GWAS with **targeted** metabolic traits - **CPS1** locus

**Associations with Glycine/Threonine**

![Graph showing associations with Glycine/Threonine](image)

- **Genotype of rs715**
- **Genome-wide associations with Glycine/Threonine**

**Expected $-\log_{10}(P)$**
GWAS with targeted metabolic traits - XYLB locus

Associations with Glycolate

Genotype of rs3132440

Genome-wide associations with Glycolate
GWAS with targeted metabolic traits - SLC6A20 locus

Associations with N,N-Dimethylglycine/Alanine

Genotype of rs17279437

Genome–wide associations with N,N-Dimethylglycine/Alanine

Expected $-\log_{10}(P)$
GWAS with targeted metabolic traits - ETNPPL locus

Associations with Ethanolamine

Genotype of rs56043887

Genome-wide associations with Ethanolamine
GWAS with targeted metabolic traits - SLC6A19 locus

Associations with Histidine/tau-Methylhistidine

Strength of association (−log₁₀(P))

Genotype of rs11133665

Observed −log₁₀(P)

Genome-wide associations with Histidine/tau–Methylhistidine

Expected −log₁₀(P)
GWAS with **targeted** metabolic traits - **AGXT2** locus

Associations with 3-Aminoisobutyrate

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**Genotype of rs37369**

**Genome-wide associations with 3-Aminoisobutyrate**

---

**Strength of association (−log10(P))**

**Recombination rate (CM/Mb)**

**Chromosome 5 (Mb)**

---

**Expected −log10(P)**

**Observed −log10(P)**
GWAS with targeted metabolic traits - DMGDH locus

Associations with N,N-Dimethylglycine/Betaine

Genotype of rs6453429

Genome-wide associations with N,N-Dimethylglycine/Betaine
GWAS with targeted metabolic traits - SLC36A2 locus

Associations with Glycine/Citrate

Genotype of rs3846710

Genome-wide associations with Glycine/Citrate
GWAS with **targeted** metabolic traits - **NAT2** locus

**Associations with Formate/Acetate**

**Genotype of rs1495743**

<table>
<thead>
<tr>
<th>Genotype</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>GG</td>
<td>2161</td>
</tr>
<tr>
<td>GC</td>
<td>1362</td>
</tr>
<tr>
<td>CC</td>
<td>197</td>
</tr>
</tbody>
</table>

**Observed $-\log_{10}(P)$**

Expected $-\log_{10}(P)$

Chromosome 8 (Mb)

Strength of association ($-\log_{10}(P)$)

Recombination rate (CM/Mb)

- **recombination rate**
- **direct effect on transcript**
- **putative regulatory effect**
- **multiple effects**
- **associated with trait**
GWAS with **targeted** metabolic traits - **GLDC** locus

Associations with Glycine/Alanine

Genotype of rs1755615

Genome-wide associations with Glycine/Alanine
GWAS with **targeted** metabolic traits - **SLC6A13** locus

Associations with 3-Aminoiso-butyrates

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**Genotype of rs11062102**

**Genome-wide associations with 3-Aminoiso-butyrates**
GWAS with **targeted** metabolic traits - **HPD** locus

**Associations with 2-Hydroxyisobutyrate**

![Genotyping of rs4760099](image)

![Genome-wide associations with 2-Hydroxyisobutyrate](image)
GWAS with **targeted** metabolic traits - **PNMT** locus

Associations with Histidine/tau-Methylhistidine
GWAS with **targeted** metabolic traits - **SLC7A9** locus

Associations with Lysine

![Graph showing GWAS results with Lysine associations](image)

**Genotype of rs7247977**

- **Genotype distribution:**
  - CC: N = 227
  - CT: N = 445
  - TT: N = 216

**Genome-wide associations with Lysine**

- **Observed vs. Expected −log10(P):**
  - Expected distribution
  - Observed distribution
GWAS with **targeted** metabolic traits - **SLC13A3** locus

**Associations with Succinate/Citrate**

- **Observed**
  - TP53RK

- **Expected**
  - recombination rate
  - unknown effect
  - direct regulatory effect
  - putative regulatory effect
  - multiple effects
  - associated with trait

Genotype of rs941206

- **Observed** $\log_{10}(P)$
  - $N = 2871$
  - $N = 849$
  - $N = 65$

Genome-wide associations with Succinate/Citrate

- **Observed** $-\log_{10}(P)$
  - $N = 849$
  - $N = 65$

**Strength of association**

$-\log_{10}(P)$

$\geq 0.2$

$N = 2871$

GWAS with **SLC13A3**

$N = 849$

**Recombination rate (CM/Mb)**

$20$

$40$

$60$

$0$

$20$

$40$

$60$

$0$

$45.1$

$45.3$

$45.5$

Chromosome 20 (Mb)

**Strength of association (log_{10}(P))**

$0$

$2$

$4$

$6$

$8$

$10$

$12$

$14$

$16$

$18$

$-\log_{10}(P)$

$-1.8$

$-1.4$

$-1.0$

$-0.6$
GWAS with **non-targeted** metabolic traits - **NAT8** locus

Associations with 2.0308 ppm
GWAS with **non-targeted** metabolic traits - HIBCH locus

