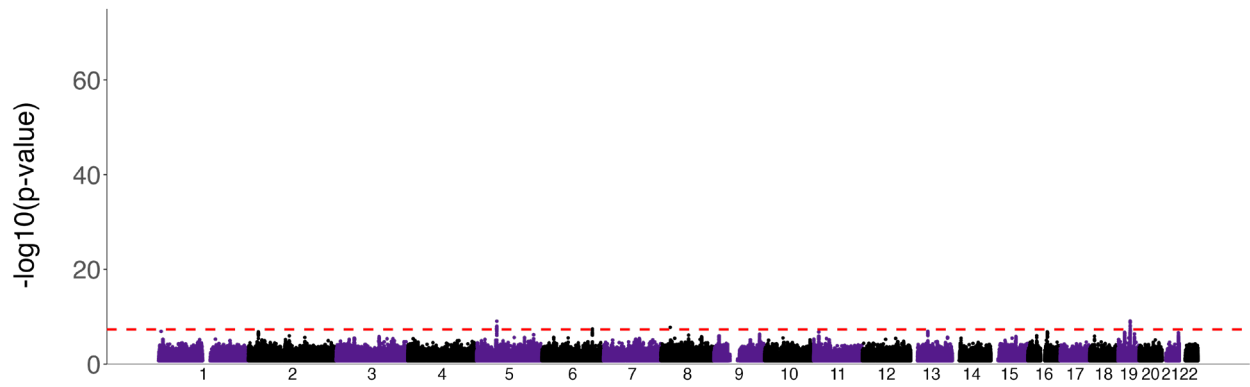
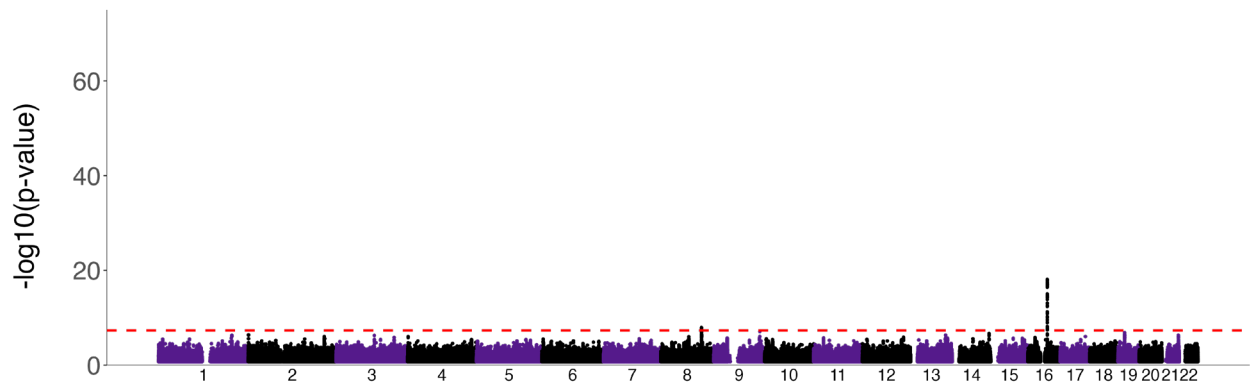


