Мета-анализ экспрессии генов в адипозной ткани человека

Смирнов Д.Д.

Руководители:
Дмитриева Р.И, к.б.н., СЗФМИЦ Алмазова, СПб
Предеус А., Ph.D., Институт биоинформатики, СПб

2016

Цель

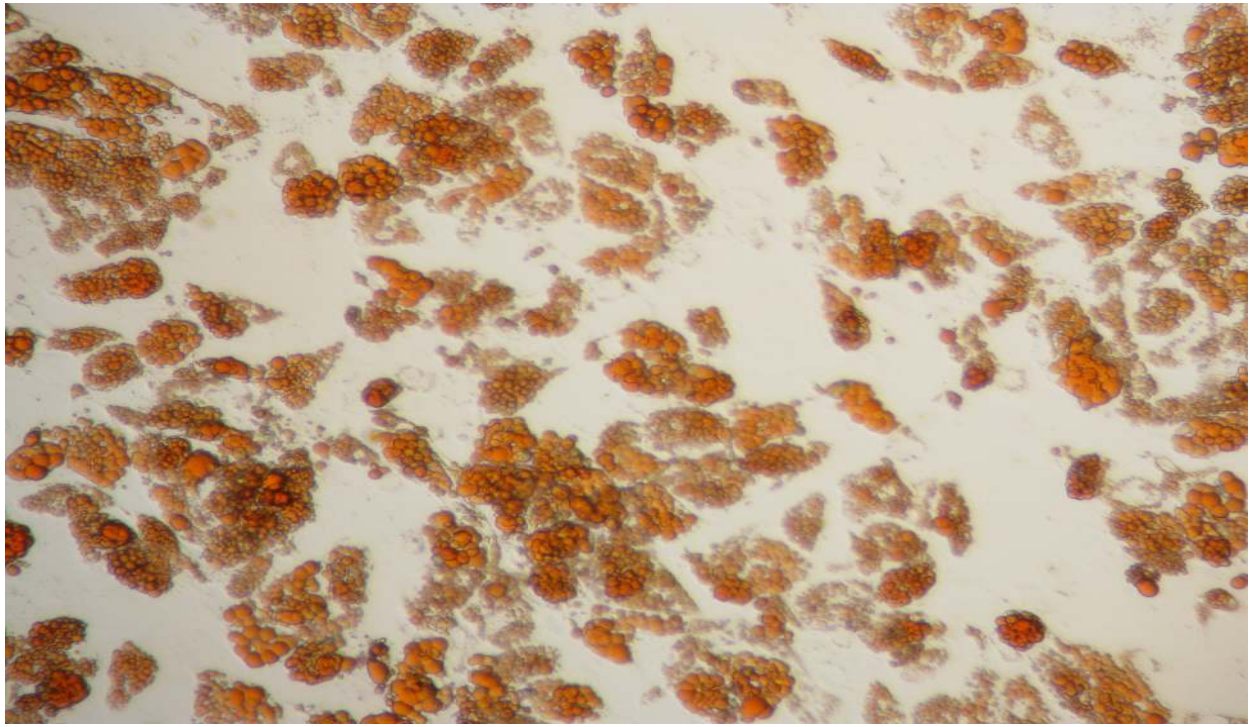
Мета-анализ изменений экспрессии в жировой ткани человека в результате перемены условий (дифференциация, голодание, обработка лекарствами), на основе публично доступных данных