Associations with 1.0666/1.0489 ppm

![Graph showing associations between recombination rate and metabolic traits.](image-url)

**Genotype of rs13006833**

- **Observed P-values**:
  - **GG**: N = 1321
  - **GC**: N = 1674
  - **CC**: N = 557

**Genome-wide associations with 1.0666/1.0489 ppm**

- **Expected -log10(P)**
  - **Observed -log10(P)**
    - 0
    - 5
    - 10
    - 15
    - 20

---

**Chromosome 2 (Mb)**

- rs13006833
- GENK1
- RP11-485N12.1
- WDSS
- RMOSH175
- ACOS50541

**Recombination rate (CM/Mb)**

- **Cirrhosis**
- **HIBCH**
- **RP11**
- **RP11-485N12.1**
- **WDSS**
- **RMOSH175**
- **ACOS50541**

**Genes and Effects**

- **Direct effect on transcript**
- **Putative regulatory effect**
- **Multiple effects**
- **Unknown effect**
- **Direct regulatory effect**
- **Associated with trait**
GWAS with **non-targeted** metabolic traits - **CPS1** locus

**Associations with 3.5549/2.5468 ppm**

**Genotype of rs715**

**Genome-wide associations with 3.5549/2.5468 ppm**

**Expected $-\log_{10}(P)$**
GWAS with non-targeted metabolic traits - AGXT locus

Associations with 1.0857 ppm

Genotype of rs6748734

Genome-wide associations with 1.0857 ppm
GWAS with non-targeted metabolic traits - SLC6A20 locus

Associations with 2.9156 ppm

Genotype of rs17279437

Genome-wide associations with 2.9156 ppm

Expected $-\log_{10}(P)$

Observed $-\log_{10}(P)$
GWAS with non-targeted metabolic traits - TKT locus

Associations with 4.0935/7.6643 ppm
GWAS with **non-targeted** metabolic traits - **ETNPPL** locus

Associations with 3.1263 ppm

![Graph showing strength of association and recombination rate](image)

**Genotype of rs7437890**

**Genome-wide associations with 3.1263 ppm**

![Graph showing genetic associations](image)
GWAS with **non-targeted** metabolic traits - **SLC6A19** locus

Associations with 6.8769 ppm

Genotype of rs11750211

Genome-wide associations with 6.8769 ppm
GWAS with **non-targeted** metabolic traits - AGXT2 locus

Associations with 1.1710/1.9733 ppm

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**Genotype of rs37369**

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**Genome-wide associations with 1.1710/1.9733 ppm**
GWAS with **non-targeted** metabolic traits - DMGDH locus

Associations with 2.9156/5.2355 ppm

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Genotype of rs6453427

Genome-wide associations with 2.9156/5.2355 ppm
GWAS with non-targeted metabolic traits - SLC36A2 locus

Associations with 3.5549/2.6495 ppm

Genotype of rs3846710

Genome-wide associations with 3.5549/2.6495 ppm
GWAS with non-targeted metabolic traits - NAT2 locus

Associations with 2.1586/3.3240 ppm

Genotype of rs35246381

Genome-wide associations with 2.1586/3.3240 ppm
GWAS with **non-targeted** metabolic traits - **ABO** locus

Associations with 2.0308/2.0489 ppm

- **Genotype of rs550057**
- **Genome-wide associations with 2.0308/2.0489 ppm**
GWAS with **non-targeted** metabolic traits - **PYROXD2** locus

Associations with 2.8541 ppm

- **Chromosome 10 (Mb)**
- **Recombination rate (CM/Mb)**

Genotype of rs11598867

- **log_{e} (2.8541 ppm/Creatinine)**
- **Observed - log_{10}(P)**
- **Expected - log_{10}(P)**

- **N = 1644**
- **N = 1197**
- **N = 238**

Genome-wide associations with 2.8541 ppm
GWAS with non-targeted metabolic traits - SLC6A13 locus

Associations with 1.1895 ppm

Strength of association (-log_{10}(P))

GWAS with non-targeted metabolic traits - SLC6A13 locus

Associations with 1.1895 ppm

Genotype of rs11062102

 Genome–wide associations with 1.1895 ppm
GWAS with **non-targeted** metabolic traits - HPD locus

Associations with 1.3455/7.6643 ppm

**Genotype of rs1916333**

**Genome-wide associations with 1.3455/7.6643 ppm**
GWAS with **non-targeted** metabolic traits - ACSM3 locus

Associations with 1.2565/1.0666 ppm

Genotype of rs11645002

Genome-wide associations with 1.2565/1.0666 ppm
GWAS with **non-targeted** metabolic traits - **SLC5A11** locus

Associations with 3.594/1.066 ppm
GWAS with **non-targeted** metabolic traits - **PNMT** locus

Associations with 6.8769 ppm

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**Genotype of rs8069451**

**Genome-wide associations with 6.8769 ppm**
GWAS with **non-targeted** metabolic traits - **SLC13A3** locus

Associations with 2.3946/2.6495 ppm

Genotype of rs941206

Genome-wide associations with 2.3946/2.6495 ppm