The supplementary document of "LLR: A latent low-rank approach to colocalizing genetic risk variants in multiple GWAS"

Jin Liu^{*1}, Xiang Wan^{*2}, Chaolong Wang³, Chao Yang⁴, Xiaowei Zhou⁵, and Can Yang^{†6}

¹Center of Quantitative Medicine, Duke-NUS Graduate Medical School, Singapore
²Department of Computer Science, Hong Kong Baptist University, Hong Kong, China
³Genome Institute of Singapore, A*STAR, Singapore
⁴Baidu Inc., Shanghai, China
⁵Computer and Information Science, University of Pennsylvania, USA
⁶Department of Mathematics, Hong Kong University of Science and Technology, Hong Kong, China

July 9, 2017

1 Details of derivation of likelihood function

The marginalization of equation (5) in the main article can be written as

$$\Pr(\mathbf{Z}_{lk}) = \Pr(\mathbf{Z}_{lk}, \eta_{lk} = 1) + \Pr(\mathbf{Z}_{lk}, \eta_{lk} = 0).$$
(S1)

Now we can derive the marginalization over this partition. The first part is

$$Pr(\mathbf{Z}_{lk}, \eta_{lk} = 1)$$

$$=Pr(\eta_{lk} = 1) \sum_{\boldsymbol{\gamma}_{lk}} Pr(\mathbf{Z}_{lk}, \boldsymbol{\gamma}_{lk} | \eta_{lk} = 1))$$

$$=Pr(\eta_{lk} = 1) \sum_{j=1}^{M_l} Pr(\mathbf{Z}_{lk} | \boldsymbol{\gamma}_{lk} (j = 1)) Pr(\boldsymbol{\gamma}_{lk} (j = 1) | \eta_{lk} = 1))$$

$$=\pi_k \sum_{j=1}^{M_l} \frac{1}{M_l} Pr(\mathbf{Z}_{lk} | \boldsymbol{\gamma}_{lk} (j = 1)),$$
(S2)

*Joint first author

[†]Correspondence author

where $\Pr(\mathbf{Z}_{lk}|\boldsymbol{\gamma}_{lk}(j=1)) = \mathcal{N}\left(\boldsymbol{\Sigma}_{l}[\boldsymbol{\lambda}_{lk} \circ \boldsymbol{\gamma}_{lk}(j=1)], \boldsymbol{\Sigma}_{l}\right)$ and $\Pr(\boldsymbol{\gamma}_{lk}(j=1)|\boldsymbol{\eta}_{lk}=1)) = \frac{1}{M_{l}}$ (non-informative prior over M_{l} configurations of $\boldsymbol{\gamma}_{lk}$). Note that the second equality holds because we assumed only one risk SNP in locus l.

The second part is

$$Pr(\mathbf{Z}_{lk}, \eta_{lk} = 0)$$

=Pr($\eta_{lk} = 0$)Pr($\mathbf{Z}_{lk} | \boldsymbol{\gamma}_{lk} = \mathbf{0}$)Pr($\boldsymbol{\gamma}_{lk} = \mathbf{0} | \eta_{lk} = 0$))
=($1 - \pi_k$)Pr($\mathbf{Z}_{lk} | \boldsymbol{\gamma}_{lk} = \mathbf{0}$), (S3)

where $\Pr(\mathbf{Z}_{lk}|\boldsymbol{\gamma}_{lk} = \mathbf{0}) = \mathcal{N}(\mathbf{0}, \boldsymbol{\Sigma}_l)$ and $\Pr(\boldsymbol{\gamma}_{lk} = \mathbf{0}|\boldsymbol{\eta}_{lk} = 0)) = 1$.

Combination of Equations (S2) and (S3) gives Equation (6) in the main article.

2 The theoretical justification of the EM-path algorithm

In this section, we justify our EM-path algorithm by characterizing the update in M-step as steepest descent such that the ascent condition holds during the EM iterations. Consider the part of the logistic log-likelihood function in the Q function at the *t*-th iteration

$$f(\mathbf{X}, \mathbf{x}_0) = \sum_{k=1}^{K} \sum_{l=1}^{L} \left\{ \mathbb{E}_{\Theta^{(t)}}[\eta_{lk} | \mathbf{Z}] \log \pi_{lk} + \mathbb{E}_{\Theta^{(t)}}[1 - \eta_{lk} | \mathbf{Z}] \log(1 - \pi_{lk}) \right\}.$$

The first order Taylor approximation of $f(\mathbf{X} + \mathbf{W}, \mathbf{x}_0 + \mathbf{w}_0)$ is

$$f(\mathbf{X} + \mathbf{W}, \mathbf{x}_0 + \mathbf{w}_0) \approx \tilde{f}(\mathbf{X} + \mathbf{W}, \mathbf{x}_0 + \mathbf{w}_0) = f(\mathbf{X}, \mathbf{x}_0) + \operatorname{tr}(\mathbf{W}^\top \mathbf{G}^{(t)}) + \mathbf{w}_0^\top \mathbf{g}^{(t)}.$$
 (S4)

Since $\operatorname{tr}(\mathbf{W}^{\top}\mathbf{G}^{(t)})$ and $\mathbf{w}_{0}^{\top}\mathbf{g}^{(t)}$ are linear in \mathbf{W} and \mathbf{w}_{0} , respectively, $\tilde{f}(\mathbf{X}+\mathbf{W},\mathbf{x}_{0}+\mathbf{w}_{0})$ can be made as positive as possible by taking \mathbf{W} and \mathbf{w}_{0} large. To make the optimization problem sensible, the steepest ascent method restricts the norm of \mathbf{W} and \mathbf{w}_{0} . Let $\|\cdot\|_{m}$ and $\|\cdot\|_{v}$ be any matrix and vector norms, respectively. The steepest ascent direction is given as

$$(\boldsymbol{\Delta}, \boldsymbol{\Delta}_0) = \arg \max_{\mathbf{W}, \mathbf{w}_0} \{ \operatorname{tr}(\mathbf{W}^\top \mathbf{G}^{(t)}) + \mathbf{w}_0^\top \mathbf{g}^{(t)} \}, \text{ subject to } \|\mathbf{W}\|_m \le 1, \|\mathbf{w}_0\|_v \le 1,$$
(S5)

With the ascent direction, \mathbf{X} and \mathbf{x}_0 can be updated as

$$\mathbf{X} = \mathbf{X} + \epsilon \mathbf{\Delta},$$

$$\mathbf{x}_0 = \mathbf{x}_0 + \epsilon \mathbf{\Delta}_0,$$
(S6)

where ϵ is the step size. Typically, the step size ϵ can be chosen by line search. For our application, we tried $\epsilon = 0.1, 0.05, 0.01, 0.005, 0.001$ and find that the choice of step size ϵ is intensive to estimation of posterior probabilities $\Pr(\eta_{lk} = 1 | \mathbf{Z})$ and $\Pr(\eta_{lk} = 1, \gamma_{lk}(j = 1) | \mathbf{Z})$. In our simulation and real data analysis, we simply set $\epsilon = 0.05$. We noticed some other strategies for tuning the step size are available in [?].

In our case, we consider the nuclear norm $\|\cdot\|_*$ for matrices and the L_2 norm $\|\cdot\|_2$ for vectors. Hence optimization problem (S5) becomes

$$(\boldsymbol{\Delta}, \boldsymbol{\Delta}_0) = \arg \max_{\mathbf{W}, \mathbf{w}_0} \{ \operatorname{tr}(\mathbf{W}^\top \mathbf{G}^{(t)}) + \mathbf{w}_0^\top \mathbf{g}^{(t)} \}, \text{ subject to } \|\mathbf{W}\|_* \le 1, \|\mathbf{w}_0\|_2 \le 1,$$
(S7)

Note that the updates for \mathbf{W} and \mathbf{w}_0 are separable. We first consider optimization problem

$$\boldsymbol{\Delta} = \operatorname*{arg\,max}_{\mathbf{W}} \operatorname{tr}(\mathbf{W}^{\top} \mathbf{G}^{(t)}), \text{ subject to } \|\mathbf{W}\|_{*} \leq 1.$$

Using the fact that the dual of the trace norm $\|\mathbf{W}\|_*$ is the spectral norm $\|\mathbf{W}\|_2$, the closed form solution is given as [?] is given by

$$\boldsymbol{\Delta} = \mathbf{u}\mathbf{v}^{\top},\tag{S8}$$

with \mathbf{u} , \mathbf{v} being leading left and right singular vectors, respectively, of $\mathbf{G}^{(t)}$. Notice that obtaining leading singular vectors \mathbf{u} and \mathbf{v} is much cheaper than singular value decomposition. Clearly, \mathbf{v} is given by the leading eigenvector of $[\mathbf{G}^{(t)}]^T \mathbf{G}^{(t)}$ which is a $K \times K$ matrix, where K is the number of studies and is much smaller than the number of loci L. Then $\mathbf{u} = \mathbf{Gv}/\|\mathbf{Gv}\|_2$.

Similarly for the intercepts, the optimal solution for Δ_0 can be written as

$$\boldsymbol{\Delta}_0 = \epsilon \frac{\mathbf{g}^{(t)}}{\|\mathbf{g}^{(t)}\|_2}.$$
(S9)

Since the steepest accent method ensures the ascent condition $Q(\Theta^{(t+1)}; \Theta^{(t)}) \ge Q(\Theta^{(t)}; \Theta^{(t)})$, we can guarantee the convergence of the EM-path algorithm. For completeness, we summarize the EM-path algorithm in Algorithm 1.

Algorithm 1: The proposed EM-path Algorithm)
Parameters: $\mathbf{\Theta} = {\mathbf{x}_0, \mathbf{X}}$
Initialize $\mathbf{x}_0^{(0)}$ using separate models on each trait k and $\mathbf{X}^{(0)} = 0$.
for $t = 1, 2,, t,, T$ do
E-step:
update posterior of γ and η .
M-step:
update $\mathbf{x}_0^{(t)}$ and $\mathbf{X}^{(t)}$ using (S6).
end

3 More details about cross validation

For ten-fold cross validation, we randomly partition $L \times K$ entries in η into five folds with roughly equal sizes, $\Omega_1, \ldots, \Omega_5$, such that $\Omega_1 \cup \cdots \cup \Omega_5 = \Omega$ and $\Omega_1 \cap \cdots \cap \Omega_5 = \emptyset$. For the first around, denote the training index as $\Omega_{\text{train}_1} = \Omega_1 \cup \cdots \cup \Omega_4$ and $\Omega_{\text{test}_1} = \Omega_5$. The overall incomplete-data log-likelihood

$$\ell^{\mathrm{p}}(\boldsymbol{\Theta}) = \sum_{k=1}^{K} \sum_{l=1}^{L} \log \left\{ (1 - \pi_{lk}) \mathcal{N}(\boldsymbol{0}, \boldsymbol{\Sigma}_{l}) + \pi_{lk} \left[\sum_{j=1}^{M_{l}} \frac{1}{M_{l}} \mathcal{N} \left(\boldsymbol{\Sigma}_{l} [\boldsymbol{\lambda}_{lk} \circ \boldsymbol{\gamma}_{lk}(j=1)], \boldsymbol{\Sigma}_{l} \right) \right] \right\},$$
(S10)

should be modified for training as

$$\ell^{\mathrm{p}}(\boldsymbol{\Theta}) = \sum_{(l,k)\in\Omega_{\mathrm{train}_{1}}} \log \left\{ (1 - \pi_{lk}) \mathcal{N}(\boldsymbol{0}, \boldsymbol{\Sigma}_{l}) + \pi_{lk} \Big[\sum_{j=1}^{M_{l}} \frac{1}{M_{l}} \mathcal{N}\Big(\boldsymbol{\Sigma}_{l} [\boldsymbol{\lambda}_{lk} \circ \boldsymbol{\gamma}_{lk}(j=1)], \boldsymbol{\Sigma}_{l} \Big) \Big] \right\}.$$
(S11)

Accordingly, log-likelihood on the testing data is given as

$$\ell^{\mathbf{p}}(\boldsymbol{\Theta}) = \sum_{(l,k)\in\Omega_{\text{test}_{1}}} \log \left\{ (1 - \pi_{lk}) \mathcal{N}(\mathbf{0}, \boldsymbol{\Sigma}_{l}) + \pi_{lk} \left[\sum_{j=1}^{M_{l}} \frac{1}{M_{l}} \mathcal{N}\left(\boldsymbol{\Sigma}_{l}[\boldsymbol{\lambda}_{lk} \circ \boldsymbol{\gamma}_{lk}(j=1)], \boldsymbol{\Sigma}_{l}\right) \right] \right\}.$$
(S12)

Indeed, this is the cross-validation strategy often used in matrix completion, e.g., [?].

4 More results in the simulation experiment.

In this section, we present more simulation results.



4.1 More results for summary-statistic-level simulation

Figure S1: The AUC (top) and FDR (bottom) of all methods for SNP prioritization in summarystatistic-level simulation (the first scenario) with the number of loci L = 500 and the heritability $h^2 = 0.3, 0.4$ and 0.5 and the within-locus correlation $\rho = 0.2, 0.5$ and 0.8. Note that the FDR were evaluated with the nominal FDR controlled at the target of 0.1. The results in each setting are summarized from 50 replications.