Задачи

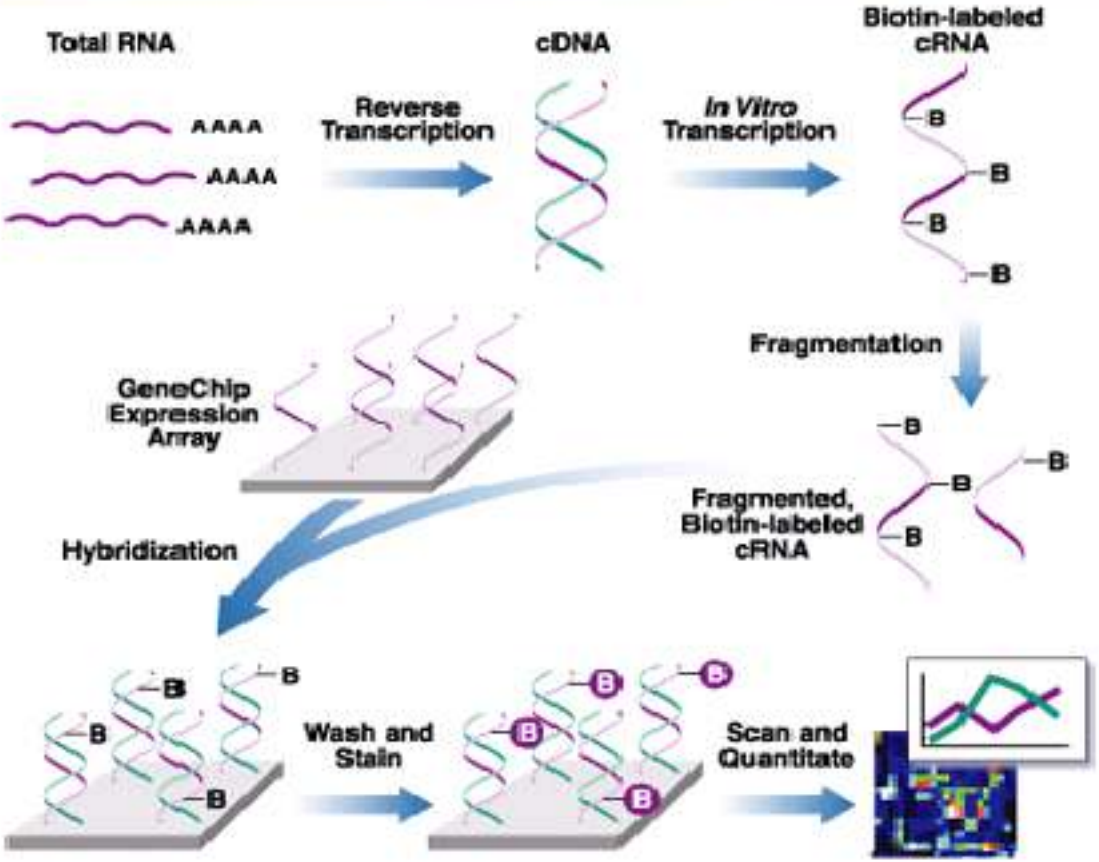
- Собрать базу всех существующих экспериментов по измерению уровней экспрессии генов в человеческих адипоцитах
- Освоить обработку этих данных
- Определить дифференциально экспрессирующиеся гены при изменении биологических условий

