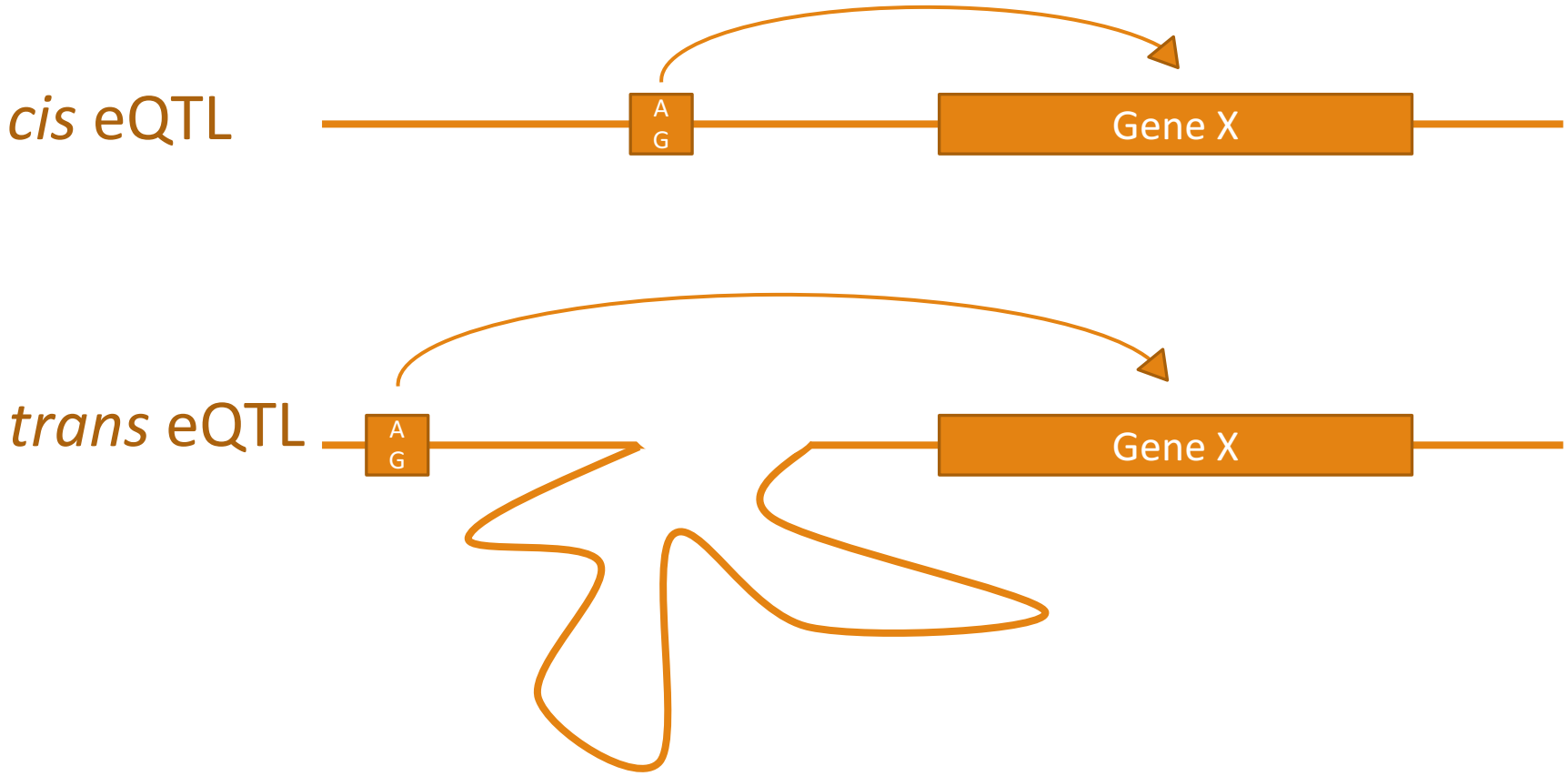
Trans-eQTL mapping in BIOS freeze 2

OPENING UP THE BBMRI GENOMICS INFRASTRUCTURE IN THE NETHERLANDS

AMSTERDAM, 21ST OF SEPTEMBER, 2016

ANNIQUE CLARINGBOULD

Expression quantitative trait loci



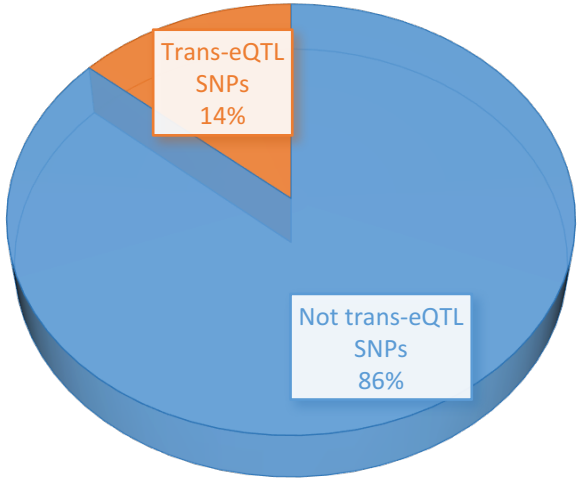
Method

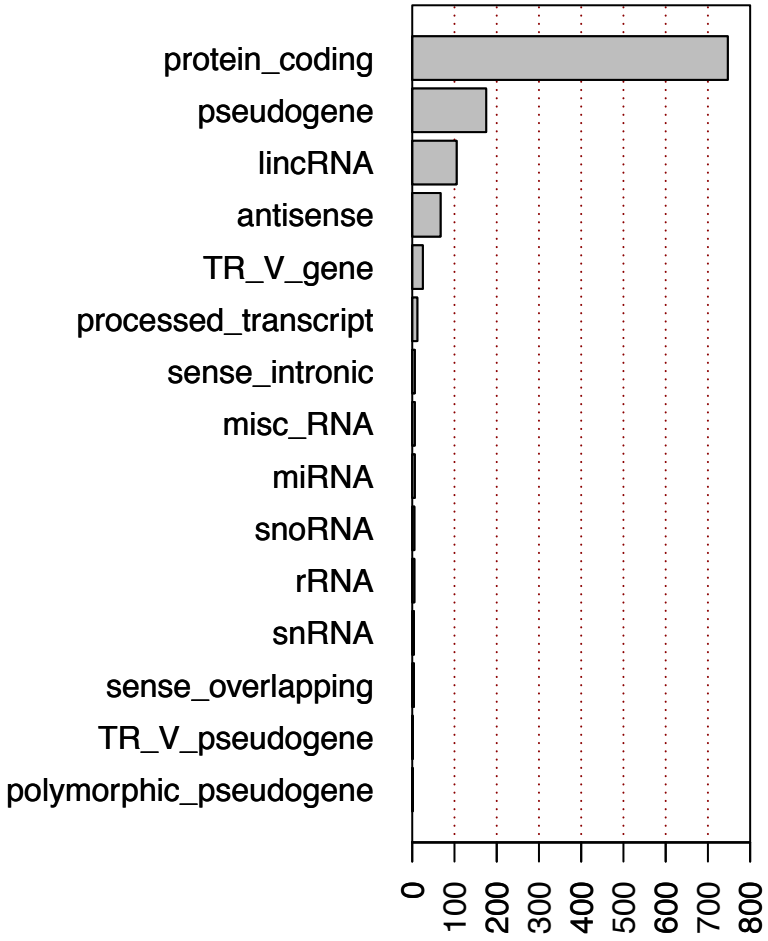
- Freeze 2 samples
- Preliminary
- DNA genotype data and RNA-seq data
- Confined to GWAS SNPs from EBI catalog
- eQTL mapping pipeline

Overall *trans*-eQTL results

Probe level FDR calculation for *trans* eQTLs	
Number of significant *trans* eQTLs	5908
Number of unique SNPs, constituting an eQTL	818
Number of unique transcripts	1520
Number of genes	1214