Figure S2: The AUC (top) and FDR (bottom) of all methods for SNP prioritization in summarystatistic-level simulation (the first scenario) with the number of loci L = 2,000, the heritability $h^2 = 0.3, 0.4$ and 0.5 and the within-locus correlation $\rho = 0.2, 0.5$ and 0.8. Note that the FDR were evaluated with the nominal FDR controlled at the target of 0.1. The results in each setting are summarized from 50 replications.



4.2 The performance for individual-level simulation

Figure S3: Performance comparison of LLR, GPA, GPA-Joint and PAINTOR (individual-level simulation) with the number of loci L = 500 (left panel) and L = 2000 (right panel). In each panel, the four methods are tested with heritability $h^2 = 0.3, 0.4$, and 0.5, and within-locus correlation $\rho = 0.2, 0.5$, and 0.8. The results in each setting are summarized from 50 replications.



Figure S4: The AUC (top) and FDR (bottom) of all methods for SNP prioritization in individuallevel simulation (the second scenario) at the number of loci L = 500 and the heritability $h^2 = 0.3, 0.4$ and 0.5 and within-locus correlation $\rho = 0.2, 0.5$ and 0.8. Note that the FDR were evaluated when the nominal FDR was controlled at the target of 0.1. The results in each setting are summarized from 50 replications.



Figure S5: The AUC (top) and FDR (bottom) of all methods for SNP prioritization in individuallevel simulation with the number of loci L = 2,000, the heritability $h^2 = 0.3, 0.4$ and 0.5 and the within-locus correlation $\rho = 0.2, 0.5$ and 0.8. Note that the FDR were evaluated with the nominal FDR controlled at the target of 0.1. The results in each setting are summarized from 50 replications.



4.3 The performance on data sets with no pleiotropy

Figure S6: The AUC (top) and FDR (bottom) of Sep (separate analysis) and LLR for SNP prioritization accuracy using data sets with no pleiotropy at the number of loci L = 500, the heritability $h^2 = 0.3, 0.4$ and 0.5 and within-locus correlation $\rho = 0.2, 0.5$ and 0.8. Note that the FDR were evaluated with the nominal FDR controlled at the target of 0.1. The results are based on 50 simulations.



Figure S7: The AUC (top) and FDR (bottom) of Sep (separate analysis) and LLR for SNP prioritization accuracy using data sets with no pleiotropy at the number of loci L = 2000, the heritability $h^2 = 0.3, 0.4$ and 0.5 and within-locus correlation $\rho = 0.2, 0.5$ and 0.8. Note that the FDR were evaluated with the nominal FDR controlled at the target of 0.1. The results are based on 50 simulations.



4.4 The performance on the locus level

Figure S8: The AUC (top) and FDR (bottom) of Sep (separated analysis) and LLR for locus prioritization using summary data at the number of loci L = 2,000, the true NCP at ncp = 2.5, 3 and 3.5 and within-locus correlation $\rho = 0.2, 0.5$ and 0.8. Note that the FDR were evaluated with the nominal FDR controlled at the target of 0.1. The results are based on 50 simulations.



Figure S9: The AUC (top) and FDR (bottom) of Sep (separated analysis) and LLR for locus prioritization using genotype data at the number of loci L = 2,000, the true NCP at ncp = 2.5, 3 and 3.5 and within-locus correlation $\rho = 0.2, 0.5$ and 0.8. Note that the FDR were evaluated with the nominal FDR controlled at the target of 0.1. The results are based on 50 simulations.

4.5 The performance using true NCP

4.5.1 SNP level



Figure S10: The AUC (top) and FDR (bottom) of Sep (separate analysis) and LLR using true NCP for SNP prioritization accuracy using summary data at the number of loci L = 500, the true NCP at ncp = 2.5, 3 and 3.5 and within-locus correlation $\rho = 0.2, 0.5$ and 0.8. Note that the FDR were evaluated with the nominal FDR controlled at the target of 0.1. The results are based on 50 simulations.

4.5.2 Locus level



Figure S11: The AUC (top) and FDR (bottom) of Sep (separated analysis) and LLR using true NCP for SNP prioritization using summary data at the number of loci L = 2,000, the true NCP at ncp = 2.5, 3 and 3.5 and within-locus correlation $\rho = 0.2, 0.5$ and 0.8. Note that the FDR were evaluated with the nominal FDR controlled at the target of 0.1. The results are based on 50 simulations.



Figure S12: The AUC (top) and FDR (bottom) of Sep (separate analysis) and LLR using true NCP for locus prioritization accuracy using summary data at the number of loci L = 500, the true NCP at ncp = 2.5, 3 and 3.5 and within-locus correlation $\rho = 0.2, 0.5$ and 0.8. Note that the FDR were evaluated with the nominal FDR controlled at the target of 0.1. The results are based on 50 simulations.



Figure S13: The AUC (top) and FDR (bottom) of Sep (separated analysis) and LLR using true NCP for locus prioritization using summary data at the number of loci L = 2,000, the true NCP at ncp = 2.5,3 and 3.5 and within-locus correlation $\rho = 0.2, 0.5$ and 0.8. Note that the FDR were evaluated with the nominal FDR controlled at the target of 0.1. The results are based on 50 simulations.



Figure S14: The comparison of FDR under different thresholds (3.7, 4.6 and 5.3) in LLR.

4.5.3 Simulation study with different correlation structures

For the above simulation studies, we used autoregressive structure to simulate the correlation among SNPs. We further evaluated our method under different correlation structures:

• Equal correlation matrix

$$\boldsymbol{\Sigma}(j,k) = \begin{cases} 1 & \text{if } j = k, \\ \rho & \text{if } j \neq k. \end{cases}$$
(S13)

• Banded correlation matrix

$$\Sigma(j,k) = \begin{cases} 1 & \text{if } j = k, \\ \rho & \text{if } |j-k| = 1, \\ \rho/2 & \text{if } |j-k| = 2, \\ 0 & \text{otherwise.} \end{cases}$$
(S14)

We varied parameter $\rho \in \{0.2, 0.4, 0.6\}$ to mimic different levels of correlation among SNPs. The results shown in Figures 4.5.3 and 4.5.3 indicate that the FDR of LLR can be controlled at nominal level 0.1 with non centrality parameter 5.3 under different correlation structures.



Figure S15: The AUC (top) and FDR (bottom) of all methods for SNP prioritization in summarystatistic-level simulation with the number of loci L = 500 and the heritability $h^2 = 0.3, 0.4$ and 0.5 and the within-locus correlation $\rho = 0.2, 0.4$ and 0.6 under equal correlation structure. Note that the FDR were evaluated with the nominal FDR controlled at the target of 0.1. The results in each setting are summarized from 50 replications.



Figure S16: The AUC (top) and FDR (bottom) of all methods for SNP prioritization in summarystatistic-level simulation with the number of loci L = 500, the heritability $h^2 = 0.3, 0.4$ and 0.5 and the within-locus correlation $\rho = 0.2, 0.4$ and 0.6 under banded correlation structure. Note that the FDR were evaluated with the nominal FDR controlled at the target of 0.1. The results in each setting are summarized from 50 replications.



4.6 Comparison between the EM-path algorithm and the standard EM algorithm

Figure S17: The solution path from the EM path algorithm and the standard EM algorithm for a synthetic dataset.

Table S2 shows the timing comparison of the EM-path algorithm and the standard EM algorithm under different choices of L and ρ . The solution paths of these two algorithms are shown in Figure S17. From Figure S17, we can observe that the solution paths of these two algorithm are very similar with each other. However, the EM-path algorithm runs about four times faster than standard EM algorithm.

 Table S1: Efficiency comparison of the EM-path algorithm and the standard EM algorithms solving LLR.

L	ρ	EM boosting	EM regularized
500	0.2	5.88	28.18
500	0.5	5.40	26.04
500	0.8	5.69	25.91
1000	0.2	11.68	53.83
1000	0.5	10.92	53.84
1000	0.8	12.22	54.94
1500	0.2	30.31	105.99
1500	0.5	27.73	104.48
1500	0.8	20.16	91.28
2000	0.2	50.90	163.46
2000	0.5	52.39	163.17
2000	0.8	43.87	151.92

5 Real data analysis

In this section, we provide more details about the real data analysis.

5.1 The details of the data sets

			1 I
ID	YEAR	Traits	Link
TAG_cpd	2010	smoking	http://www.med.unc.edu/pgc/downloads
IGAP	2013	Alzheimer's disease	http://www.pasteur-lille.fr/en/recherche/u744/igap/igap_download.php
GCAN	2014	anorexia nervosa	http://www.med.unc.edu/pgc/files/resultfiles/gcan_meta-out.gz
cardiogram	2010	coronary artery disease	http://www.cardiogramplusc4d.org/downloads/
FastingGlucose	2012	fasting glucose	http://www.magicinvestigators.org/downloads/
SCZ	2011	Schizophrenia	http://www.med.unc.edu/pgc/downloads
DHA	2011	plasma DHA	http://www.chargeconsortium.com/main/results
MS	2013	multiple sclerosis	https://www.immunobase.org/downloads/protected_data/iChip_Data/
Putamen	2015	human subcortical brain structures	http://enigma.ini.usc.edu/wp-content/uploads/E2_EVIS/
BMI_MEN	2013	body mass index of men	https://www.broadinstitute.org/collaboration/giant/index.php/GIANT_consortium_data_files
BMI_WOMEN	2013	body mass index of women	https://www.broadinstitute.org/collaboration/giant/index.php/GIANT_consortium_data_files
PCV	2012	packed cell volume	https://www.ebi.ac.uk/ega/studies/EGAS0000000132
T1D	2008	Type 1 Diabetes	https://www.immunobase.org/page/Overview/display/study_id/GDXHsS00004
ADHD	2010	attention deficit-hyperactivity disorder	http://www.med.unc.edu/pgc/downloads
MDD	2013	major depressive disorder	http://www.med.unc.edu/pgc/downloads
Caudate	2015	human subcortical brain structures	http://enigma.ini.usc.edu/wp-content/uploads/E2_EVIS/
BPD	2011	bipolar disorder	http://www.med.unc.edu/pgc/downloads
ASD	2013	autism spectrum disorder	http://www.med.unc.edu/pgc/downloads

Table S2: GWAS data sets in our experiment

5.2 Details on preprocessing the directions of Z-scores

Since the directions of Z-scores depend on the reference alleles that individual GWASs used, it is not necessary that the reference panel data set from the 1000 Genome Project used the same set reference alleles for all SNPs. Thus, we matched the reference alleles in each GWAS with the 1000 Genome reference panel data set. If they were the same, we kept the directions of corresponding Zscores. Otherwise, we changed the directions of Z-scores for the corresponding SNPs. In addition, ambiguity may come from the fact that the reference alleles and non-reference alleles rely on whether the starting points were from 3' or 5'. Hence we removed these ambiguous SNPs.

5.3 More results in real data analysis



Figure S18: Manhattan plots of all 18 traits using LLR. The y-axis is $-\log_{10} \widehat{\text{fdr}}^{\text{SNP}}$. Comparing with Figure S19, it is clear that LLR can identified some variants whose signals are not strong enough to be selected by separated analyses. The numbers of significant hits under different FDR threshold are given in Table S3 and Table S4.



Figure S19: Manhattan plots of all 18 traits using separate analyses. The y-axis is $-\log_{10} \widehat{fdr}^{SNP}$.