Supplementary Information

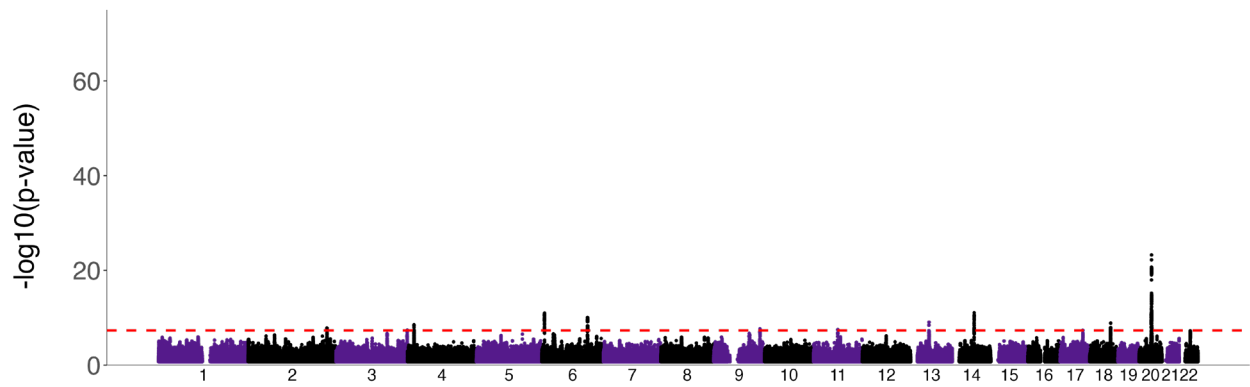
Visceral adipose tissue



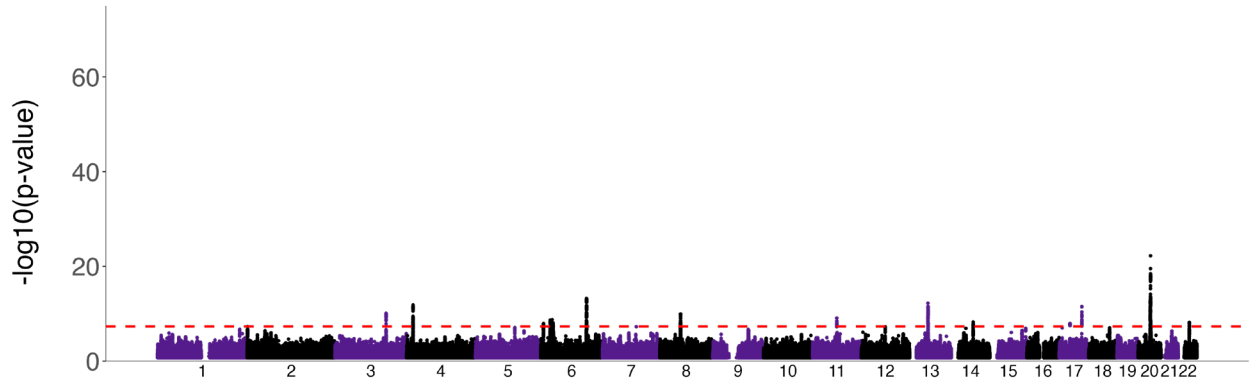
Abdominal subcutaneous adipose tissue



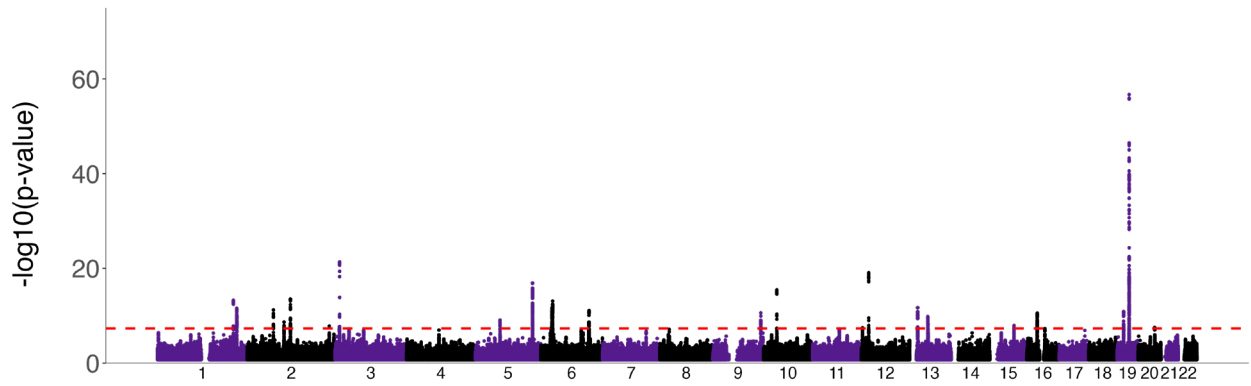
Anterior thigh muscle volume