GWAS catalog SNPs with and without *trans*-eQTL

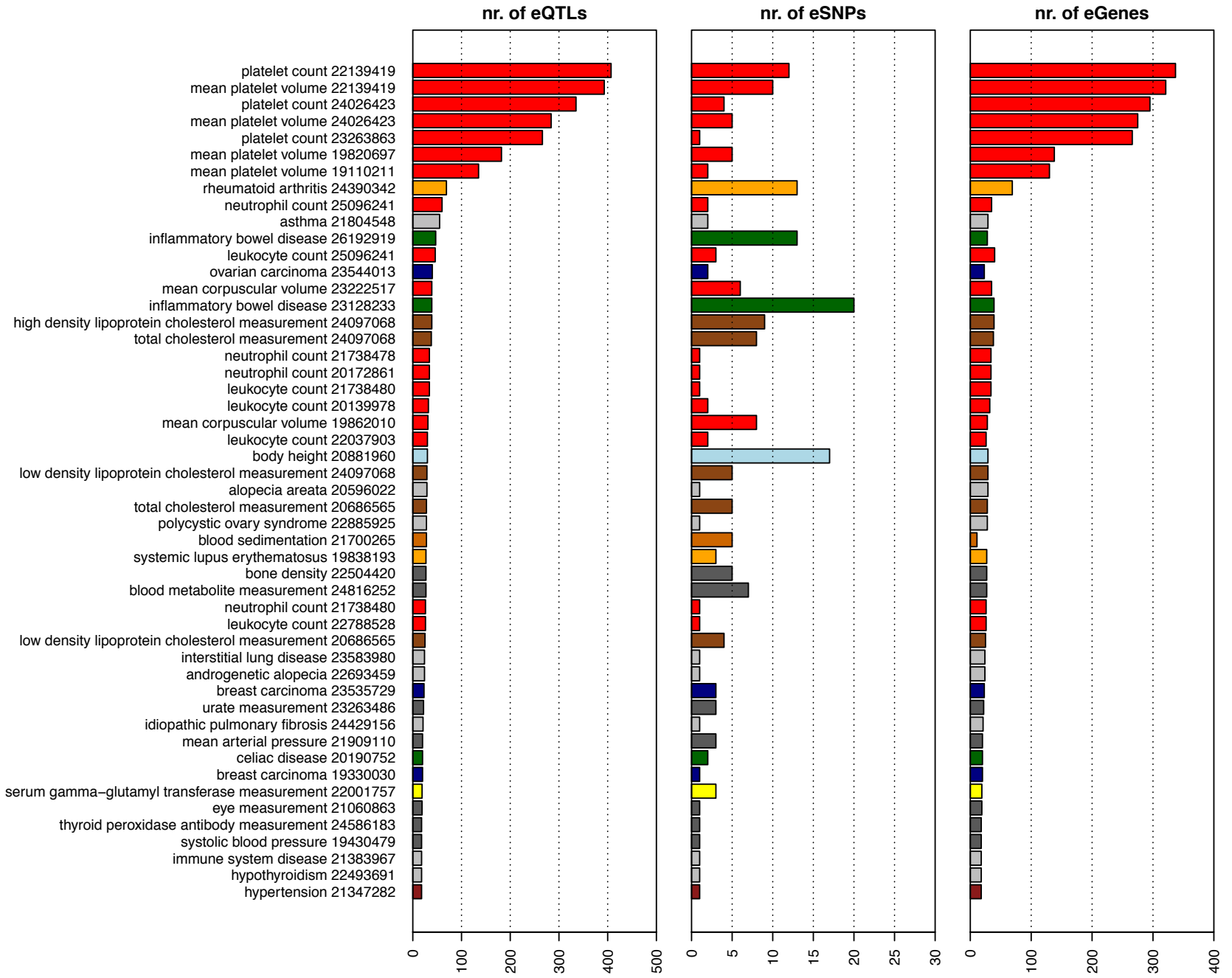




- Top 50 GWAS traits with highest number of *trans*-eQTLs
- Most eQTLs found for blood-related traits and immune-related traits

Number of *trans* eQTLs	
.. in total	5908
.. after removing blood-trait SNPs	1808
.. for only immune-related SNPs	433

Trait category
- Cardiovascular disease
- Other disease
- Other measurement
- Liver enzyme measurement
- Cancer
- Digestive system disorder
- Lipid or lipoprotein measurement
- Hematological measurement
- Immune system disorder
- Inflammatory measurement
- Body measurement