Data Sets		Loc	al FDR	thres	hold	
	0.	2	0.	1	0.0)5
	LLR	Sep	LLR	Sep	LLR	Sep
TAG_cpd	1	1	1	1	1	1
IGAP	35	18	32	13	23	12
GCAN	4	4	4	3	1	1
cardiogram	78	33	72	22	69	15
FastingGlucose	53	26	47	22	39	20
SCZ	72	23	64	13	55	9
DHA	2	2	2	1	1	1
MS	112	67	102	56	89	48
Putamen	5	5	4	4	4	4
BMI-MEN	35	22	31	16	28	13
BMI-WOMEN	39	26	32	20	28	17
PCV	53	21	46	20	38	14
T1D	147	72	129	58	115	49
ADHD	0	0	0	0	0	0
MDD	0	0	0	0	0	0
Caudate	1	1	1	1	1	1
BPD	5	5	4	3	2	2
ASD	2	2	2	2	1	1
Total	644	328	573	255	495	208

Table S3: Number of Locus identified below different threshold for LLR and Sep (separate analysis)

Data Sets		Loca	al FDR	thres	hold	
	0.	2	0.	1	0.0)5
	LLR	Sep	LLR	Sep	LLR	Sep
TAG_cpd	1	1	1	1	1	1
IGAP	9	7	6	3	4	3
GCAN	2	2	1	0	0	0
cardiogram	36	13	28	7	18	6
FastingGlucose	25	12	17	11	15	11
SCZ	25	7	14	5	10	2
DHA	0	0	0	0	0	0
MS	51	31	39	24	26	18
Putamen	2	2	2	2	1	1
BMI-MEN	5	1	1	0	1	0
BMI-WOMEN	7	4	4	2	2	1
PCV	26	13	18	9	7	5
T1D	63	38	42	30	33	27
ADHD	0	0	0	0	0	0
MDD	0	0	0	0	0	0
Caudate	0	0	0	0	0	0
BPD	1	1	0	0	0	0
ASD	0	0	0	0	0	0
Total	253	132	173	94	118	75

Table S4: Number of SNPs identified below different threshold for LLR and Sep (separate analysis)

Table 55: New identified variants using	Table S5:	New	identified	variants	using	LLR
---	-----------	-----	------------	----------	-------	-----

