2269242	A	G	0.765	0.168	0.030	2.14E-08	14741	0.203	0.042	0.061	0.488	15815
			rs2383983	G	A	0.612	0.138	0.025	3.39E-08	14741	0.368	0.051	0.051	0.317	15815
			rs2516491	C	A	0.748	0.841	0.029	6.58E-185	14741	0.271	0.012	0.055	0.830	15815
			rs2532924	C	T	0.568	0.359	0.029	3.38E-35	14741	0.563	-0.006	0.049	0.906	15815
			rs2596501	T	C	0.534	-0.404	0.025	9.66E-59	14741	0.470	-0.003	0.049	0.947	15815
			rs2726039	A	G	0.586	0.147	0.026	1.57E-08	14741	0.400	-0.029	0.051	0.565	15815
			rs2734973	T	C	0.872	-0.453	0.043	5.97E-26	14741	0.123	-0.101	0.074	0.171	15815
			rs2791332	T	C	0.749	0.328	0.026	1.74E-36	14741	0.289	0.073	0.054	0.179	15815
			rs2844697	T	C	0.670	0.633	0.027	1.51E-121	14741	0.371	0.010	0.050	0.837	15815
			rs2844746	C	T	0.633	0.483	0.026	4.94E-77	14741	0.627	0.008	0.051	0.872	15815
			rs28752520	C	T	0.739	-1.242	0.041	1.00E-200	14741	0.252	-0.022	0.057	0.697	15815
			rs2894233	G	A	0.985	-1.788	0.243	1.87E-13	14741	0.024	-0.303	0.185	0.102	15815
			rs3087243	A	G	0.530	-0.178	0.025	1.08E-12	14741	0.451	-0.063	0.049	0.203	15815
			rs3180379	C	A	0.715	-0.829	0.042	1.02E-86	14741	0.262	-0.102	0.063	0.104	15815
			rs33998987	C	T	0.664	-0.198	0.028	1.53E-12	14741	0.326	0.015	0.052	0.779	15815
			rs34302671	G	A	0.903	-0.249	0.043	7.01E-09	14741	0.105	0.035	0.079	0.656	15815
			rs34569761	G	A	0.910	0.408	0.035	2.11E-31	14741	0.122	0.230	0.075	0.002	15815
			rs34613987	T	C	0.919	0.423	0.035	1.26E-33	14741	0.125	0.138	0.073	0.059	15815
			rs35029304	C	T	0.969	-0.464	0.070	2.30E-11	14741	0.050	0.043	0.117	0.713	15815
			rs374532386	T	C	0.973	1.078	0.081	2.06E-40	14741	0.017	-0.233	0.279	0.405	15815
			rs4850921	G	T	0.619	-0.146	0.026	1.96E-08	14741	0.358	-0.021	0.051	0.681	15815
			rs4959027	G	A	0.793	2.094	0.061	1.00E-200	14741	0.764	0.179	0.058	0.002	15815
			rs4999716	A	C	0.897	0.550	0.040	5.09E-43	14741	0.096	-0.070	0.086	0.416	15815
			rs56376830	G	A	0.686	-0.392	0.034	9.38E-31	14741	0.341	0.041	0.051	0.419	15815
			rs58540156	T	C	0.979	0.818	0.114	7.21E-13	14741	0.013	0.152	0.243	0.533	15815
			rs6043405	C	T	0.662	0.144	0.026	3.05E-08	14741	0.647	0.019	0.051	0.717	15815
			rs62395766	C	A	0.989	-1.077	0.164	5.13E-11	14741	0.016	-0.384	0.193	0.046	15815
			rs6679677	C	A	0.909	0.695	0.038	1.00E-74	14741	0.103	0.013	0.079	0.865	15815
			rs6902536	G	A	0.901	-1.451	0.083	1.97E-68	14741	0.079	0.009	0.099	0.924	15815
			rs6908626	T	G	0.823	0.216	0.034	2.11E-10	14741	0.175	0.022	0.066	0.739	15815