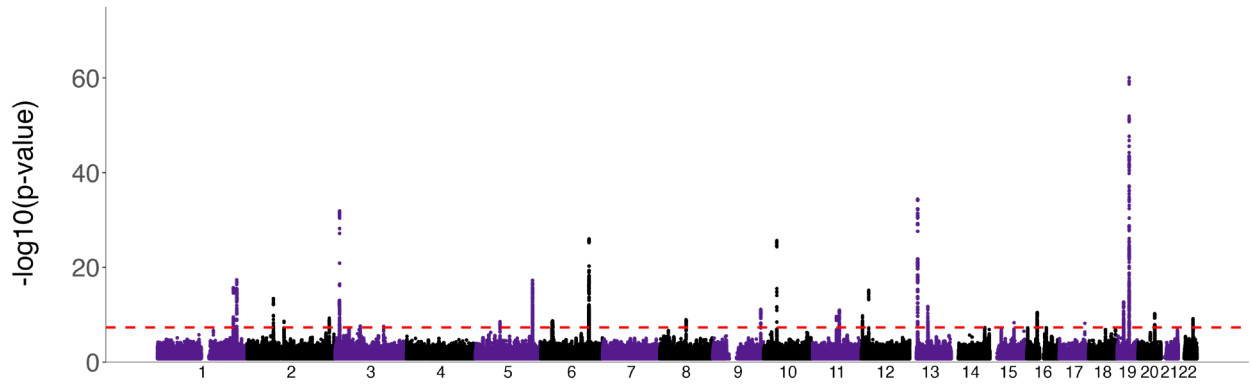
Posterior thigh muscle volume



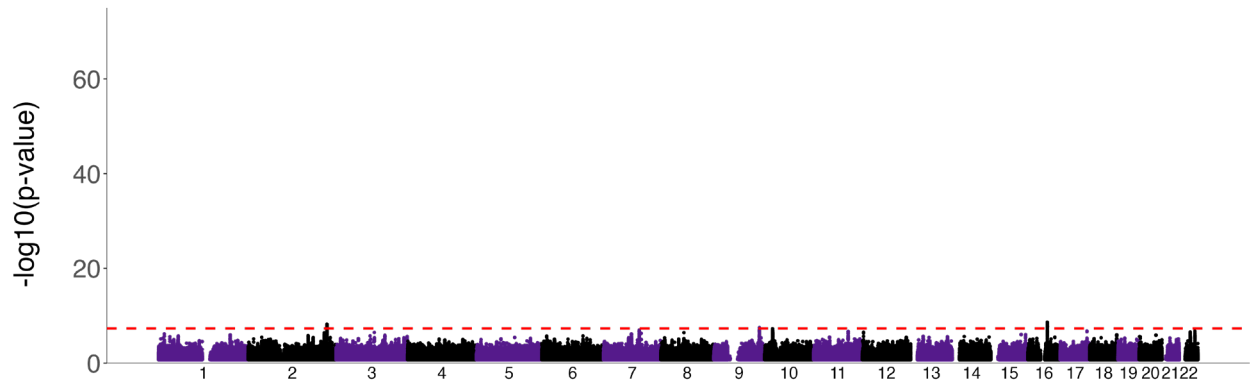
Anterior thigh muscle fat infiltration (%)



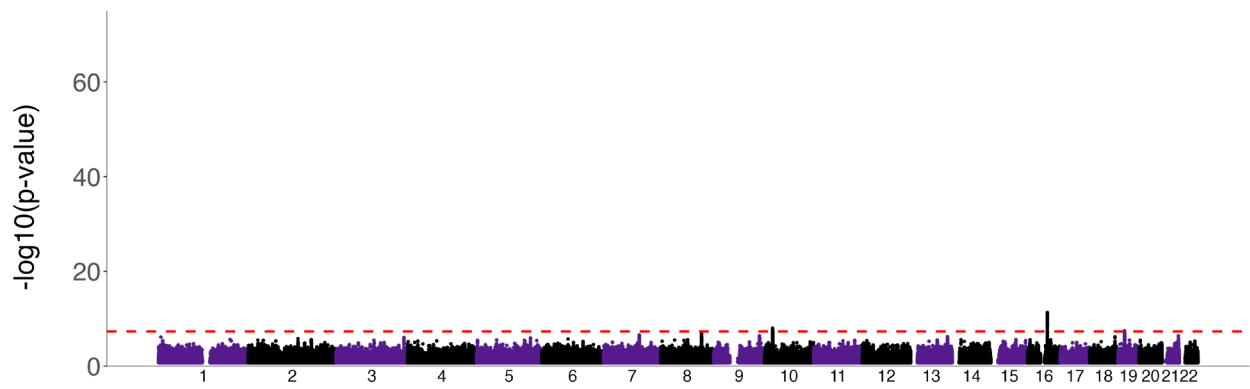
Posterior thigh muscle fat infiltration (%)