Data Sets	SNP id	Chr	Pos	Type	Gene
IGAP	rs7812391	8	31121769	intergenic	WRN(dist=90492),NRG1(dist=375499)
	rs3752240	19	1051214	exonic	ABCA7
	rs6024881	20	55020689	intronic	CASS4
GCAN	rs923768	8	19530963	intronic	CSGALNACT1
cardiogram	rs4675833	2	241947122	intronic	SNED1
	rs9866277	3	86105340	intronic	CADM2
	rs1992265	4	44531665	intergenic	KCTD8(dist=80841),YIPF7(dist=92689)
	rs6842241	4	148400819	intergenic	TTC29(dist=533785),EDNRA(dist=1250)
	rs1533837	4	171644884	intergenic	LINC01612(dist=440011),LOC100506122(dist=316869)
	rs2395656	6	36662171	intergenic	CDKN1A(dist=7055) BAB44(dist=3457)
	rs1974369	6	73864494	intronic	KCNO5
	rs2096066	6	151255434	intronic	MTHEDIL
	rs1495741	8	18272881	intergenic	NAT2(dist-14158) PSD3(dist-111932)
	rs7819541	8	22042151	intronic	BMP1
	re481204	0	27100800	intronic	TEK
	re505022	9	1361/0220	intronic	ABO
	ra10887650	10	130143223 88461600	intronia	L DB3
	ra2207472	10	00084000	intronic	LDD3
	rs1180610	10	131850087	intergonic	EBE3(dist-07806) LINC00050(dist-2175)
	151180010	10	106074020	intergenic	EDF5(dist=97890),EINC00959(dist=2175)
	rs11067000	11	120274032	intergonia	DPM10(dist=260420) TPX5(dist=118120)
	1811007009	12	107026514	intergenic	ADCI U1(4:t-16000) I INC00551(4:t-22644)
	19972154	10	107230314	Intergenic	ARGLUI(dist=10000),LINC00551(dist=55044)
	rs128/3154	13	110920852	Intronic	COL4AI MCTD9/1: + 255099) LOC440211/1: + 16299)
	rs10520769	15	95382263	Intergenic	MC1P2(alst=355082),LOC440311(alst=16329)
	rs8111989	19	45809208	downstream	CKM,MARK4
FastingGlucose	rs1996546	4	185714289	intronic	ACSL1
	rs926127	8	127320627	intergenic	LINC00861(dist=357186),LOC101927657(dist=17113)
	rs12370484	12	61844049	intergenic	SLC16A7(dist=1660414),FAM19A2(dist=257980)
	rs7981007	12	133026146	intergenic	LOC101928416(dist=117985), FBRSL1(dist=41011)
	rs1337645	13	60721640	ncRNA_intronic	DIAPH3-AS2
	rs131056	22	47905322	intergenic	LL22NC03-75H12.2(dist=22462),LINC00898(dist=111470)
SCZ	rs10495658	2	17303288	intergenic	FAM49A(dist=456154),RAD51AP2(dist=388698)
	rs17180327	2	181016133	intergenic	CWC22(dist=144353),SCHLAP1(dist=540698)
	rs1522174	3	71315237	intronic	FOXP1
	rs396861	9	4743626	intergenic	AK3(dist=1583),RCL1(dist=49208)
	rs1025641	10	128307192	intergenic	C10orf90(dist=97182),DOCK1(dist=286786)
	rs545382	11	68171013	exonic	LRP5
	rs1380934	15	39401850	intergenic	C15orf53(dist=409611),C15orf54(dist=141020)
	rs1869901	15	40505627	intronic	DLCDa
	10100001	1 10	4000021	meronic	FLCB2
	rs4309482	18	52750469	intergenic	CCDC68(dist=123730),LOC101927229(dist=22666)
MS	rs4309482 rs9821630	18	52750469 16970938	intergenic intronic	CCDC68(dist=123730),LOC101927229(dist=22666) PLCL2
MS	rs4309482 rs9821630 rs433317	18 3 3	$\begin{array}{r} 40333021\\ 52750469\\ 16970938\\ 28060456\end{array}$	intergenic intergenic intergenic	CCDC68(dist=123730),LOC101927229(dist=22666) PLCL2 LOC100996624(dist=184829),CMC1(dist=222668)
MS	rs4309482 rs9821630 rs433317 rs6832151		$\begin{array}{r} 40333021\\ 52750469\\ 16970938\\ 28060456\\ 40303633\end{array}$	intergenic intronic intergenic intergenic	CCDC68(dist=123730),LOC101927229(dist=22666) PLCL2 LOC100996624(dist=184829),CMC1(dist=222668) RHOH(dist=57249),LOC101060498(dist=5569)
MS	rs4309482 rs9821630 rs433317 rs6832151 rs228614		$\begin{array}{r} 40333021\\ 52750469\\ 16970938\\ 28060456\\ 40303633\\ 103578637\end{array}$	intergenic intergenic intergenic intergenic intergenic	CCDC68(dist=123730),LOC101927229(dist=22666) PLCL2 LOC100996624(dist=184829),CMC1(dist=222668) RHOH(dist=57249),LOC101060498(dist=5569) MANBA
MS	rs4309482 rs9821630 rs433317 rs6832151 rs228614 rs1062158		$\begin{array}{r} 40333021\\ 52750469\\ 16970938\\ 28060456\\ 40303633\\ 103578637\\ 141523000 \end{array}$	intergenic intergenic intergenic intergenic intronic intronic	CCDC68(dist=123730),LOC101927229(dist=22666) PLCL2 LOC100996624(dist=184829),CMC1(dist=222668) RHOH(dist=57249),LOC101060498(dist=5569) MANBA NDFIP1
MS	rs4309482 rs9821630 rs433317 rs6832151 rs228614 rs1062158 rs6952809		$\begin{array}{r} 52750469\\ 16970938\\ 28060456\\ 40303633\\ 103578637\\ 141523000\\ 2448493 \end{array}$	intergenic intergenic intergenic intergenic intronic intronic intronic	CCDC68(dist=123730),LOC101927229(dist=22666) PLCL2 LOC100996624(dist=184829),CMC1(dist=222668) RHOH(dist=57249),LOC101060498(dist=5569) MANBA NDFIP1 CHST12
MS	rs4309482 rs9821630 rs433317 rs6832151 rs228614 rs1062158 rs6952809 rs2214543	18 18 3 3 4 4 5 7 7 7 7	$\begin{array}{r} 40333021\\ 52750469\\ 16970938\\ 28060456\\ 40303633\\ 103578637\\ 141523000\\ 2448493\\ 10796892 \end{array}$	intergenic intronic intergenic intergenic intronic intronic intronic intronic	CCDC68(dist=123730),LOC101927229(dist=22666) PLCL2 LOC100996624(dist=184829),CMC1(dist=222668) RHOH(dist=57249),LOC101060498(dist=5569) MANBA NDFIP1 CHST12 PER4(dist=1121445),NDUF44(dist=174688)
MS	rs4309482 rs9821630 rs433317 rs6832151 rs228614 rs1062158 rs6952809 rs2214543 rs2066992	$ \begin{array}{r} 18 \\ 3 \\ 3 \\ 4 \\ 4 \\ 5 \\ 7 \\ 7 \\ 7 \\ 7 \\ 7 \end{array} $	$\begin{array}{r} 40333627\\ 52750469\\ 16970938\\ 28060456\\ 40303633\\ 103578637\\ 141523000\\ 2448493\\ 10796892\\ 22768249 \end{array}$	intergenic intergenic intergenic intergenic intronic intronic intronic intergenic intergenic	CCDC68(dist=123730),LOC101927229(dist=22666) PLCL2 LOC100996624(dist=184829),CMC1(dist=222668) RHOH(dist=57249),LOC101060498(dist=5569) MANBA NDFIP1 CHST12 PER4(dist=1121445),NDUFA4(dist=174688) IL6
MS	rs4309482 rs9821630 rs433317 rs6832151 rs228614 rs1062158 rs6952809 rs2214543 rs2066992 rs1455808	$ \begin{array}{r} 18 \\ 3 \\ 3 \\ 4 \\ 4 \\ 5 \\ 7 \\ 7 \\ 7 \\ 8 \\ \end{array} $	$\begin{array}{r} 40335021\\ 52750469\\ 16970938\\ 28060456\\ 40303633\\ 103578637\\ 141523000\\ 2448493\\ 10796892\\ 22768249\\ 76034604 \end{array}$	intergenic intergenic intergenic intronic intronic intronic intergenic intergenic intergenic	CCDC68(dist=123730),LOC101927229(dist=22666) PLCL2 LOC100996624(dist=184829),CMC1(dist=222668) RHOH(dist=57249),LOC101060498(dist=5569) MANBA NDFIP1 CHST12 PER4(dist=1121445),NDUFA4(dist=174688) LL6 CRISPLD1(dist=87811),CASC9(dist=100748)
MS	rs4309482 rs9821630 rs9821630 rs6832151 rs228614 rs1062158 rs6952809 rs2214543 rs2066992 rs1455808 rs3004212	$ \begin{array}{r} 18 \\ 18 \\ 3 \\ 3 \\ 4 \\ 4 \\ 5 \\ 7 \\ 7 \\ 7 \\ 7 \\ 8 \\ 10 \\ \end{array} $	$\begin{array}{c} 4033021\\ 52750469\\ 16970938\\ 28060456\\ 40303633\\ 103578637\\ 141523000\\ 2448493\\ 10796892\\ 22768249\\ 76034604\\ 43642810\\ \end{array}$	intergenic intergenic intergenic intronic intronic intronic intergenic intergenic intergenic intergenic	CCDC68(dist=123730),LOC101927229(dist=22666) PLCL2 LOC100996624(dist=184829),CMC1(dist=222668) RHOH(dist=57249),LOC101060498(dist=5569) MANBA NDFIP1 CHST12 PER4(dist=1121445),NDUFA4(dist=174688) IL6 CRISPLD1(dist=87811),CASC9(dist=100748) CSGALNACT2
MS	rs4309482 rs9821630 rs6832151 rs228614 rs1062158 rs6952809 rs2214543 rs2066992 rs1455808 rs3004212 rs7912269	$ \begin{array}{r} 18 \\ 18 \\ 3 \\ 3 \\ 4 \\ 4 \\ 5 \\ 7 \\ 7 \\ 7 \\ 7 \\ 8 \\ 10 \\ 10 \\ 10$	$\begin{array}{r} 40335021\\ 52750469\\ 16970938\\ 28060456\\ 40303633\\ 103578637\\ 141523000\\ 2448493\\ 10796892\\ 22768249\\ 76034604\\ 43642810\\ 78727604 \end{array}$	intergenic intergenic intergenic intronic intronic intronic intergenic intergenic intergenic intergenic intergenic intergenic	CCDC68(dist=123730),LOC101927229(dist=22666) PLCL2 LOC100996624(dist=184829),CMC1(dist=222668) RHOH(dist=57249),LOC101060498(dist=5569) MANBA NDFIP1 CHST12 PER4(dist=1121445),NDUFA4(dist=174688) L6 CRISPLD1(dist=87811),CASC9(dist=100748) CSGALNACT2 KCNMA1-AS1
MS	rs4309482 rs9821630 rs433317 rs6832151 rs228614 rs1062158 rs6952809 rs2214543 rs2066992 rs1455808 rs3004212 rs7912269 rs4409785	$ \begin{array}{r} 18 \\ 18 \\ 3 \\ 3 \\ 4 \\ 4 \\ 5 \\ 7 \\ 7 \\ 7 \\ 8 \\ 10 \\ 10 \\ 11 \end{array} $	$\begin{array}{c} 4033521\\ 52750469\\ 16970938\\ 28060456\\ 40303633\\ 103578637\\ 141523000\\ 2448493\\ 10796892\\ 22768249\\ 76034604\\ 43642810\\ 78727604\\ 95311422 \end{array}$	intergenic intergenic intergenic intronic intronic intronic intergenic intergenic intergenic intergenic intergenic intergenic intergenic intronic intergenic intronic	CCDC68(dist=123'30),LOC101927229(dist=22666) PLCL2 LOC100996624(dist=184829),CMC1(dist=222668) RHOH(dist=57249),LOC101060498(dist=25669) MANBA NDFIP1 CHST12 PER4(dist=1121445),NDUFA4(dist=174688) IL6 CRISPLD1(dist=87811),CASC9(dist=100748) CSGALNACT2 KCNMA1-AS1 LOC100129203(dist=343854),FAM76B(dist=190684)
MS	rs4309482 rs9821630 rs9821630 rs6832151 rs228614 rs1062158 rs6952809 rs2214543 rs2066992 rs1455808 rs3004212 rs7912269 rs4409785 rs491111	$ \begin{array}{r} 18 \\ 3 \\ 3 \\ 4 \\ 4 \\ 5 \\ 7 \\ 7 \\ 7 \\ 7 \\ 8 \\ 10 \\ 10 \\ 11 \\ 11 \end{array} $	$\begin{array}{r} 4033021\\ 52750469\\ 16970938\\ 28060456\\ 40303633\\ 103578637\\ 141523000\\ 2448493\\ 10796892\\ 22768249\\ 76034604\\ 43642810\\ 78727604\\ 95311422\\ 95311422\\ \end{array}$	intergenic intergenic intergenic intronic intronic intronic intergenic intronic intergenic intergenic nerRNA_intronic intergenic intergenic intergenic	CCDC68(dist=123730),LOC101927229(dist=22666) PLCL2 LOC100996624(dist=184829),CMC1(dist=222668) RHOH(dist=57249),LOC101060498(dist=5569) MANBA NDFIP1 CHST12 PER4(dist=1121445),NDUFA4(dist=174688) IL6 CRISPLD1(dist=87811),CASC9(dist=100748) CSGALNACT2 KCNMA1-AS1 LOC100129203(dist=343854),FAM76B(dist=190684) LJNC00900(dist=607116),BUD13/dist=380852)