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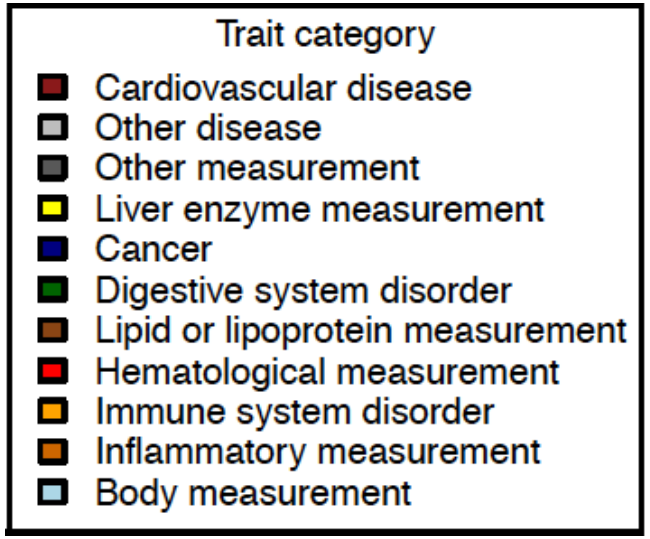
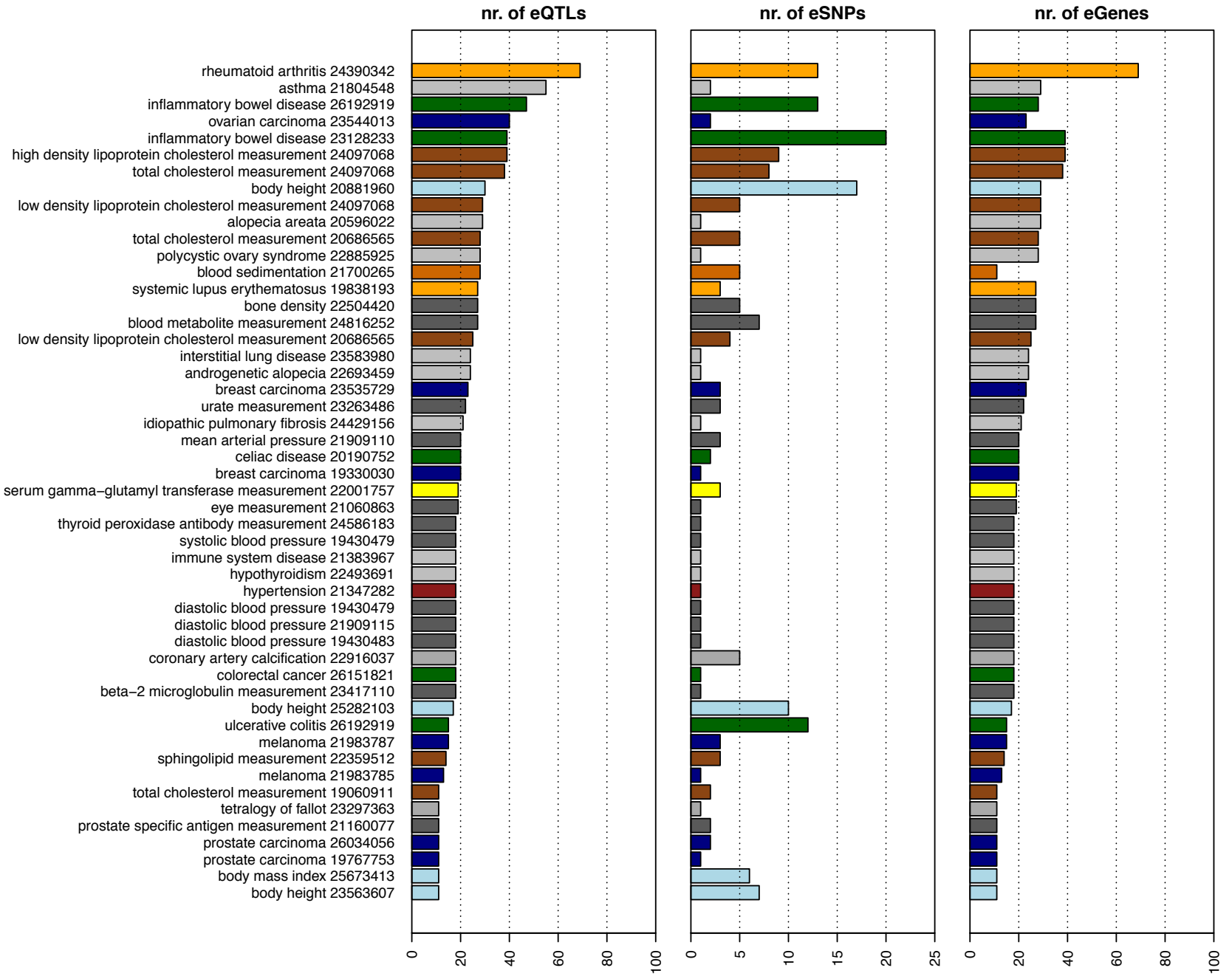
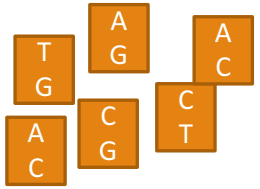