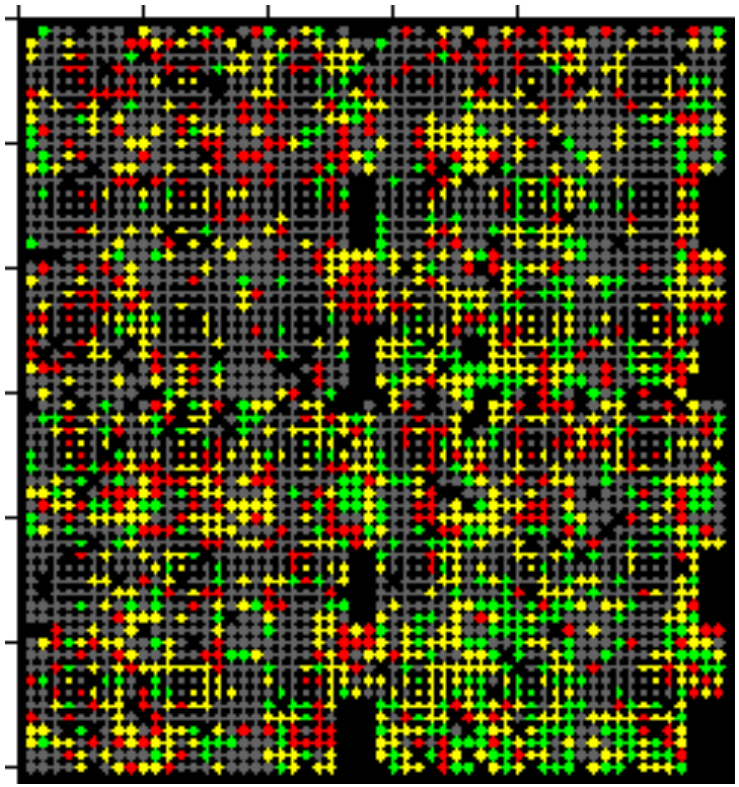
Жировая ткань

- Адипозная ткань является самым большим эндокринным органом в организме человека, активно секретирующим гормоны и сигнальные молекулы. Многие широко распространённые заболевания (сахарный диабет 2-го типа, хронические воспалительные процессы) связанных с изменениями в функциях адипозной ткани.



ДНК-микрочип





NCBI Resources How To Sign in to NCBI

GEO DataSets

GEO DataSets ("adipocytes"[MeSH Terms] OR Adipocytes[All Fields]) AND "Homo sapien Search

Save search Advanced Help

Show additional filters

Entry type
Series (134)

Organism
Select ...

Study type
Expression profiling by array
Methylation profiling by array
More ...

Author
Select ...

Attribute name
tissue
strain
More ...

Publication dates
30 days
1 year
Custom range...

Clear all

Show additional filters

Display Settings: Summary, 20 per page, Sorted by Default order **Send to:**

Results: 1 to 20 of 134

<< First < Prev Page 1 of 7 Next > Last >>

1. Exosomal Transfer of Stromal Cell-Derived miR21 Confers Taxol Resistance in High-grade Serous Ovarian Cancer Cells Through Down-Regulation of APAF1.

(Submitter supplied) Advanced ovarian cancer usually spreads to the visceral adipose tissue of the omentum. However, the stromal cell-derived molecular determinants that modulate ovarian cancer growth have not been characterized. Here, we identified significantly higher levels of miR21 in exosomes and tissue lysate isolated from cancer associated **adipocytes** (CAA) and fibroblasts (CAF) compared to those from ovarian cancer cells. more...

Organism: **Homo sapiens**
Type: **Expression profiling by array**
Platform: GPL570 6 Samples
Download data: GEO (CEL, CHP)
Series Accession: GSE51457 ID: 200051457
Analyze with GEO2R

2. Expression data from SGBS human cells before and after 24 hours of stimulation with differentiation cocktail, with or without Scrambled (Scr) or Tenomodulin (TNMD) siRNA to knockdown the genes of interest.

(Submitter supplied) In a screen for upregulated adipocyte genes in insulin resistant versus insulin sensitive subjects matched for BMI, we identified the type II transmembrane protein tenomodulin (TNMD), previously implicated in glucose tolerance in gene association studies. TNMD expression was greatly increased in human preadipocytes during differentiation, while silencing TNMD blocked adipogenic gene induction and adipogenesis. more...

Organism: **Homo sapiens**
Type: **Expression profiling by array**
Platform: GPL16686 12 Samples
Download data: GEO (CEL)
Series Accession: GSE76319 ID: 200076319
Analyze with GEO2R

Filters: Manage Filters

Top Organisms [Tree]
Homo sapiens *(134)*
Mus musculus *(5)*
synthetic construct *(2)*
Macaca mulatta *(1)*
Rattus norvegicus *(1)*
More...