MS	rs4309482 rs9821630 rs9821630 rs6832151 rs228614 rs1062158 rs6952809 rs2214543 rs2066992 rs1455808 rs3004212 rs7912269 rs4409785 rs491111 rs12148050	$ \begin{array}{r} 18\\ 18\\ 3\\ 3\\ 4\\ 4\\ 5\\ 7\\ 7\\ 7\\ 7\\ 8\\ 10\\ 10\\ 11\\ 11\\ 11\\ 14\\ \end{array} $	$\begin{array}{r} 4033521\\ \pm 02352469\\ \pm 023526469\\ \pm 02352669\\ \pm 0235669\\ \pm 02356669\\ \pm 02356669\\ \pm 02356669\\ \pm 023566669\\ \pm 02356669\\ \pm 023566669\\ $	intergenic intergenic intergenic intronic intronic intronic intergenic intergenic intergenic ntergenic intergenic intergenic intergenic intergenic intergenic intergenic	CCDC68(dist=123730),LOC101927229(dist=22666) PLCL2 LOC100996624(dist=184829),CMC1(dist=222668) RHOH(dist=57249),LOC101060498(dist=5569) MANBA NDFIP1 CHST12 PER4(dist=1121445),NDUFA4(dist=174688) IL6 CRISPLD1(dist=87811),CASC9(dist=100748) CSGALNACT2 KCNMA1-AS1 LOC100129203(dist=343854),FAM76B(dist=190684) LINC00900(dist=607116),BUD13(dist=380852) TRAF3
MS	rs4309482 rs9821630 rs433317 rs6832151 rs228614 rs1062158 rs6952809 rs2214543 rs2066992 rs1455808 rs3004212 rs7912269 rs4409785 rs491111 rs12148050 rs16959924	$ \begin{array}{r} 18\\ 3\\ 3\\ 4\\ 4\\ 5\\ 7\\ 7\\ 7\\ 7\\ 8\\ 10\\ 10\\ 11\\ 11\\ 11\\ 14\\ 15\\ \end{array} $	$\begin{array}{r} 4033021\\ 52750469\\ 16970938\\ 28060456\\ 40303633\\ 103578637\\ 141523000\\ 2448493\\ 10796892\\ 22768249\\ 76034604\\ 43642810\\ 78727604\\ 95311422\\ 116238034\\ 103263788\\ 47982456\end{array}$	intergenic intergenic intergenic intronic intronic intronic intergenic intergenic intergenic intronic neRNA_intronic intergenic intergenic intergenic intergenic intergenic intergenic intergenic	CCDC68(dist=123730),LOC101927229(dist=22666) PLCL2 LOC100996624(dist=184829),CMC1(dist=222668) RHOH(dist=57249),LOC101060498(dist=5569) MANBA NDFIP1 CHST12 PER4(dist=1121445),NDUFA4(dist=174688) IL6 CRISPLD1(dist=87811),CASC9(dist=100748) CSGALNACT2 KCNMA1-AS1 LOC100129203(dist=343854),FAM76B(dist=190684) LINC00900(dist=607116),BUD13(dist=380852) TRAF3 SEMA6D
MS BMI-MEN	$\begin{array}{c} 13309482\\ rs4309482\\ rs9821630\\ rs43317\\ rs6832151\\ rs228614\\ rs1062158\\ rs6952809\\ rs2214543\\ rs2066992\\ rs1455808\\ rs3004212\\ rs7912269\\ rs409785\\ rs491111\\ rs12148050\\ rs6959924\\ rs544023\\ \end{array}$	$ \begin{array}{r} 18\\ 18\\ 3\\ 3\\ 4\\ 4\\ 5\\ 7\\ 7\\ 7\\ 7\\ 8\\ 10\\ 10\\ 11\\ 11\\ 14\\ 15\\ 15\\ \end{array} $	$\begin{array}{r} 4033521\\ 52750469\\ 16970938\\ 28060456\\ 40303633\\ 103578637\\ 141523000\\ 2448493\\ 10796892\\ 22768249\\ 76034604\\ 43642810\\ 78727604\\ 43642810\\ 78727604\\ 95311422\\ 116238034\\ 103263788\\ 47982456\\ 52007522\\ \end{array}$	intergenic intergenic intergenic intronic intronic intronic intergenic intronic intergenic intergenic intergenic intergenic intergenic intergenic intergenic intergenic intergenic intergenic intergenic intergenic intergenic	CCDC68(dist=123730),LOC101927229(dist=22666) PLCL2 LOC100996624(dist=184829),CMC1(dist=222668) RHOH(dist=57249),LOC101060498(dist=5569) MANBA NDFIP1 CHST12 PER4(dist=1121445),NDUFA4(dist=174688) IL6 CRISPLD1(dist=87811),CASC9(dist=100748) CSGALNACT2 KCNMA1-AS1 LOC100129203(dist=343854),FAM76B(dist=190684) LINC00900(dist=607116),BUD13(dist=380852) TRAF3 SEMA6D SCG3
MS BMI-MEN BMI-WOMEN	$\begin{array}{c} 13309482\\ rs4309482\\ rs9821630\\ rs433317\\ rs6832151\\ rs228614\\ rs1062158\\ rs6952809\\ rs2214543\\ rs2066992\\ rs12045808\\ rs3004212\\ rs7912269\\ rs4409785\\ rs491111\\ rs12148050\\ rs16959924\\ rs544023\\ rs2060604\\ \end{array}$	$\begin{array}{c} 18\\ 3\\ 3\\ 4\\ 4\\ 5\\ 7\\ 7\\ 7\\ 7\\ 7\\ 8\\ 10\\ 10\\ 11\\ 11\\ 14\\ 15\\ 15\\ 8\end{array}$	$\begin{array}{r} 4033021\\ \hline 4033021\\ \hline 52750469\\ \hline 16970938\\ 28060456\\ 40303633\\ \hline 103578637\\ \hline 141523000\\ 2448493\\ \hline 10796892\\ 22768249\\ \hline 76034604\\ \hline 43642810\\ \hline 78727604\\ \hline 95311422\\ \hline 116238034\\ \hline 103263788\\ \hline 47982456\\ \hline 52007522\\ \hline 76650334\\ \end{array}$	intergenic intergenic intergenic intergenic intronic intronic intronic intergenic intronic neRNA_intronic intergenic intergenic intergenic intergenic intergenic intergenic intronic intergenic intronic intergenic intronic intergenic intronic intergenic intronic intergenic intronic	CCDC68(dist=123730),LOC101927229(dist=22666) PLCL2 LOC100996624(dist=184829),CMC1(dist=222668) RHOH(dist=57249),LOC101060498(dist=5569) MANBA NDFIP1 CHST12 PER4(dist=1121445),NDUFA4(dist=174688) IL6 CRISPLD1(dist=87811),CASC9(dist=100748) CSGALNACT2 KCNMA1-AS1 LOC100129203(dist=343854),FAM76B(dist=190684) LINC00900(dist=607116),BUD13(dist=380852) TRAF3 SEMA6D SCG3 HNF4G(dist=171273),LINC01111(dist=668555)
MS BMI-MEN BMI-WOMEN	rs4309482 rs9821630 rs433317 rs6832151 rs228614 rs1062158 rs6952809 rs2214543 rs2066992 rs1455808 rs3004212 rs7912269 rs4409785 rs491111 rs12148050 rs16959924 rs544023 rs540234 rs50206454	$\begin{array}{c} 18\\ 18\\ 3\\ 3\\ 4\\ 4\\ 5\\ 7\\ 7\\ 7\\ 7\\ 7\\ 8\\ 10\\ 10\\ 11\\ 11\\ 11\\ 11\\ 14\\ 15\\ 15\\ 8\\ 17\\ \end{array}$	$\begin{array}{r} 4033521\\ 52750469\\ 16970938\\ 28060456\\ 40303633\\ 103578637\\ 141523000\\ 2448493\\ 10796892\\ 22768249\\ 76034604\\ 43642810\\ 78727604\\ 95311422\\ 116238034\\ 103263788\\ 47982456\\ 52007522\\ 76650334\\ 38160754\\ \end{array}$	intergenic intergenic intergenic intronic intronic intronic intronic intergenic intronic intergenic intronic neRNA_intronic intergenic intergenic intergenic intergenic intronic intergenic intergenic intergenic intergenic intergenic intergenic intergenic	FLCb2 CCDC68(dist=123730),LOC101927229(dist=22666) PLCL2 LOC100996624(dist=184829),CMC1(dist=222668) RHOH(dist=57249),LOC101060498(dist=2569) MANBA NDFIP1 CHST12 PER4(dist=1121445),NDUFA4(dist=174688) L6 CRISPLD1(dist=87811),CASC9(dist=100748) CSGALNACT2 KCNMA1-AS1 LOC100129203(dist=343854),FAM76B(dist=190684) LINC00900(dist=607116),BUD13(dist=380852) TRAF3 SEMA6D SCG3 HNF4G(dist=171273),LINC01111(dist=668555) PSMD3(dist=6341).CSF3(dist=10660)
MS BMI-MEN BMI-WOMEN PCV	$\begin{array}{c} rs4309482\\ rs9821630\\ rs9821630\\ rs9821630\\ rs6832151\\ rs228614\\ rs1062158\\ rs6952809\\ rs2214543\\ rs2066992\\ rs1455808\\ rs3004212\\ rs7912269\\ rs409785\\ rs491111\\ rs12148050\\ rs16959924\\ rs544023\\ rs2060604\\ rs8070454\\ rs3761945\end{array}$	$\begin{array}{c} 18\\ 18\\ 3\\ 3\\ 4\\ 4\\ 5\\ 7\\ 7\\ 7\\ 8\\ 10\\ 10\\ 10\\ 11\\ 11\\ 14\\ 15\\ 15\\ 8\\ 17\\ 1\\ 1\\ 1\\ 1\\ 1\\ 1\\ 1\\ 1\\ 1\\ 1\\ 1\\ 1\\ 1\\$	$\begin{array}{r} 4033521\\ 16970938\\ 28060456\\ 40303633\\ 103578637\\ 141523000\\ 2448493\\ 10796892\\ 22768249\\ 76034604\\ 43642810\\ 78727604\\ 95311422\\ 116238034\\ 103263788\\ 47982456\\ 52007522\\ 76650334\\ 38160754\\ 38160754\\ \end{array}$	intergenic intergenic intergenic intronic intronic intronic intronic intergenic intronic neRNA.intronic intergenic intergenic intergenic intergenic intergenic intronic intergenic intronic intergenic intronic intergenic intronic intergenic intronic intergenic intergenic intergenic intergenic intergenic intergenic	CCDC68(dist=123730),LOC101927229(dist=22666) PLCL2 LOC100996624(dist=184829),CMC1(dist=222668) RHOH(dist=57249),LOC101060498(dist=5569) MANBA NDFIP1 CHST12 PER4(dist=1121445),NDUFA4(dist=174688) LL6 CRISPLD1(dist=87811),CASC9(dist=100748) CSGALNACT2 KCNMA1-AS1 LOC100129203(dist=343854),FAM76B(dist=190684) LINC00900(dist=607116),BUD13(dist=380852) TRAF3 SEMA6D SCG3 HNF4G(dist=171273),LINC01111(dist=668555) PSRD3(dist=6541),CSF3(dist=10860) PGBD5(dist=14504) COG2(dist=1434)
MS BMI-MEN BMI-WOMEN PCV	$\begin{array}{rrr} rs4309482 \\ rs9821630 \\ rs9821630 \\ rs6832151 \\ rs6832151 \\ rs228614 \\ rs1062158 \\ rs6952809 \\ rs2214543 \\ rs2066992 \\ rs1206892 \\ rs1062122 \\ rs7912269 \\ rs409785 \\ rs491111 \\ rs12148050 \\ rs16959924 \\ rs544023 \\ rs2060604 \\ rs8070454 \\ rs3761945 \\ rs1796636 \\ rs1796636 \\ \end{array}$	$\begin{array}{c} 18\\ 18\\ 3\\ 3\\ 4\\ 4\\ 4\\ 5\\ 7\\ 7\\ 7\\ 7\\ 8\\ 10\\ 10\\ 10\\ 10\\ 11\\ 11\\ 14\\ 15\\ 15\\ 8\\ 17\\ 1\\ 5\\ 5\end{array}$	$\begin{array}{r} 4033021\\ \hline 16970938\\ 28060456\\ 40303633\\ 103578637\\ 141523000\\ 2448493\\ 10796892\\ 22768249\\ 76034604\\ 43642810\\ 78727604\\ 43642810\\ 78727604\\ 103263788\\ 47982456\\ 52007522\\ 76650334\\ 38160754\\ 230706768\\ 148785449\end{array}$	intergenic intergenic intergenic intronic intronic intronic intronic intergenic intronic nergenic intergenic intergenic intergenic intergenic intronic intergenic intronic intergenic intronic intergenic intronic intergenic intergenic intergenic intergenic intergenic intergenic intergenic intergenic intergenic	CCDC68(dist=123730),LOC101927229(dist=22666) PLCL2 LOC100996624(dist=184829),CMC1(dist=222668) RHOH(dist=57249),LOC101060498(dist=5569) MANBA NDFIP1 CHST12 PER4(dist=1121445),NDUFA4(dist=174688) IL6 CRISPLD1(dist=87811),CASC9(dist=100748) CSGALNACT2 KCNMA1-AS1 LOC100129203(dist=343854),FAM76B(dist=190684) LINC00900(dist=67116),BUD13(dist=380852) TRAF3 SEMA6D SCG3 HNF4G(dist=171273),LINC01111(dist=668555) PSMD3(dist=6541),CSF3(dist=10860) PGBD5(dist=145094),COG2(dist=71434) CARMN
MS BMI-MEN BMI-WOMEN PCV	$\begin{array}{c} rs4309482\\ rs9821630\\ rs43317\\ rs6832151\\ rs228614\\ rs1062158\\ rs6952809\\ rs2214543\\ rs2066992\\ rs1455808\\ rs3004212\\ rs7912269\\ rs4409785\\ rs409785\\ rs491111\\ rs12148050\\ rs16959924\\ rs544023\\ rs2060604\\ rs8070454\\ rs3761945\\ rs3761945\\ rs265370\\ \end{array}$	$\begin{array}{c} 18\\ 18\\ 3\\ 3\\ 4\\ 4\\ 5\\ 7\\ 7\\ 7\\ 7\\ 7\\ 8\\ 10\\ 10\\ 11\\ 11\\ 11\\ 11\\ 15\\ 15\\ 8\\ 117\\ 1\\ 5\\ 11\\ 11\\ 11\\ 11\\ 11\\ 11\\ 11\\ 11\\ $	$\begin{array}{r} 4033021\\ 52750469\\ 16970938\\ 28060456\\ 40303633\\ 103578637\\ 141523000\\ 2448493\\ 10796892\\ 22768249\\ 76034604\\ 43642810\\ 78727604\\ 95311422\\ 116238034\\ 103263788\\ 47982456\\ 52007522\\ 76650334\\ 47982456\\ 52007522\\ 76650034\\ 38160754\\ 230706768\\ 148785449\\ 148785449\\ \end{array}$	intergenic intergenic intergenic intronic intronic intronic intronic intergenic intronic intergenic intronic intergenic	$\begin{tabular}{lllllllllllllllllllllllllllllllllll$