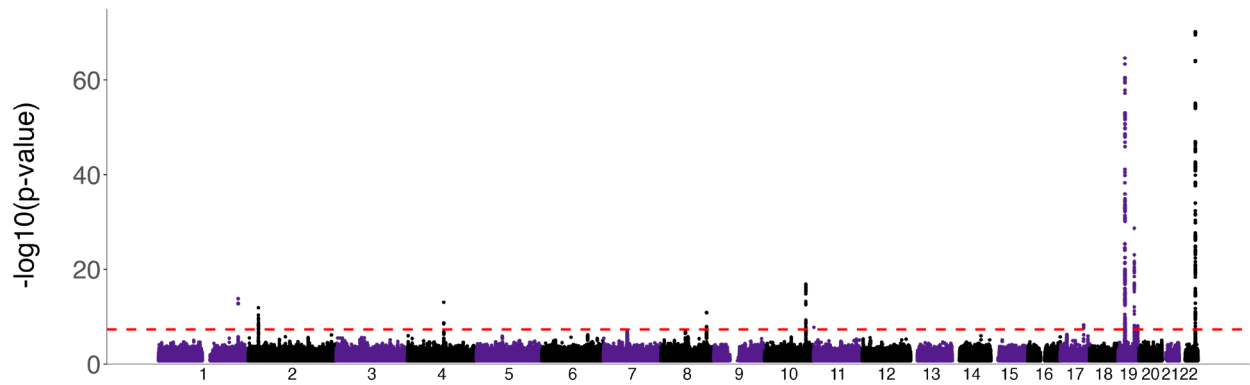
Weight-muscle-ratio



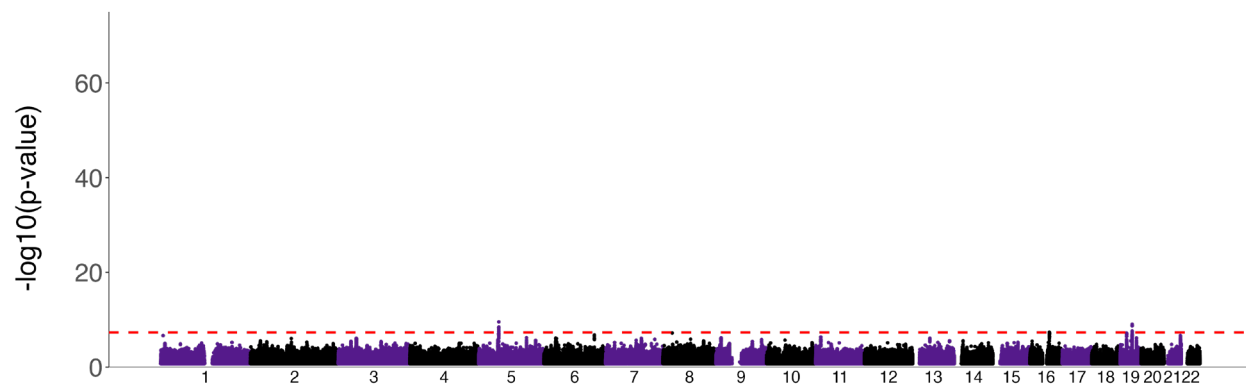
Abdominal fat ratio



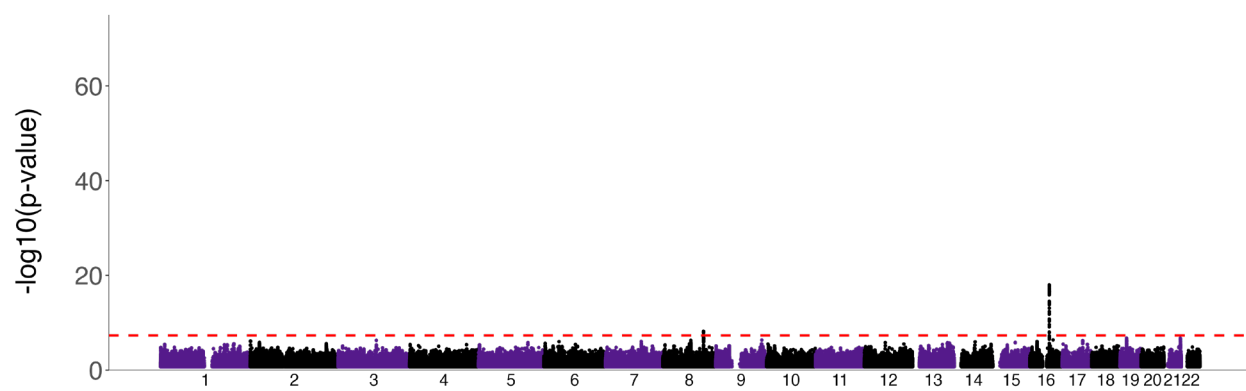
Liver proton density fat fraction (%)