			rs6926599	A	G	0.973	0.357	0.059	1.44E-09	14741	0.037	0.076	0.126	0.549	15815
			rs7226035	T	C	0.606	0.162	0.026	4.64E-10	14741	0.645	-0.038	0.051	0.460	15815
			rs7297175	C	T	0.588	-0.246	0.025	7.57E-23	14741	0.576	-0.012	0.050	0.806	15815
			rs74598819	G	T	0.982	0.986	0.117	3.54E-17	14741	0.019	-0.022	0.179	0.902	15815
			rs7481173	T	G	0.674	0.242	0.029	7.13E-17	14741	0.339	-0.009	0.052	0.858	15815
			rs767896	T	C	0.653	-0.282	0.029	2.38E-22	14741	0.297	0.008	0.054	0.882	15815
			rs7766015	C	T	0.560	-0.266	0.025	1.94E-26	14741	0.576	0.048	0.050	0.334	15815
			rs7776597	G	A	0.973	0.363	0.066	3.80E-08	14741	0.953	-0.007	0.115	0.952	15815
			rs78037977	G	A	0.882	-0.249	0.042	3.06E-09	14741	0.125	0.065	0.074	0.381	15815
			rs80054410	C	T	0.643	0.175	0.025	2.56E-12	14741	0.371	0.008	0.051	0.878	15815
			rs8283	G	A	0.792	-0.736	0.041	4.69E-72	14741	0.173	-0.040	0.065	0.535	15815
			rs9262551	C	T	0.973	1.167	0.085	6.77E-43	14741	0.022	-0.186	0.165	0.258	15815
			rs9276931	G	A	0.912	0.873	0.038	8.54E-117	14741	0.116	0.091	0.076	0.234	15815
			rs9366622	C	T	0.862	-0.327	0.034	6.74E-22	14741	0.858	-0.163	0.071	0.021	15815
			rs9380199	G	A	0.685	0.167	0.027	6.20E-10	14741	0.276	0.072	0.055	0.187	15815
			rs9467638	A	G	0.950	0.365	0.057	1.52E-10	14741	0.046	0.072	0.119	0.547	15815
			rs9501640	C	A	0.989	-1.738	0.199	2.47E-18	14741	0.014	0.191	0.216	0.378	15815
			rs10814914	C	T	0.531	-0.146	0.025	5.22E-09	1474					

Type 1 diabetes COVID-19 recovery time with placebo treatment	360.65	rs2174281	C	T	0.541	0.151	0.025	1.54E-09	14741	0.480	-0.013	0.057	0.820	872
		rs2301055	C	T	0.766	0.169	0.031	4.99E-08	14741	0.200	0.019	0.073	0.800	872
		rs231779	T	C	0.647	0.176	0.025	1.92E-12	14741	0.340	-0.130	0.061	0.037	872
		rs2523948	T	G	0.603	0.349	0.026	4.43E-41	14741	0.420	0.071	0.059	0.230	872
		rs28752520	C	T	0.739	-1.242	0.041	1.00E-200	14741	0.330	0.069	0.063	0.270	872
		rs3117192	C	T	0.884	0.355	0.045	3.05E-15	14741	0.120	0.098	0.090	0.280	872
		rs3129823	A	G	0.902	0.575	0.033	5.40E-68	14741	0.082	0.000	0.110	1.000	872
		rs3130627	T	G	0.855	0.908	0.030	1.00E-200	14741	0.140	0.025	0.085	0.770	872
		rs3132572	A	G	0.906	0.646	0.048	2.75E-41	14741	0.073	0.060	0.110	0.600	872
		rs34767257	A	G	0.925	0.875	0.045	3.25E-84	14741	0.066	-0.013	0.120	0.920	872
		rs35718543	A	G	0.907	-0.343	0.053	9.69E-11	14741	0.110	-0.034	0.091	0.710	872
		rs449073	G	T	0.675	0.395	0.028	3.43E-45	14741	0.300	0.073	0.063	0.250	872