MS BMI-MEN BMI-WOMEN PCV	$\begin{array}{c} rs4309482\\ rs9821630\\ rs9821630\\ rs9821630\\ rs6832151\\ rs228614\\ rs1062158\\ rs6952809\\ rs2214543\\ rs2066992\\ rs1455808\\ rs3004212\\ rs7912269\\ rs4409785\\ rs491111\\ rs12148050\\ rs16959924\\ rs544023\\ rs2060604\\ rs8070454\\ rs3761945\\ rs17796636\\ rs2653570\\ rs801437\\ \end{array}$	$\begin{array}{c} 18\\ 18\\ 3\\ 3\\ 4\\ 4\\ 5\\ 7\\ 7\\ 7\\ 7\\ 8\\ 10\\ 10\\ 10\\ 10\\ 10\\ 11\\ 11\\ 14\\ 15\\ 15\\ 8\\ 17\\ 1\\ 5\\ 11\\ 1\\ 5\\ 11\\ 11\\ 11\\ 11\\ 11\\ 11$	$\begin{array}{r} 4033521\\ 16970938\\ 28060456\\ 40303633\\ 103578637\\ 141523000\\ 2448493\\ 10796892\\ 22768249\\ 76034604\\ 43642810\\ 78727604\\ 43642810\\ 78727604\\ 95311422\\ 116238034\\ 103263788\\ 47982456\\ 52007522\\ 76650334\\ 38160754\\ 38160754\\ 230706768\\ 148785449\\ 8987823\\ 8987823\\ 8987823\\ \end{array}$	intergenic intergenic intergenic intronic intronic intronic intronic intergenic intronic intergenic intergenic intergenic intergenic intergenic intergenic intergenic intronic intergenic intronic intergenic intronic intergenic	$\begin{array}{c} {\rm FLCD2} \\ {\rm CCDC68}({\rm dist}{=}123730), {\rm LOC101927229}({\rm dist}{=}22666) \\ {\rm PLCL2} \\ {\rm LOC100996624}({\rm dist}{=}184829), {\rm CMC1}({\rm dist}{=}222668) \\ {\rm RHOH}({\rm dist}{=}57249), {\rm LOC101060498}({\rm dist}{=}5569) \\ {\rm MANBA} \\ {\rm NDFIP1} \\ {\rm CHST12} \\ {\rm PER4}({\rm dist}{=}1121445), {\rm NDUFA4}({\rm dist}{=}174688) \\ {\rm L6} \\ {\rm CRISPLD1}({\rm dist}{=}87811), {\rm CASC9}({\rm dist}{=}100748) \\ {\rm CSGALNACT2} \\ {\rm KCNMA1-AS1} \\ {\rm LOC100129203}({\rm dist}{=}343854), {\rm FAM76B}({\rm dist}{=}190684) \\ {\rm LINC00900}({\rm dist}{=}607116), {\rm BUD13}({\rm dist}{=}380852) \\ {\rm TRAF3} \\ {\rm SCG3} \\ {\rm HNF4G}({\rm dist}{=}171273), {\rm LINC01111}({\rm dist}{=}668555) \\ {\rm PSMD3}({\rm dist}{=}6541), {\rm CSF3}({\rm dist}{=}110860) \\ {\rm PGB5}({\rm dist}{=}145094), {\rm COG2}({\rm dist}{=}7134) \\ {\rm CARMN} \\ {\rm TMEM9B-AS1} \\ {\rm SC5D}({\rm dist}{=}40657), {\rm SOB1}({\rm dist}{=}98136) \\ \end{array}$
MS BMI-MEN BMI-WOMEN PCV	$\begin{array}{c} 13309482\\ rs4309482\\ rs9821630\\ rs43317\\ rs6832151\\ rs228614\\ rs1062158\\ rs6952809\\ rs2214543\\ rs2066992\\ rs12214543\\ rs2066992\\ rs1455808\\ rs3004212\\ rs7912269\\ rs4409785\\ rs491111\\ rs12148050\\ rs16959924\\ rs544023\\ rs2060604\\ rs8070454\\ rs3761945\\ rs17796636\\ rs2653570\\ rs891437\\ rs4765292\\ \end{array}$	$\begin{array}{c} 18\\ 18\\ 3\\ 3\\ 4\\ 4\\ 5\\ 7\\ 7\\ 7\\ 7\\ 8\\ 10\\ 10\\ 10\\ 11\\ 11\\ 14\\ 15\\ 15\\ 15\\ 8\\ 17\\ 1\\ 5\\ 11\\ 11\\ 12\\ \end{array}$	$\begin{array}{r} 4033021\\ \hline 4033021\\ \hline 52750469\\ \hline 16970938\\ 28060456\\ \hline 40303633\\ \hline 103578637\\ \hline 141523000\\ 2448493\\ \hline 10796892\\ 22768249\\ \hline 22768249\\ \hline 76034604\\ \hline 43642810\\ \hline 78727604\\ \hline 43642810\\ \hline 78727604\\ \hline 43642810\\ \hline 78727604\\ \hline 43642810\\ \hline 78727603\\ \hline 43642810\\ \hline 78727604\\ \hline 43642820\\ \hline 78727604\\ \hline 43642810\\ \hline 78727604\\ \hline 787276$	intergenic intergenic intergenic intronic intronic intronic intronic intergenic intronic netronic netronic intergenic intronic intergenic intronic intergenic intronic intergenic intronic intergenic	$\begin{tabular}{lllllllllllllllllllllllllllllllllll$
MS BMI-MEN BMI-WOMEN PCV	$\begin{array}{c} rs4309482\\ rs9821630\\ rs433317\\ rs6832151\\ rs228614\\ rs1062158\\ rs6952809\\ rs2214543\\ rs2066992\\ rs1455808\\ rs3004212\\ rs7912269\\ rs4409785\\ rs491111\\ rs12148050\\ rs16959924\\ rs5409785\\ rs491111\\ rs12148050\\ rs16959924\\ rs5470454\\ rs3761945\\ rs3761945\\ rs3761945\\ rs265370\\ rs891437\\ rs4765929\\ rs1211706\end{array}$	$\begin{array}{c} 18\\ 18\\ 3\\ 4\\ 4\\ 5\\ 7\\ 7\\ 7\\ 7\\ 7\\ 8\\ 10\\ 10\\ 10\\ 11\\ 11\\ 11\\ 14\\ 15\\ 15\\ 8\\ 17\\ 1\\ 15\\ 15\\ 8\\ 17\\ 1\\ 1\\ 11\\ 11\\ 12\\ 14\\ 14\\ 14\\ 14\\ 14\\ 14\\ 14\\ 14\\ 14\\ 14$	$\begin{array}{r} 4033021\\ 52750469\\ 16970938\\ 28060456\\ 40303633\\ 103578637\\ 141523000\\ 2448493\\ 10796892\\ 22768249\\ 76034604\\ 43642810\\ 78727604\\ 95311422\\ 116238034\\ 103263788\\ 47982456\\ 52007522\\ 76650334\\ 47982456\\ 52007522\\ 76650334\\ 14230706768\\ 148785449\\ 8987823\\ 121224776\\ 2518352\\ 27243073\\ \end{array}$	intergenic intergenic intergenic intronic intronic intronic intronic intergenic intronic intergenic intronic intergenic	$\begin{tabular}{lllllllllllllllllllllllllllllllllll$
MS BMI-MEN BMI-WOMEN PCV	$\begin{array}{c} 183309482\\ 184309482\\ 1843317\\ 1843317\\ 185632151\\ 18528614\\ 18528614\\ 1852861\\ 1852862809\\ 182214543\\ 1852066992\\ 181455808\\ 183004212\\ 18545808\\ 183004212\\ 18145808\\ 183004212\\ 1844023\\ 1844023\\ 1844023\\ 184023\\ 1852060604\\ 188070454\\ 183761945\\ 183761945\\ 1837796636\\ 182653570\\ 182655555\\ 18265555\\ 18265555\\ 18265555\\ 18265555\\ 18265555\\ 18265555\\ 18265555\\ 182655555\\ 18265555\\ 182655555\\ 18265555\\ 182655555\\ 182655555\\ 182655555\\ 182655555\\ 182655555\\ 1826555555\\ 1826555555\\ 1826555555\\ 1826555555\\ 1826555555\\ 1826555555\\ 18265555555\\ 1826555555\\ 1826555555\\ 182655555555\\ 18265555555555555\\ 1826555555555555555555555555555555555555$	$\begin{array}{c} 18\\ 18\\ 3\\ 3\\ 4\\ 4\\ 5\\ 7\\ 7\\ 7\\ 7\\ 8\\ 10\\ 10\\ 10\\ 10\\ 11\\ 11\\ 14\\ 15\\ 15\\ 8\\ 17\\ 1\\ 15\\ 8\\ 17\\ 1\\ 15\\ 11\\ 11\\ 11\\ 11\\ 11\\ 11\\ 11\\ 11\\$	$\begin{array}{r} 4033521\\ 16970938\\ 28060456\\ 40303633\\ 103578637\\ 141523000\\ 2448493\\ 10796892\\ 22768249\\ 76034604\\ 43642810\\ 78727604\\ 43642810\\ 78727604\\ 116238034\\ 103263788\\ 47982456\\ 52007522\\ 76650334\\ 403263788\\ 47982456\\ 52007522\\ 76650334\\ 103263788\\ 47982456\\ 52007522\\ 76650334\\ 116238034\\ 103263788\\ 47982456\\ 52007522\\ 76650334\\ 11623804$	intergenic intergenic intergenic intronic intronic intronic intronic intronic intergenic	$\begin{array}{c} {\rm FLCD2} \\ {\rm CCDC68}({\rm dist}{=}123730), {\rm LOC101927229}({\rm dist}{=}22666) \\ {\rm PLCL2} \\ {\rm LOC100996624}({\rm dist}{=}184829), {\rm CMC1}({\rm dist}{=}222668) \\ {\rm RHOH}({\rm dist}{=}57249), {\rm LOC101060498}({\rm dist}{=}5569) \\ {\rm MANBA} \\ {\rm NDFIP1} \\ {\rm CHST12} \\ {\rm PER4}({\rm dist}{=}1121445), {\rm NDUFA4}({\rm dist}{=}174688) \\ {\rm L6} \\ {\rm CRISPLD1}({\rm dist}{=}87811), {\rm CASC9}({\rm dist}{=}100748) \\ {\rm CSGALNACT2} \\ {\rm KCNMA1-AS1} \\ {\rm LOC100129203}({\rm dist}{=}343854), {\rm FAM76B}({\rm dist}{=}190684) \\ {\rm LINC00900}({\rm dist}{=}607116), {\rm BUD13}({\rm dist}{=}380852) \\ {\rm TRAF3} \\ {\rm SEMA6D} \\ {\rm SCG3} \\ {\rm HNF4G}({\rm dist}{=}171273), {\rm LINC01111}({\rm dist}{=}668555) \\ {\rm PSMD3}({\rm dist}{=}145094), {\rm COG2}({\rm dist}{=}1134) \\ {\rm CARMN} \\ {\rm TMEM9B-AS1} \\ {\rm SC5D}({\rm dist}{=}17613), {\rm LOC101927062}({\rm dist}{=}1628) \\ {\rm LINC01581}({\rm dist}{=}76113}), {\rm LOC101927062}({\rm dist}{=}{-}601) \\ \end{array}$
MS BMI-MEN BMI-WOMEN PCV	$\begin{array}{rrr} rs4309482 \\ rs9309482 \\ rs9821630 \\ rs9821630 \\ rs6352151 \\ rs228614 \\ rs1062158 \\ rs6952809 \\ rs2214543 \\ rs2066992 \\ rs1245808 \\ rs3004212 \\ rs7912269 \\ rs4409785 \\ rs491111 \\ rs12148050 \\ rs16959924 \\ rs544023 \\ rs2060604 \\ rs8070454 \\ rs3761945 \\ rs17796636 \\ rs2653570 \\ rs891437 \\ rs4765929 \\ rs17111706 \\ rs6497196 \\ rs67216086 \\ \end{array}$	$\begin{array}{c} 18\\ 18\\ 3\\ 3\\ 4\\ 4\\ 5\\ 7\\ 7\\ 7\\ 8\\ 10\\ 10\\ 10\\ 10\\ 11\\ 11\\ 14\\ 15\\ 15\\ 15\\ 8\\ 17\\ 1\\ 15\\ 8\\ 17\\ 1\\ 1\\ 12\\ 14\\ 15\\ 5\\ 11\\ 11\\ 12\\ 14\\ 15\\ 5\\ 11\\ 11\\ 12\\ 14\\ 15\\ 5\\ 11\\ 11\\ 12\\ 14\\ 15\\ 5\\ 11\\ 11\\ 12\\ 14\\ 15\\ 5\\ 11\\ 11\\ 12\\ 14\\ 15\\ 5\\ 11\\ 11\\ 11\\ 11\\ 11\\ 11\\ 11\\ 11\\$	$\begin{array}{r} 4033021\\ \hline 4033021\\ 52750469\\ \hline 16970938\\ 28060456\\ 40303633\\ 103578637\\ \hline 141523000\\ 2448493\\ 10796892\\ 22768249\\ 76034604\\ 43642810\\ 78727604\\ 43642810\\ 78727604\\ 43642810\\ 78727604\\ 103263788\\ 47982456\\ 52007522\\ 76650334\\ 38160754\\ 230706768\\ 148785449\\ 8987823\\ 121224776\\ 148785449\\ 8987823\\ 121224776\\ 2518352\\ 27243073\\ 94838829\\ 94838829\\ \end{array}$	intergenic intergenic intergenic intronic intronic intronic intronic intergenic intronic intergenic intronic intergenic intronic intergenic intronic intergenic intronic intergenic	$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$
MS BMI-MEN BMI-WOMEN PCV	$\begin{array}{c} rs4309482 \\ rs9821630 \\ rs433317 \\ rs6832151 \\ rs228614 \\ rs1062158 \\ rs6952809 \\ rs2214543 \\ rs2066992 \\ rs1455808 \\ rs3004212 \\ rs7912269 \\ rs4409785 \\ rs409785 \\ rs491111 \\ rs12148050 \\ rs16959924 \\ rs540023 \\ rs2060604 \\ rs8070454 \\ rs8070454 \\ rs8070454 \\ rs8070454 \\ rs8761945 \\ rs4765929 \\ rs7911776636 \\ rs6497196 \\ rs67901756 \\ rs7216086 \\ rs7201756 \end{array}$	$\begin{array}{c} 18\\ 18\\ 3\\ 3\\ 4\\ 4\\ 5\\ 7\\ 7\\ 7\\ 7\\ 8\\ 10\\ 10\\ 10\\ 10\\ 11\\ 11\\ 11\\ 14\\ 15\\ 15\\ 8\\ 17\\ 1\\ 1\\ 5\\ 11\\ 11\\ 11\\ 12\\ 14\\ 15\\ 17\\ 12\\ 14\\ 15\\ 17\\ 12\\ 22\\ 22\\ 22\\ 22\\ 22\\ 22\\ 22\\ 22\\ 22$	$\begin{array}{r} 4033021\\ 52750469\\ 16970938\\ 28060456\\ 40303633\\ 103578637\\ 141523000\\ 2448493\\ 10796892\\ 22768249\\ 76034604\\ 43642810\\ 78727604\\ 95311422\\ 116238034\\ 103263788\\ 47982456\\ 52007522\\ 76650334\\ 47982456\\ 52007522\\ 76650334\\ 14238456\\ 52007522\\ 76650334\\ 14238456\\ 52007522\\ 76650334\\ 121224776\\ 2518352\\ 227243073\\ 94838829\\ 37709422\\ 30226102\\ \end{array}$	intergenic intergenic intergenic intronic intronic intronic intronic intronic intergenic intronic intergenic intronic intergenic	$\begin{tabular}{lllllllllllllllllllllllllllllllllll$