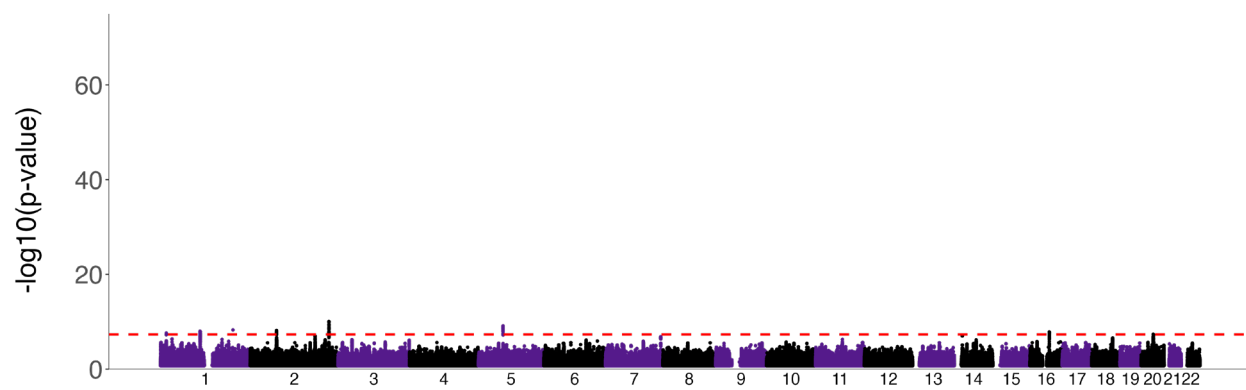
VAT/height²



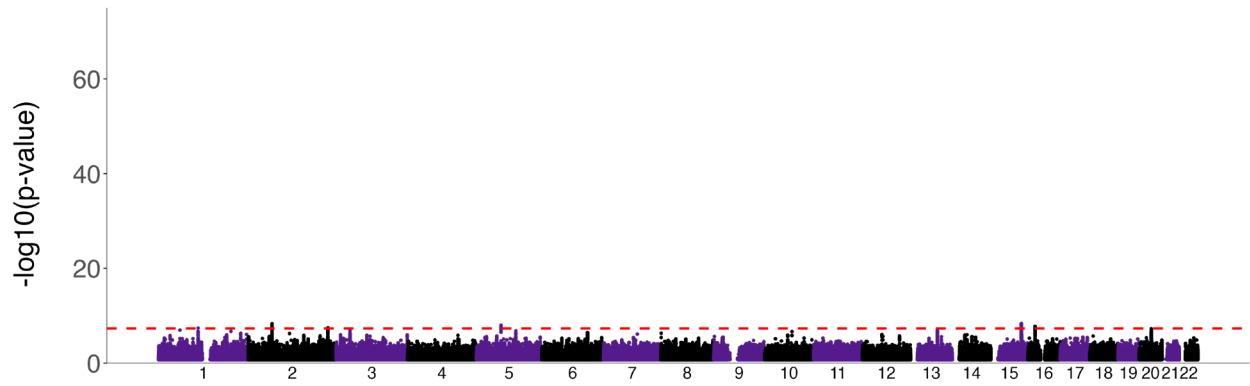
ASAT/height²