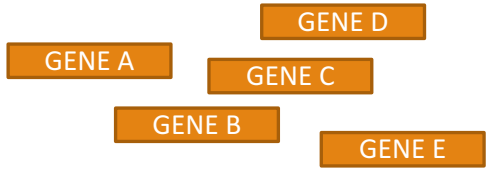


Immune related traits

Immune patients



Immune-related SNPs



Gene expression affected by > 5 immune SNPs

GWAS

Trans-eQTL mapping

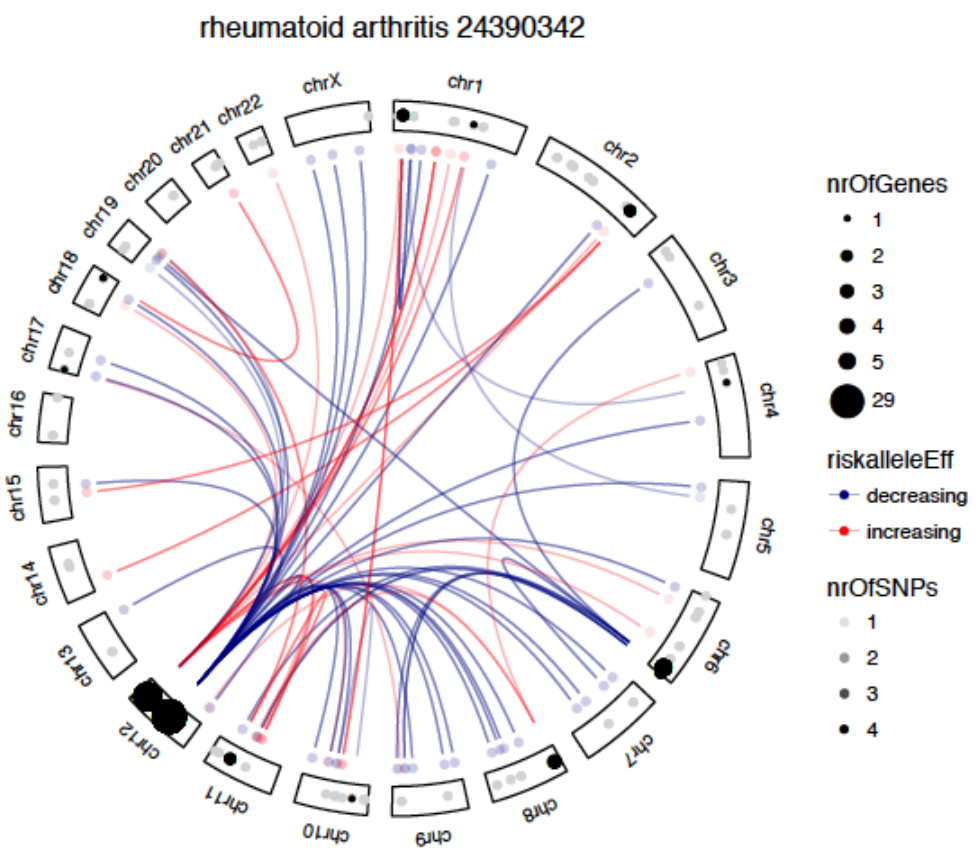
Gene list enrichment

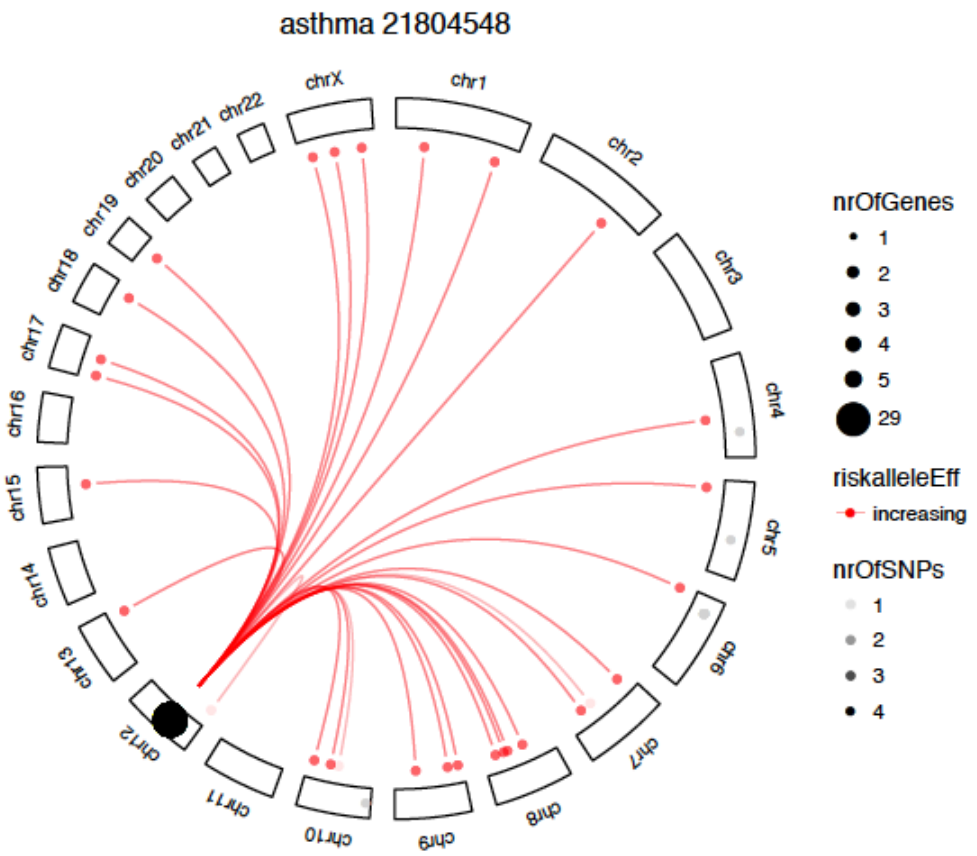
2: GO: Biological Process [Display Chart] 429 annotations

	ID	Name
1	GO:0071346	cellular response to interferon-gamma
2	GO:0034341	response to interferon-gamma
3	GO:0035458	cellular response to interferon-beta
4	GO:0042832	defense response to protozoan
5	GO:0001562	response to protozoan
6	GO:0035456	response to interferon-beta
7	GO:0098542	defense response to other organism
8	GO:0071345	cellular response to cytokine stimulus
9	GO:0006952	defense response
10	GO:0060333	interferon-gamma-mediated signaling pathway
11	GO:0034097	response to cytokine
12	GO:0045087	innate immune response
13	GO:0043207	response to external biotic stimulus
14	GO:0051707	response to other organism
15	GO:0009607	response to biotic stimulus
16	GO:0044406	adhesion of symbiont to host
17	GO:0009617	response to bacterium
18	GO:0006955	immune response
19	GO:0042742	defense response to bacterium
20	GO:0072616	interleukin-18 secretion