MS BMI-MEN BMI-WOMEN PCV	$\begin{array}{c} rs4309482 \\ rs9821630 \\ rs43317 \\ rs6832151 \\ rs28614 \\ rs1062158 \\ rs6952809 \\ rs2214543 \\ rs2066992 \\ rs1455808 \\ rs3004212 \\ rs1455808 \\ rs3004212 \\ rs1409785 \\ rs491111 \\ rs12148050 \\ rs16959924 \\ rs5409785 \\ rs491111 \\ rs12148050 \\ rs16959924 \\ rs54023 \\ rs2060604 \\ rs8070454 \\ rs3761945 \\ rs17796636 \\ rs2060604 \\ rs8716945 \\ rs17796636 \\ rs7261794 \\ rs4765929 \\ rs17111706 \\ rs6497196 \\ rs7216086 \\ rs7210756 \\ rs1216086 \\ rs7210756 \\ rs1216086 \\ rs7210462 \\ rs156636 \\ rs7291756 \\ rs156636 \\ rs7291756 \\ rs156636 \\ rs7216086 \\ rs7216086 \\ rs7216086 \\ rs7216086 \\ rs7216086 \\ rs7216086 \\ rs721668 \\ rs15666 \\ rs151666 \\ rs15666 \\ rs151666 \\ rs15666 \\ rs151666 \\ rs15666 \\ rs1566 \\ rs15666 \\ rs1566 \\ rs15666 \\ rs1566 \\ rs166 \\ rs166 \\ rs166 \\ rs166 \\ $	$\begin{array}{c} 18\\ 18\\ 3\\ 3\\ 4\\ 4\\ 5\\ 7\\ 7\\ 7\\ 7\\ 8\\ 10\\ 10\\ 10\\ 11\\ 11\\ 14\\ 15\\ 15\\ 8\\ 17\\ 15\\ 15\\ 8\\ 17\\ 11\\ 11\\ 11\\ 11\\ 11\\ 11\\ 11\\ 11\\ 11$	$\begin{array}{r} 4033521\\ 16970938\\ 28060456\\ 40303633\\ 1003578637\\ 141523000\\ 2448493\\ 10796892\\ 22768249\\ 76034604\\ 43642810\\ 78727604\\ 95311422\\ 116238034\\ 103263788\\ 47982456\\ 52007522\\ 76650334\\ 47982456\\ 52007522\\ 76650334\\ 103263788\\ 47982456\\ 52007522\\ 76650334\\ 116238034\\ 103263788\\ 47982456\\ 52007522\\ 76650334\\ 116238034\\ 103263788\\ 47982456\\ 52007522\\ 76550334\\ 116238034\\ 103263788\\ 388492\\ 3887823\\ 121224776\\ 2518352\\ 27243073\\ 94838829\\ 37709422\\ 30326102\\ 291872120\\ \end{array}$	intergenic intergenic intergenic intergenic intronic intronic intronic intergenic intronic intergenic	$\begin{tabular}{lllllllllllllllllllllllllllllllllll$
MS BMI-MEN BMI-WOMEN PCV T1D	$\begin{array}{r} rs4309482\\ rs9321630\\ rs433317\\ rs6832151\\ rs228614\\ rs1062158\\ rs6952809\\ rs2214543\\ rs2066992\\ rs1455808\\ rs3004212\\ rs7912269\\ rs4409785\\ rs491111\\ rs12148050\\ rs16959924\\ rs544023\\ rs2060604\\ rs8070454\\ rs3761945\\ rs17796636\\ rs2653570\\ rs891437\\ rs4765929\\ rs17111706\\ rs6497196\\ rs7216086\\ rs7291756\\ rs7291756\\ rs1519463\\ rs4672927\\ rs4765929\\ rs47659297\\ rs47659297\\ rs1519463\\ rs46772975\\ rs1519463\\ rs4767927\\ rs47659297\\ rs4765929\\ rs1519463\\ rs4677927\\ rs4765929\\ rs4767927\\ rs4765929\\ rs47629297\\ rs4765929\\ rs1711766\\ rs7291756\\ rs1519463\\ rs4677927\\ rs4765929\\ rs4767927\\ rs4765929\\ rs4767927\\ rs4765929\\ rs4767927\\ rs4767927\\ rs4767927\\ rs4767927\\ rs4767927\\ rs4767927\\ rs4767927\\ rs4767927\\ rs4767927\\ rs47672927\\ rs47672827\\ rs476782927\\ rs47672827\\ rs4767827\\ r$	$\begin{array}{c} 18\\ 18\\ 3\\ 3\\ 4\\ 4\\ 5\\ 7\\ 7\\ 7\\ 8\\ 10\\ 10\\ 10\\ 10\\ 10\\ 11\\ 11\\ 14\\ 15\\ 15\\ 15\\ 11\\ 11\\ 11\\ 15\\ 8\\ 17\\ 1\\ 5\\ 11\\ 11\\ 11\\ 12\\ 14\\ 15\\ 17\\ 22\\ 1\\ 22\\ 1\\ 2\end{array}$	$\begin{array}{r} 4033021\\ \hline 4033021\\ 52750469\\ \hline 16970938\\ 28060456\\ 40303633\\ \hline 103578637\\ \hline 141523000\\ 2448493\\ \hline 10796892\\ 22768249\\ \hline 22768249\\ \hline 76034604\\ 43642810\\ \hline 78727604\\ 43642810\\ \hline 78727604\\ \hline 436482829\\ \hline 78727604\\ \hline 436482829\\ \hline 78727604\\ \hline 43642810\\ \hline 78727604\\ \hline $	intergenic intergenic intergenic intronic intronic intronic intronic intronic intergenic intronic intergenic intronic intergenic intronic intergenic intronic intergenic intronic intergenic	$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$
MS BMI-MEN BMI-WOMEN PCV T1D	$\begin{array}{c} rs4309482 \\ rs9821630 \\ rs433317 \\ rs6832151 \\ rs228614 \\ rs1062158 \\ rs6952809 \\ rs2214543 \\ rs2066992 \\ rs1455808 \\ rs3004212 \\ rs7912269 \\ rs4409785 \\ rs409785 \\ rs409785 \\ rs409785 \\ rs409785 \\ rs400785 \\ rs400785 \\ rs4070454 \\ rs5070454 \\ rs3761945 \\ rs17796636 \\ rs2653570 \\ rs870454 \\ rs8770454 \\ rs72076636 \\ rs2653570 \\ rs891437 \\ rs4765929 \\ rs1711706 \\ rs6497196 \\ rs7216086 \\ rs7291756 \\ rs1519463 \\ rs4672337 \\ ra000000 \\ \end{array}$	$\begin{array}{c} 18\\ 18\\ 3\\ 3\\ 4\\ 4\\ 5\\ 7\\ 7\\ 7\\ 8\\ 10\\ 10\\ 10\\ 10\\ 11\\ 11\\ 14\\ 15\\ 15\\ 8\\ 17\\ 1\\ 15\\ 15\\ 8\\ 17\\ 1\\ 11\\ 11\\ 12\\ 14\\ 15\\ 17\\ 22\\ 14\\ 12\\ 14\\ 15\\ 17\\ 22\\ 1\\ 4\\ 4\end{array}$	$\begin{array}{r} 4033021\\ 52750469\\ 16970938\\ 28060456\\ 40303633\\ 103578637\\ 141523000\\ 2448493\\ 10796892\\ 22768249\\ 76034604\\ 43642810\\ 78727604\\ 95311422\\ 116238034\\ 103263788\\ 47982456\\ 52007522\\ 76650334\\ 47982456\\ 52007522\\ 76650334\\ 1428456\\ 52007522\\ 76650334\\ 1428456\\ 52007522\\ 76650334\\ 14285449\\ 8987823\\ 121224776\\ 2518352\\ 27243073\\ 94838829\\ 37709422\\ 30326102\\ 221878139\\ 60217093\\ 4680758\\ \end{array}$	intergenic intergenic intergenic intronic intronic intronic intronic intronic intergenic intronic intergenic intronic intergenic	$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$
MS BMI-MEN BMI-WOMEN PCV T1D	$\begin{array}{c} 1.54309482 \\ 1.54309482 \\ 1.59821630 \\ 1.543317 \\ 1.543317 \\ 1.5582803 \\ 1.5582809 \\ 1.52214543 \\ 1.5228614 \\ 1.5228614 \\ 1.5228614 \\ 1.5228614 \\ 1.522863 \\ 1.522869 \\ 1.52214543 \\ 1.522869 \\ 1.522869 \\ 1.522869 \\ 1.522869 \\ 1.522869 \\ 1.522869 \\ 1.522869 \\ 1.522869 \\ 1.522869 \\ 1.52286 \\ 1.5286 \\ $	$\begin{array}{c} 18\\ 18\\ 3\\ 3\\ 4\\ 4\\ 5\\ 7\\ 7\\ 7\\ 7\\ 8\\ 10\\ 10\\ 10\\ 11\\ 11\\ 14\\ 15\\ 15\\ 8\\ 17\\ 15\\ 15\\ 8\\ 17\\ 11\\ 11\\ 11\\ 11\\ 11\\ 11\\ 11\\ 11\\ 11$	$\begin{array}{r} 4033521\\ \hline 4033524\\ \hline 52750469\\ \hline 16970938\\ \hline 28060456\\ \hline 40303633\\ \hline 103578637\\ \hline 141523000\\ \hline 2448493\\ \hline 10796892\\ \hline 22768249\\ \hline 76034604\\ \hline 43642810\\ \hline 78727604\\ \hline 95311422\\ \hline 116238034\\ \hline 103263788\\ \hline 47982456\\ \hline 52007522\\ \hline 76650334\\ \hline 103263788\\ \hline 47982456\\ \hline 52007522\\ \hline 76550334\\ \hline 116238034\\ \hline 103263788\\ \hline 37709422\\ \hline 30326102\\ \hline 221878139\\ \hline 60217093\\ \hline 4682768\\ \hline 90067525 \\ \hline \end{array}$	intergenic intergenic intergenic intergenic intronic intronic intronic intronic intergenic	$\begin{tabular}{l l l l l l l l l l l l l l l l l l l $
MS BMI-MEN BMI-WOMEN PCV T1D	$\begin{array}{c} rs4309482 \\ rs9821630 \\ rs43317 \\ rs6832151 \\ rs228614 \\ rs1062158 \\ rs6952809 \\ rs2214543 \\ rs2066992 \\ rs1455808 \\ rs3004212 \\ rs7912269 \\ rs4409785 \\ rs491111 \\ rs12148050 \\ rs16959924 \\ rs544023 \\ rs2060604 \\ rs8070454 \\ rs3761945 \\ rs17796636 \\ rs2653570 \\ rs891437 \\ rs4765929 \\ rs1711706 \\ rs6497196 \\ rs7291756 \\ rs7291756 \\ rs1519463 \\ rs4672337 \\ rs201908 \\ rs2661141 \\ rs054154 \\ rs0561141 \\ rs054154 \\ rs054154 \\ rs0561141 \\ rs054154 \\ rs054154 \\ rs0561141 \\ rs054154 \\ rs055454 \\ rs0561141 \\ rs054154 \\ rs05454 \\ rs0561141 \\ rs054154 \\ rs05454 \\ rs0561141 \\ rs054154 \\ rs054154 \\ rs05454 $	$\begin{array}{c} 18\\ 18\\ 3\\ 3\\ 4\\ 4\\ 4\\ 5\\ 7\\ 7\\ 7\\ 7\\ 8\\ 10\\ 10\\ 10\\ 11\\ 11\\ 11\\ 11\\ 15\\ 15\\ 8\\ 17\\ 1\\ 1\\ 15\\ 17\\ 11\\ 11\\ 11\\ 12\\ 14\\ 15\\ 17\\ 11\\ 11\\ 12\\ 4\\ 4\\ 4\\ 6\\ \end{array}$	$\begin{array}{r} 4033021\\ 52750469\\ 16970938\\ 28060456\\ 40303633\\ 103578637\\ 141523000\\ 2448493\\ 10796892\\ 22768249\\ 76034604\\ 43642810\\ 78727604\\ 95311422\\ 116238034\\ 103263788\\ 47982456\\ 52007522\\ 76650334\\ 38160754\\ 230706768\\ 14878549\\ 121224776\\ 2518352\\ 121224776\\ 2518352\\ 121224776\\ 2518352\\ 121224776\\ 2518352\\ 121224776\\ 2518352\\ 30326102\\ 221878139\\ 60217093\\ 4682768\\ 88665977\\ 8005261\\ \end{array}$	intergenic intergenic intergenic intergenic intronic intronic intronic intronic intergenic intergenic intergenic intergenic intergenic intergenic intergenic intergenic intronic intergenic	$\begin{tabular}{lllllllllllllllllllllllllllllllllll$
MS BMI-MEN BMI-WOMEN PCV T1D	$\begin{array}{c} rs4309482 \\ rs9821630 \\ rs433317 \\ rs6832151 \\ rs228614 \\ rs1062158 \\ rs6952809 \\ rs2214543 \\ rs2066992 \\ rs1455808 \\ rs3004212 \\ rs7912269 \\ rs4409785 \\ rs409785 \\ rs76631 \\ rs407237 \\ rs2019908 \\ rs7661141 \\ rs9341413 \\ rs400255 \\ rs400000 \\ rs400000 \\ rs400000 \\ rs400000 \\ rs400000 \\ rs7661141 \\ rs9341413 \\ rs9341413 \\ rs4000000 \\ rs400000 \\ rs4000000 \\ rs4000000 \\ rs4000000 \\ rs400000 \\ rs4000000 \\ rs400000 \\$	$\begin{array}{c} 18\\ 18\\ 3\\ 3\\ 4\\ 4\\ 5\\ 7\\ 7\\ 7\\ 7\\ 8\\ 10\\ 10\\ 10\\ 11\\ 11\\ 11\\ 14\\ 15\\ 15\\ 8\\ 17\\ 1\\ 15\\ 15\\ 15\\ 17\\ 1\\ 11\\ 11\\ 12\\ 14\\ 15\\ 17\\ 22\\ 1\\ 4\\ 4\\ 6\\ 6\\ \end{array}$	$\begin{array}{r} 4033021\\ 52750469\\ 16970938\\ 28060456\\ 40303633\\ 103578637\\ 141523000\\ 2448493\\ 10796892\\ 22768249\\ 76034604\\ 43642810\\ 78727604\\ 95311422\\ 116238034\\ 103263788\\ 47982456\\ 52007522\\ 76650334\\ 47982456\\ 52007522\\ 76650334\\ 1428456\\ 52007522\\ 76650334\\ 1428456\\ 52007522\\ 76650334\\ 14288456\\ 52007522\\ 76650334\\ 14288456\\ 52007522\\ 76650334\\ 14288456\\ 52007522\\ 76650334\\ 14288456\\ 52007522\\ 76650334\\ 14288456\\ 52007522\\ 76650334\\ 230706768\\ 14878549\\ 8987823\\ 121224776\\ 2518352\\ 27243073\\ 94838829\\ 37709422\\ 230326102\\ 221878139\\ 60217093\\ 4682768\\ 88665977\\ 73900091\\ 73900091\\ \end{array}$	intergenic intergenic intergenic intronic intronic intronic intronic intronic intergenic intronic intergenic intronic intergenic	$\begin{tabular}{lllllllllllllllllllllllllllllllllll$