		rs4713691	A	G	0.766	0.235	0.027	3.21E-18	14741	0.250	0.005	0.066	0.940	872
		rs4850921	T	G	0.619	-0.146	0.026	1.96E-08	14741	0.340	-0.090	0.060	0.130	872
		rs5753025	C	T	0.601	-0.164	0.025	5.38E-11	14741	0.420	-0.045	0.060	0.450	872
		rs59233561	T	C	0.948	-0.501	0.054	1.73E-20	14741	0.080	0.076	0.100	0.460	872
		rs6043409	G	A	0.660	0.143	0.026	3.80E-08	14741	0.350	-0.053	0.062	0.390	872
		rs62636895	A	G	0.919	-0.442	0.057	8.88E-15	14741	0.093	0.030	0.097	0.760	872
		rs6827756	C	T	0.622	-0.160	0.025	1.55E-10	14741	0.380	0.009	0.061	0.880	872
		rs6930138	A	G	0.560	-0.266	0.025	1.94E-26	14741	0.440	-0.130	0.061	0.033	872
		rs6933763	G	A	0.915	-0.472	0.055	9.34E-18	14741	0.098	-0.120	0.097	0.220	872
		rs71565361	A	C	0.940	-0.640	0.068	4.88E-21	14741	0.066	0.340	0.110	0.002	872
		rs7226035	T	C	0.606	0.162	0.026	4.64E-10	14741	0.400	-0.130	0.058	0.023	872
		rs73402240	T	C	0.967	-0.607	0.083	2.61E-13	14741	0.052	0.022	0.130	0.860	872
		rs7776597	G	A	0.973	0.363	0.066	3.80E-08	14741	0.050	-0.130	0.140	0.350	872
		rs77831222	A	G	0.953	0.446	0.061	2.64E-13	14741	0.063	0.036	0.120	0.760	872
		rs78037977	G	A	0.882	-0.249	0.042	3.06E-09	14741	0.120	-0.019	0.088	0.830	872
		rs8283	G	A	0.792	-0.736	0.041	4.69E-72	14741	0.210	0.120	0.069	0.095	872
		rs9257802	T	C	0.841	0.482	0.030	4.37E-58	14741	0.150	0.058	0.084	0.490	872
		rs9268005	A	C	0.666	1.131	0.034	1.00E-200	14741	0.310	-0.066	0.061	0.280	872
		rs9277517	A	G	0.798	0.303	0.034	5.02E-19	14741	0.320	-0.110	0.063	0.079	872
		rs9366622	C	T	0.862	-0.327	0.034	6.74E-22	14741	0.120	-0.040	0.088	0.650	872
		rs9393867	T	C	0.870	-0.241	0.041	4.15E-09	14741	0.130	0.140	0.085	0.096	872
		rs10814914	C	T	0.531	-0.146	0.025	5.22E-09	14741	0.460	-0.063	0.058	0.280	851
		rs11065979	T	C	0.561	0.270	0.025	3.44E-27	14741	0.440	0.040	0.059	0.500	851
		rs11171739	T	C	0.585	-0.241	0.025	5.42E-22	14741	0.420	0.029	0.058	0.610	851
		rs11964507	T	C	0.950	0.294	0.052	1.57E-08	14741	0.067	0.032	0.110	0.770	851
		rs12126425	G	A	0.893	0.297	0.038	5.46E-15	14741	0.100	-0.077	0.095	0.420	851
		rs1225716	C	A	0.749	0.328	0.026	1.74E-36	14741	0.270	-0.085	0.068	0.210	851
		rs12828640	G	A	0.578	-0.171	0.025	7.92E-12	14741	0.440	0.052	0.059	0.380	851
		rs1468253	C	T	0.833	-0.198	0.034	5.76E-09	14741	0.170	-0.059	0.077	0.450	851
		rs17133805	G	T	0.684	-0.154	0.028	3.80E-08	14741	0.290	0.039	0.063	0.540	851
		rs17177816	A	G	0.960	-0.661	0.068	2.46E-22	14741	0.060	-0.068	0.120	0.590	851