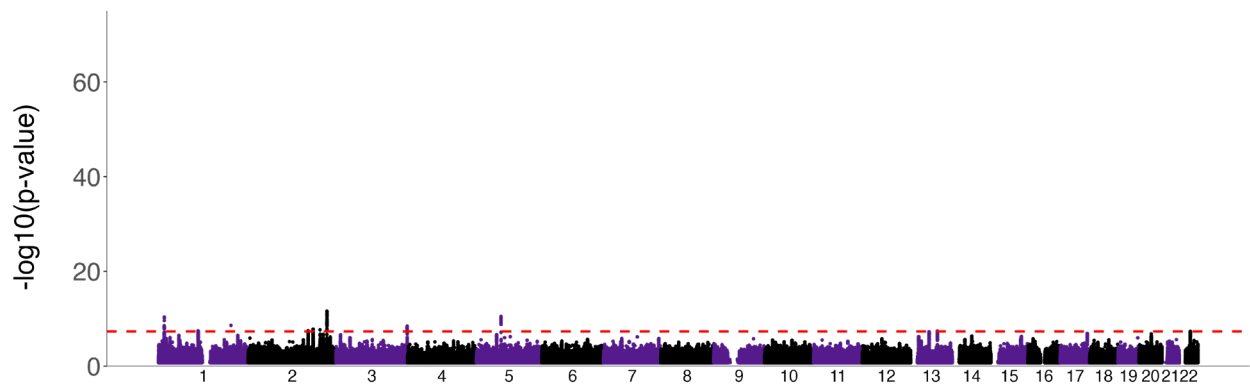
ATMV/height²



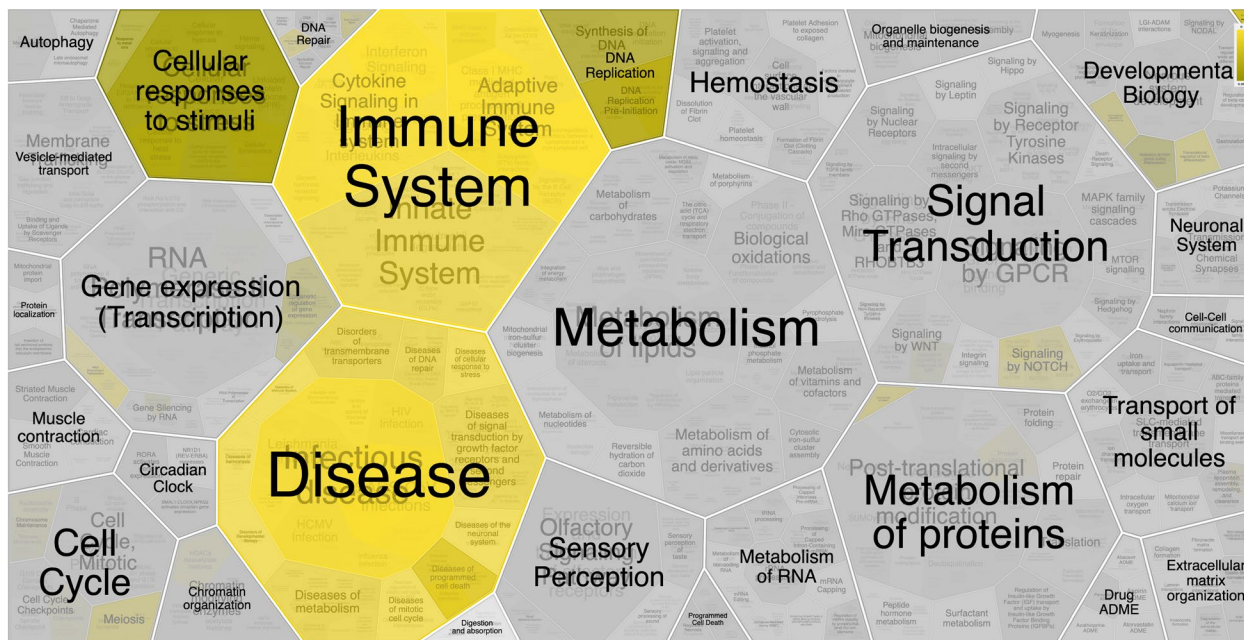
PTMV/height²