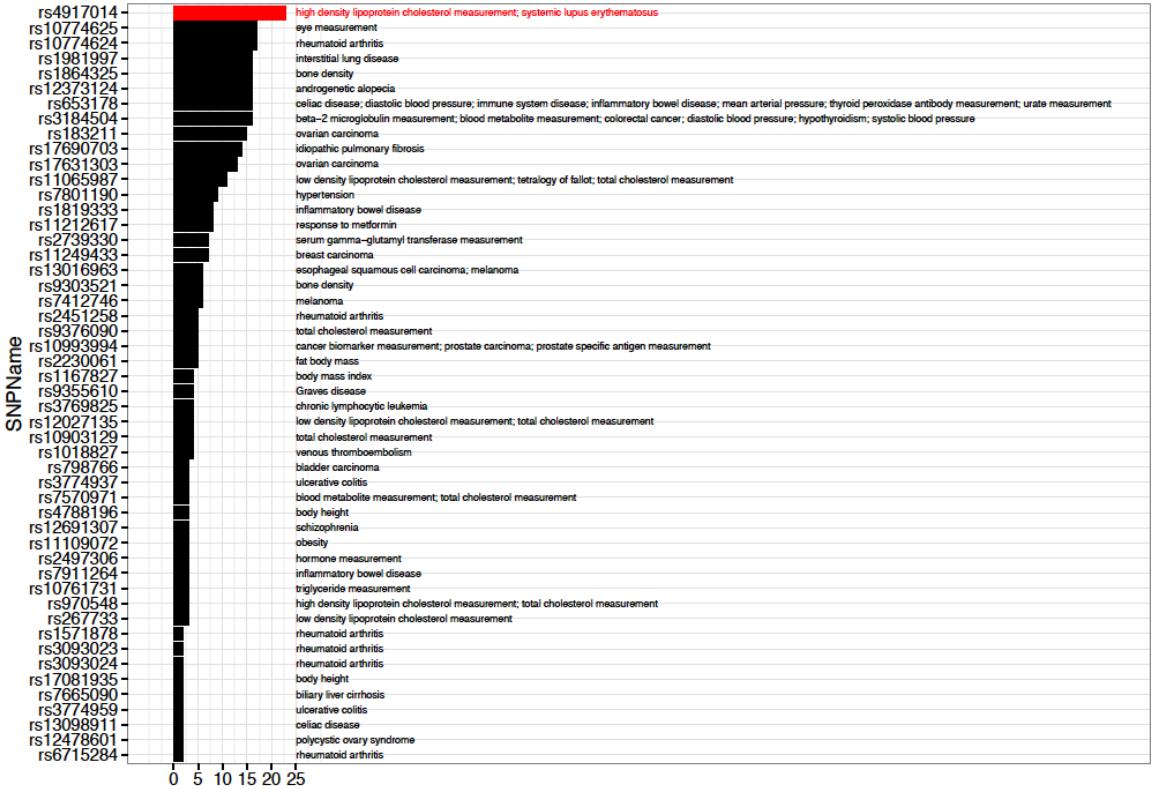
GO terms associated with immunity

Hub SNPs and genes per study





Hub SNPs across studies



Affects expression of 23 protein-coding genes

187106 / Interferon gamma signaling

187103 / Interferon Signaling

366171 / Cytokine Signaling in Immune system

366161 / Class I MHC mediated antigen processing & presentation

477126 / Cross-presentation of soluble exogenous antigens (endosomes)

198918 / Type II interferon signaling (IFNG)

187104 / Interferon alpha/beta signaling

530760 / Antiviral mechanism by IFN-stimulated genes

530761 / ISG15 antiviral mechanism

144181 / Leishmaniasis

477122 / Antigen processing-Cross presentation

366160 / Adaptive Immune System

Concluding remarks

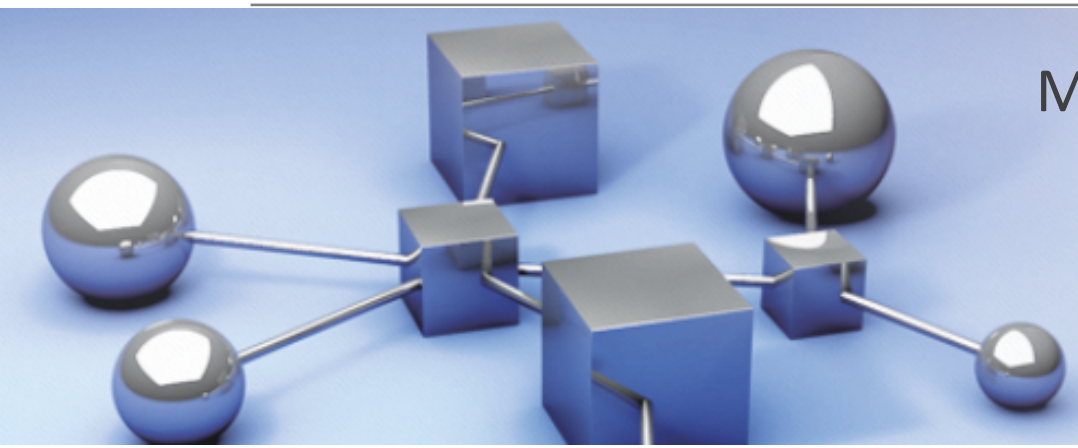
- With this large collection of RNA-seq samples, we..

  .. can investigate expression of non-coding genes

  .. have power to look into non blood-related traits

  .. can characterize downstream effects of hub SNPs per trait and across traits

Acknowledgments



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BBMRI.nl
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