MS BMI-MEN BMI-WOMEN PCV T1D	$\begin{array}{c} 1.54309482\\ rs9821630\\ rs43317\\ rs6832151\\ rs28614\\ rs1062158\\ rs6952809\\ rs2214543\\ rs2066992\\ rs1455808\\ rs3004212\\ rs17912269\\ rs4409785\\ rs491111\\ rs12148050\\ rs16959924\\ rs5409785\\ rs491111\\ rs12148050\\ rs16959924\\ rs54023\\ rs2060604\\ rs8070454\\ rs3761945\\ rs17796636\\ rs2060604\\ rs872653570\\ rs17796636\\ rs7291756\\ rs61945\\ rs17111706\\ rs6497196\\ rs7216086\\ rs7291756\\ rs1519463\\ rs7201796\\ rs201908\\ rs7661141\\ rs9341413\\ rs12676524\\ \end{array}$	$\begin{array}{c} 18\\ 18\\ 3\\ 3\\ 4\\ 4\\ 4\\ 5\\ 7\\ 7\\ 7\\ 7\\ 8\\ 10\\ 10\\ 10\\ 11\\ 11\\ 14\\ 15\\ 15\\ 8\\ 17\\ 11\\ 11\\ 11\\ 11\\ 15\\ 15\\ 8\\ 17\\ 11\\ 11\\ 11\\ 11\\ 12\\ 14\\ 15\\ 17\\ 22\\ 1\\ 12\\ 14\\ 6\\ 6\\ 8\\ 8\\ 5\end{array}$	$\begin{array}{r} 4033521\\ 16970938\\ 28060456\\ 40303633\\ 1003578637\\ 141523000\\ 2448493\\ 10796892\\ 22768249\\ 76034604\\ 43642810\\ 78727604\\ 95311422\\ 116238034\\ 103263788\\ 47982456\\ 52007522\\ 76650334\\ 47982456\\ 52007522\\ 76650334\\ 103263788\\ 47982456\\ 52007522\\ 76650334\\ 116238034\\ 103263788\\ 47982456\\ 52007522\\ 76650334\\ 116238034\\ 103263788\\ 47982456\\ 52007522\\ 76650334\\ 116238034\\ 103263788\\ 47982456\\ 52007522\\ 76550334\\ 116238034\\ 103263788\\ 47982456\\ 52007522\\ 76550334\\ 116238034\\ 103263788\\ 38665977\\ 73300091\\ 22703557\\ \end{array}$	intergenic intergenic intergenic intronic intronic intronic intronic intronic intergenic intronic intergenic	$\begin{tabular}{l l l l l l l l l l l l l l l l l l l $
MS BMI-MEN BMI-WOMEN PCV T1D	$\begin{array}{c} rs4309482\\ rs9821630\\ rs43317\\ rs6832151\\ rs228614\\ rs1062158\\ rs6952809\\ rs2214543\\ rs2066992\\ rs1455808\\ rs3004212\\ rs7912269\\ rs4409785\\ rs491111\\ rs12148050\\ rs16959924\\ rs544023\\ rs2060604\\ rs8070454\\ rs3761945\\ rs4765929\\ rs17796636\\ rs2653570\\ rs891437\\ rs4765929\\ rs17111706\\ rs6497196\\ rs7291756\\ rs7291756\\ rs1519463\\ rs7661141\\ rs9341413\\ rs9341413\\ rs12676524\\ rs7019909\\ \end{array}$	$\begin{array}{c} 18\\ 18\\ 3\\ 3\\ 4\\ 4\\ 5\\ 7\\ 7\\ 7\\ 7\\ 8\\ 10\\ 10\\ 10\\ 11\\ 11\\ 11\\ 14\\ 15\\ 15\\ 8\\ 17\\ 1\\ 1\\ 15\\ 11\\ 11\\ 11\\ 12\\ 12\\ 11\\ 11\\ 12\\ 4\\ 4\\ 6\\ 8\\ 9\\ 9\\ 9\\ 1\end{array}$	$\begin{array}{r} 4033021\\ 52750469\\ 16970938\\ 28060456\\ 40303633\\ 103578637\\ 141523000\\ 2448493\\ 10796892\\ 22768249\\ 76034604\\ 43642810\\ 78727604\\ 95311422\\ 116238034\\ 103263788\\ 47982456\\ 52007522\\ 76650334\\ 38160754\\ 230706768\\ 148785449\\ 121224776\\ 2518352\\ 121224776\\ 2518352\\ 121224776\\ 2518352\\ 121224776\\ 2518352\\ 121224776\\ 2518352\\ 30326102\\ 221878139\\ 60217093\\ 4682768\\ 88665977\\ 73900091\\ 22703557\\ 33113322\\ \end{array}$	intergenic intergenic intergenic intronic intronic intronic intronic intronic intergenic intronic intergenic intronic intergenic intronic intergenic intronic intergenic intronic intergeni	$\begin{tabular}{lllllllllllllllllllllllllllllllllll$
MS BMI-MEN BMI-WOMEN PCV T1D	$\begin{array}{c} rs4309482\\ rs9821630\\ rs433317\\ rs6832151\\ rs228614\\ rs1062158\\ rs6952809\\ rs2214543\\ rs2066992\\ rs1455808\\ rs3004212\\ rs7912269\\ rs4409785\\ rs491111\\ rs12148050\\ rs409785\\ rs491111\\ rs12148050\\ rs16959924\\ rs544023\\ rs2060604\\ rs2060604\\ rs2060604\\ rs2060604\\ rs17796636\\ rs2653570\\ rs491437\\ rs4765929\\ rs17111706\\ rs6497196\\ rs7216086\\ rs7291756\\ rs1519463\\ rs4672337\\ rs2019908\\ rs7661141\\ rs9341413\\ rs12676524\\ rs1216829\\ rs11216829\\ rs1$	$\begin{array}{c} 18\\ 18\\ 3\\ 3\\ 4\\ 4\\ 4\\ 5\\ 7\\ 7\\ 7\\ 7\\ 8\\ 10\\ 10\\ 10\\ 10\\ 11\\ 11\\ 11\\ 14\\ 15\\ 15\\ 8\\ 17\\ 1\\ 15\\ 17\\ 1\\ 1\\ 11\\ 11\\ 12\\ 14\\ 15\\ 17\\ 22\\ 4\\ 4\\ 6\\ 8\\ 9\\ 11\\ 1\end{array}$	$\begin{array}{r} 4033021\\ 16970938\\ 28060456\\ 40303633\\ 1003578637\\ 141523000\\ 2448493\\ 10796892\\ 22768249\\ 76034604\\ 43642810\\ 78727604\\ 43642810\\ 78727604\\ 95311422\\ 116238034\\ 103263788\\ 47982456\\ 52007522\\ 76650334\\ 47982456\\ 52007522\\ 76650334\\ 381607524\\ 230706768\\ 148785449\\ 8987823\\ 121224776\\ 2518352\\ 27243073\\ 94838829\\ 37709422\\ 30326102\\ 221878139\\ 60217093\\ 4682768\\ 888665977\\ 73900091\\ 22703557\\ 73900091\\ 22703557\\ 33113322\\ 118112911 \end{array}$	intergenic intergenic intergenic intergenic intronic intronic intronic intronic intergenic intronic intergenic	$\begin{tabular}{l l l l l l l l l l l l l l l l l l l $
MS BMI-MEN BMI-WOMEN PCV T1D	$\begin{array}{r} rs4309482 \\ rs9821630 \\ rs43317 \\ rs6832151 \\ rs28614 \\ rs1062158 \\ rs6952809 \\ rs2214543 \\ rs2066992 \\ rs1455808 \\ rs3004212 \\ rs1455808 \\ rs3004212 \\ rs1409785 \\ rs491111 \\ rs12148050 \\ rs16959924 \\ rs5409785 \\ rs491111 \\ rs12148050 \\ rs16959924 \\ rs54023 \\ rs2060604 \\ rs870454 \\ rs3761945 \\ rs17796636 \\ rs2653570 \\ rs470929 \\ rs17796636 \\ rs7291756 \\ rs6497196 \\ rs7216086 \\ rs7291756 \\ rs1519463 \\ rs7201796 \\ rs201908 \\ rs7661141 \\ rs9341413 \\ rs12676529 \\ rs1680726 \\ rs1$	$\begin{array}{c} 18\\ 18\\ 3\\ 3\\ 4\\ 4\\ 5\\ 7\\ 7\\ 7\\ 7\\ 8\\ 10\\ 10\\ 10\\ 11\\ 11\\ 14\\ 15\\ 15\\ 8\\ 17\\ 11\\ 11\\ 15\\ 15\\ 8\\ 17\\ 11\\ 11\\ 12\\ 14\\ 15\\ 17\\ 22\\ 4\\ 4\\ 6\\ 8\\ 9\\ 9\\ 11\\ 14\\ 14\\ 14\\ 14\\ 14\\ 14\\ 14\\ 14\\ 14$	4033521 52750469 16970938 28060456 40303633 103578637 141523000 2448493 10796892 22768249 76034604 43642810 78727604 95311422 116238034 103263788 47982456 52007522 76650334 2030706768 148785449 8987823 121224776 2518352 27243073 94338829 37709422 30326102 21878139 60217093 4682768 88665977 73900091 22703557 3113322 118112911 34509293	intergenic intergenic intergenic intronic intronic intronic intronic intronic intergenic intronic intergenic	$\begin{tabular}{lllllllllllllllllllllllllllllllllll$
MS BMI-MEN BMI-WOMEN PCV T1D	$\begin{array}{c} rs4309482\\ rs9821630\\ rs433317\\ rs6832151\\ rs228614\\ rs1062158\\ rs6952809\\ rs2214543\\ rs2066992\\ rs1455808\\ rs3004212\\ rs7912269\\ rs4409785\\ rs491111\\ rs12148050\\ rs46959924\\ rs544023\\ rs2060604\\ rs8070454\\ rs3761945\\ rs4779663\\ rs1779663\\ rs1779663\\ rs7216086\\ rs7291756\\ rs7291756\\ rs1519463\\ rs7201756\\ rs1519463\\ rs7661141\\ rs9341413\\ rs12676524\\ rs7019909\\ rs1680726\\ rs4779910\\ \end{array}$	$\begin{array}{c} 18\\ 18\\ 3\\ 3\\ 4\\ 4\\ 5\\ 7\\ 7\\ 7\\ 7\\ 7\\ 8\\ 10\\ 10\\ 10\\ 11\\ 11\\ 11\\ 14\\ 15\\ 15\\ 8\\ 7\\ 1\\ 15\\ 15\\ 8\\ 17\\ 1\\ 1\\ 15\\ 17\\ 1\\ 12\\ 4\\ 15\\ 17\\ 22\\ 4\\ 4\\ 6\\ 8\\ 9\\ 11\\ 14\\ 15\\ 14\\ 14\\ 15\\ 14\\ 15\\ 14\\ 15\\ 14\\ 15\\ 14\\ 14\\ 15\\ 14\\ 15\\ 14\\ 14\\ 15\\ 14\\ 15\\ 14\\ 15\\ 14\\ 14\\ 15\\ 14\\ 15\\ 14\\ 14\\ 15\\ 14\\ 15\\ 14\\ 14\\ 15\\ 14\\ 14\\ 15\\ 14\\ 14\\ 15\\ 14\\ 15\\ 14\\ 15\\ 14\\ 15\\ 14\\ 15\\ 14\\ 14\\ 15\\ 14\\ 15\\ 14\\ 15\\ 14\\ 15\\ 14\\ 15\\ 14\\ 15\\ 14\\ 15\\ 14\\ 15\\ 14\\ 15\\ 14\\ 15\\ 14\\ 15\\ 14\\ 15\\ 14\\ 15\\ 14\\ 15\\ 14\\ 15\\ 14\\ 15\\ 14\\ 15\\ 14\\ 14\\ 15\\ 14\\ 15\\ 14\\ 14\\ 15\\ 14\\ 15\\ 14\\ 15\\ 14\\ 15\\ 14\\ 15\\ 14\\ 15\\ 14\\ 15\\ 14\\ 15\\ 14\\ 15\\ 14\\ 15\\ 14\\ 14\\ 15\\ 14\\ 15\\ 14\\ 14\\ 15\\ 14\\ 15\\ 14\\ 14\\ 15\\ 14\\ 14\\ 15\\ 14\\ 14\\ 15\\ 14\\ 14\\ 15\\ 14\\ 14\\ 15\\ 14\\ 14\\ 15\\ 14\\ 14\\ 15\\ 14\\ 14\\ 14\\ 15\\ 14\\ 14\\ 14\\ 14\\ 15\\ 14\\ 14\\ 14\\ 15\\ 14\\ 14\\ 15\\ 14\\ 14\\ 14\\ 15\\ 14\\ 14\\ 14\\ 15\\ 14\\ 14\\ 14\\ 15\\ 14\\ 14\\ 14\\ 15\\ 14\\ 14\\ 14\\ 15\\ 14\\ 14\\ 14\\ 14\\ 15\\ 14\\ 14\\ 14\\ 15\\ 14\\ 14\\ 14\\ 15\\ 14\\ 14\\ 14\\ 15\\ 14\\ 14\\ 14\\ 15\\ 14\\ 14\\ 14\\ 15\\ 14\\ 14\\ 14\\ 14\\ 15\\ 14\\ 14\\ 14\\ 14\\ 15\\ 14\\ 14\\ 14\\ 14\\ 14\\ 15\\ 14\\ 14\\ 14\\ 14\\ 14\\ 14\\ 14\\ 15\\ 14\\ 14\\ 14\\ 14\\ 14\\ 14\\ 14\\ 14\\ 14\\ 14$	$\begin{array}{r} 4033021\\ 52750469\\ 16970938\\ 28060456\\ 40303633\\ 103578637\\ 141523000\\ 2448493\\ 10796892\\ 22768249\\ 76034604\\ 43642810\\ 78727604\\ 95311422\\ 116238034\\ 103263788\\ 47982456\\ 52007522\\ 76650334\\ 47982456\\ 52007522\\ 76650334\\ 38160754\\ 230706768\\ 148785449\\ 230706768\\ 148785449\\ 230706768\\ 148785449\\ 230706768\\ 148785439\\ 121224776\\ 2518352\\ 27243073\\ 94838829\\ 37709422\\ 27243073\\ 94838829\\ 37709422\\ 27243073\\ 9483829\\ 37709422\\ 27243073\\ 9483829\\ 37709422\\ 27243073\\ 9483829\\ 37709422\\ 11872768\\ 88665977\\ 73900091\\ 2270357\\ 33113322\\ 118112911\\ 34509293\\ 31947042\\ \end{array}$	intergenic intergenic intergenic intronic intronic intronic intronic intronic intergenic intronic intergenic intronic intergenic	$\begin{tabular}{l l l l l l l l l l l l l l l l l l l $
MS BMI-MEN BMI-WOMEN PCV T1D	$\begin{array}{c} rs4309482 \\ rs4309482 \\ rs9821630 \\ rs433317 \\ rs6832151 \\ rs228614 \\ rs1062158 \\ rs6952809 \\ rs2214543 \\ rs2066992 \\ rs1455808 \\ rs3004212 \\ rs7912269 \\ rs4409785 \\ rs491111 \\ rs12148050 \\ rs409785 \\ rs491111 \\ rs12148050 \\ rs16959924 \\ rs544023 \\ rs2060604 \\ rs8761945 \\ rs4765929 \\ rs17796636 \\ rs2653570 \\ rs891437 \\ rs4765929 \\ rs771117066 \\ rs6497196 \\ rs7216086 \\ rs7291756 \\ rs1519463 \\ rs4672337 \\ rs2019908 \\ rs7661141 \\ rs9341413 \\ rs12676524 \\ rs17846124 \\ rs7019909 \\ rs11216829 \\ rs1680726 \\ rs4779910 \\ rs2867316 \\ \end{array}$	$\begin{array}{c} 18\\ 18\\ 3\\ 3\\ 4\\ 4\\ 5\\ 7\\ 7\\ 7\\ 7\\ 8\\ 10\\ 10\\ 10\\ 10\\ 11\\ 11\\ 11\\ 14\\ 15\\ 15\\ 8\\ 17\\ 1\\ 15\\ 17\\ 1\\ 12\\ 14\\ 15\\ 17\\ 22\\ 4\\ 4\\ 6\\ 8\\ 9\\ 11\\ 14\\ 15\\ 17\\ 15\\ 15\\ 17\\ 15\\ 15\\ 17\\ 15\\ 15\\ 15\\ 15\\ 17\\ 15\\ 15\\ 15\\ 15\\ 15\\ 15\\ 15\\ 15\\ 15\\ 15$	$\begin{array}{r} 4033021\\ 16970938\\ 28060456\\ 40303633\\ 1003578637\\ 141523000\\ 2448493\\ 10796892\\ 22768249\\ 76034604\\ 43642810\\ 78727604\\ 43642810\\ 78727604\\ 95311422\\ 116238034\\ 103263788\\ 47982456\\ 52007522\\ 76650334\\ 47982456\\ 52007522\\ 76650334\\ 47982456\\ 52007522\\ 76650334\\ 14288549\\ 8987823\\ 121224776\\ 2518352\\ 27243073\\ 94838829\\ 37709422\\ 30326102\\ 221878139\\ 60217093\\ 4682768\\ 88665977\\ 73900091\\ 22703557\\ 73900091\\ 22703557\\ 73900091\\ 22703557\\ 33113322\\ 118112911\\ 34509293\\ 31947042\\ 43376447\\ \end{array}$	intergenic intergenic intergenic intronic intronic intronic intronic intronic intergenic intronic intergenic intronic intergenic intronic intergenic intronic intergenic intronic intergenic intergenic intronic intergenic intergenic intergenic intronic intergenic intergenic intergenic intergenic intronic intergenic intergenic intronic intergenic intergenic intergenic	$\begin{tabular}{lllllllllllllllllllllllllllllllllll$