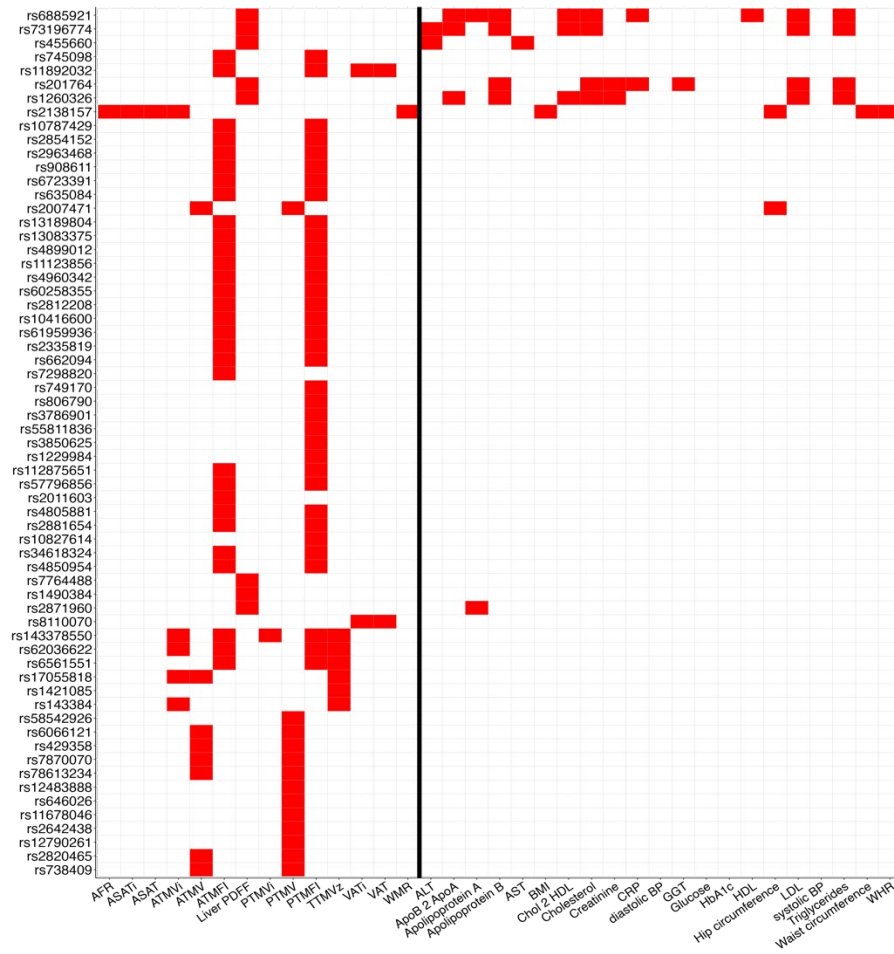
Total thigh muscle volume (TTMVz; age, height, weight and sex corrected)