		rs17212350	G	A	0.762	-1.319	0.047	2.71E-173	14741	0.290	0.020	0.064	0.750	851
		rs2071590	G	A	0.636	0.627	0.029	1.15E-103	14741	0.370	-0.019	0.062	0.760	851
		rs210120	G	A	0.572	0.273	0.025	9.25E-28	14741	0.490	-0.043	0.057	0.450	851
		rs2174281	C	T	0.541	0.151	0.025	1.54E-09	14741	0.500	-0.036	0.058	0.540	851
		rs2253802	T	C	0.957	-0.405	0.071	1.17E-08	14741	0.051	-0.050	0.140	0.720	851
		rs2301055	C	T	0.766	0.169	0.031	4.99E-08	14741	0.200	-0.020	0.071	0.780	851
		rs231779	T	C	0.647	0.176	0.025	1.92E-12	14741	0.320	-0.059	0.064	0.350	851
		rs2523948	T	G	0.603	0.349	0.026	4.43E-41	14741	0.460	-0.051	0.056	0.370	851
		rs28752520	C	T	0.739	-1.242	0.041	1.00E-200	14741	0.330	0.097	0.063	0.130	851
		rs3117192	C	T	0.884	0.355	0.045	3.05E-15	14741	0.120	-0.062	0.090	0.490	851
		rs3129823	A	G	0.902	0.575	0.033	5.40E-68	14741	0.093	-0.027	0.110	0.810	851
		rs3130627	T	G	0.855	0.908	0.030	1.00E-200	14741	0.150	-0.006	0.087	0.950	851
		rs3132572	A	G	0.906	0.646	0.048	2.75E-41	14741	0.078	-0.150	0.120	0.180	851
		rs34767257	A	G	0.925	0.875	0.045	3.25E-84	14741	0.068	-0.130	0.120	0.270	851
		rs35718543	A	G	0.907	-0.343	0.053	9.69E-11	14741	0.120	0.110	0.086	0.190	851
		rs449073	G	T	0.675	0.395	0.028	3.43E-45	14741	0.290	-0.015	0.065	0.810	851
		rs4713691	A	G	0.766	0.235	0.027	3.21E-18	14741	0.260	-0.051	0.066	0.450	851
		rs4850921	T	G	0.619	-0.146	0.026	1.96E-08	14741	0.360	0.076	0.059	0.200	851
		rs5753025	C	T	0.601	-0.164	0.025	5.38E-11	14741	0.400	0.075	0.062	0.220	851
		rs59233561	T	C	0.948	-0.501	0.054	1.73E-20	14741	0.073	-0.150	0.120	0.190	851
		rs6043409	G	A	0.660	0.143	0.026	3.80E-08	14741	0.350	-0.110	0.058	0.065	851
		rs62636895	A	G	0.919	-0.442	0.057	8.88E-15	14741	0.090	-0.160	0.100	0.120	851
		rs6827756	C	T	0.622	-0.160	0.025	1.55E-10	14741	0.380	0.023	0.060	0.700	851
		rs6930138	A	G	0.560	-0.266	0.025	1.94E-26	14741	0.420	0.011	0.058	0.850	851
		rs6933763	G	A	0.915	-0.472	0.055	9.34E-18	14741	0.093	0.110	0.095	0.260	851
		rs71565361	A	C	0.940	-0.640	0.068	4.88E-21	14741	0.066	-0.140	0.120	0.240	851
		rs7226035	T	C	0.606	0.162	0.026	4.64E-10	14741	0.390	0.140	0.061	0.025	851
		rs77831222	A	G	0.953	0.446	0.061	2.64E-13	14741	0.057	-0.055	0.130	0.670	851
		rs78037977	G	A	0.882	-0.249	0.042	3.06E-09	14741	0.110	0.120	0.091	0.200	851
		rs8283	G	A	0.792	-0.736	0.041	4.69E-72	14741	0.210	0.028	0.071	0.700	851
		rs9257802	T	C	0.841	0.482	0.030	4						