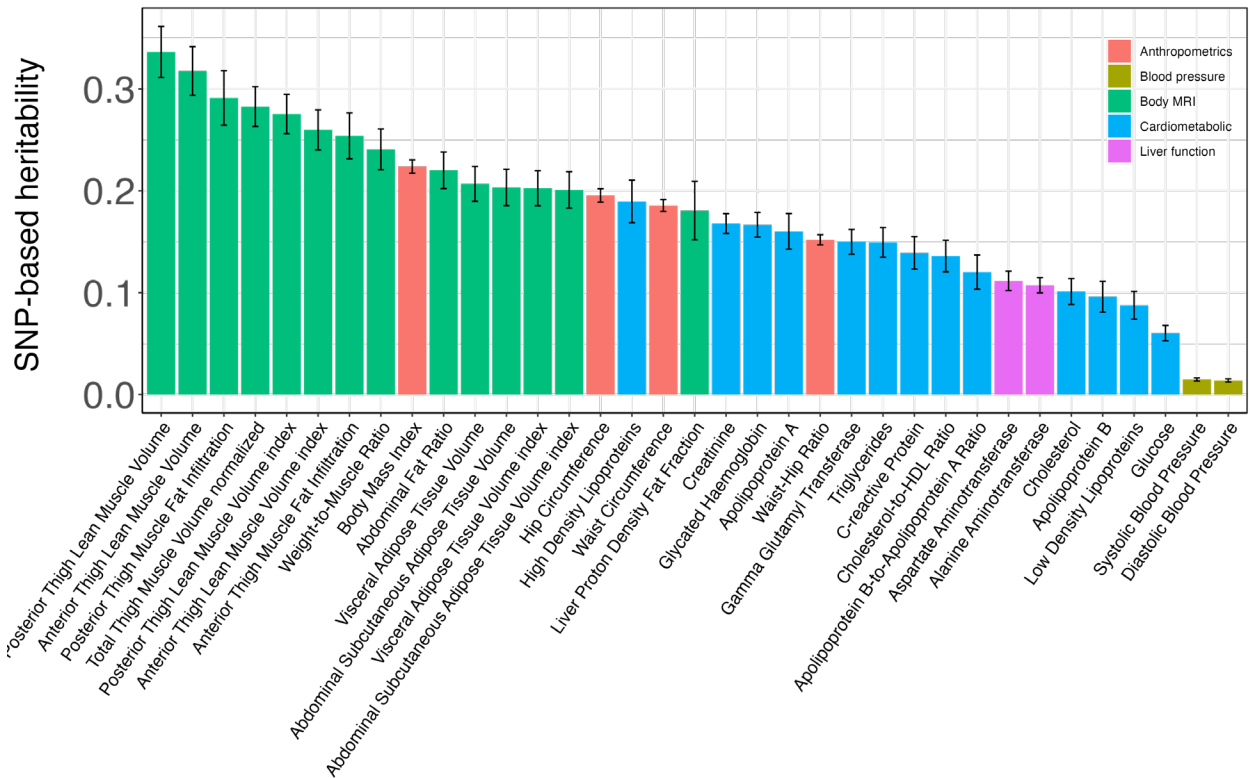
Supplementary Figure 1. Manhattan plots for each of the MRI-derived measures of body composition, as indicated above each of the plots. The x-axis indicates genomic position, ordered by chromosome, the y-axis indicates the $-\log_{10}(p)$. The red horizontal dotted line indicates nominal GWAS significance threshold ($p=5*10^{-8}$).



Supplementary Figure 2. Visual representation of the output from coupling the MOSTest-identified set of genes to the Reactome database. Brighter yellow indicates higher significance. Information on the specific pathways and their significance is provided in the Supplementary Data 5.



Supplementary Figure 3. Novelty of loci discovered through the univariate GWAS of body MRI measures. The rs-codes on the y-axis represent the lead SNPs of the discovered loci, and on the x-axis are all the studied measures; on the left of the vertical black line are the body MRI measures and on the right are the secondary measures of cardiometabolism. Red cells indicate that the SNP is whole-genome significantly associated with the measure.



Supplementary Figure 4. Bar plot summarizing the SNP-based heritability (y-axis) for each of the univariate measures analyzed (x-axis), as calculated through LD score regression. This tool was applied to the GWAS summary statistics, derived from N=33 588 individuals. The fill of the bars indicates the measurement category, as indicated in the legend. The error bars reflect standard error.

Supplementary Table 1. Results from sex-stratified GWAS on the body MRI measures, listing locus yields and genetic correlations (r_g) between the male and female-specific GWAS.

Measure	r_g	Male yield	Female yield
Abdominal Fat Ratio	0.84	0	0
Abdominal Subcutaneous Adipose Tissue Volume index	0.79	1	1
Abdominal Subcutaneous Adipose Tissue Volume	0.73	1	1
Anterior Thigh Lean Muscle Volume index	0.56	0	0
Anterior Thigh Lean Muscle Volume	0.63	3	1
Anterior Thigh Muscle Fat Infiltration	0.89	6	6
Liver Proton Density Fat Fraction	0.8	6	3
Posterior Thigh Lean Muscle Volume index	0.58	0	0
Posterior Thigh Lean Muscle Volume	0.6	2	3
Posterior Thigh Muscle Fat Infiltration	0.97	7	11
Total Thigh Muscle Volume normalized	0.73	0	0
Visceral Adipose Tissue Volume index	0.76	0	0
Visceral Adipose Tissue Volume	0.78	0	0
Weight-to-Muscle Ratio	0.82	0	0