Find related data
Database: Select
Find items

Search details

```
("adipocytes"[MeSH Terms] OR
("adipocytes"[MeSH Terms] OR
Adipocytes[All Fields])) AND "Homo
sapiens"[porgn] AND ("gse"[Filter]
AND "Expression profiling by array"
```

Search See more...

Recent activity
Turn Off Clear
("adipocytes"[MeSH Terms] OR Adipocytes[All Fields]) , GEO DataSets
See more...

Данные по экспрессии в жировой ткани

№	ТИП	Группы	Обработка	Дополнительно	кол-во образцов	Наименования образцов	Ссылка	Название
1	Клеточная линия SGBS преадипоциты line	Экспрессия до и после 24 ч стимулирования адипогенеза; чувствительные и нечувствительные к инсулину	Scrambled (Scr) or Tenomodulin (TNMD) siRNA	нокдаун генов интереса	12	GSM1981273 SGBS preadipocytes with siRNA to Tenor GSM1981274 SGBS preadipocytes with siRNA to Tenor GSM1981275 SGBS preadipocytes with siRNA to Tenor GSM1981276 SGBS preadipocytes with siRNA to Tenor GSM1981277 SGBS preadipocytes with siRNA to Tenor GSM1981278 SGBS preadipocytes with siRNA to Tenor GSM1981279 SGBS preadipocytes with siRNA to a scra GSM1981280 SGBS preadipocytes with siRNA to a scra GSM1981281 SGBS preadipocytes with siRNA to a scra GSM1981282 SGBS preadipocytes with siRNA to a scra GSM1981283 SGBS preadipocytes with siRNA to a scra GSM1981284 SGBS preadipocytes with siRNA to a scra	ftp://ftp.ncbi.nlm.nih.gov	Expression data from SGB
2	Клеточная линия 3T3-L1 line	сокультивировали адипоциты и MCF-7		3T3-L1 adipocytes co-cultivated MCF-7 for 72 hours in DMEM	6	GSM1602510 MCF7 mono_1 GSM1602511 MCF7 mono_2 GSM1602512 MCF7+prehASC_1 GSM1602513 MCF7+prehASC_2 GSM1602514 MCF7+hASC_1 GSM1602515 MCF7+hASC_2	ftp://ftp.ncbi.nlm.nih.gov	Cancer-adipoocyte interac
3	Культура culture		small-molecule and genetic loss/gain of function perturbagens.		10000	https://www.ncbi.nlm.nih.gov/geo/browse/?view=samples&se	ftp://ftp.ncbi.nlm.nih.gov	L1000 Connectivity Ma
4	культура сосудистых предшественников culture	before and after adipogenic differentiation after chronic adenylate cyclase activation of differentiated cells	treated with vehicle or forskolin for 7 days	capillary network-derived cells	9	GSM1892385 Cells without differentiation, biological rep GSM1892386 Cells without differentiation, biological rep GSM1892387 Cells without differentiation, biological rep GSM1892388 Cells after adipogenic differentiation with N GSM1892389 Cells after adipogenic differentiation with N GSM1892390 Cells after adipogenic differentiation with N GSM1892391 Cells after adipogenic differentiation with N GSM1892392 Cells after adipogenic differentiation with N GSM1892393 Cells after adipogenic differentiation with N	ftp://ftp.ncbi.nlm.nih.gov	Expression data fom huma
5	культура culture	CD133+/CD24+ RDCs were isolated from 40 patients.	-	Renal Cancer Stem Cells obtained from clear cell renal cell carcinoma Microarray analysis was performed on 6 tARPCs and 6 RDCs clones. The colony-forming efficiency and self-renewal ability were tested with lim The tumorigenic properties were evaluated in vitro with Soft Agar Assay. The angiogenic response was evaluated in vivo with the chorioallantoic r Expression of membrane proteins was evaluated with flowcytometry and 6 subcultures of tubular ARPCs (tARPCs), 3 subcultures of the MSC and 3 subcultures of the RPTEC were included in the analysis.	18	GSM1180693 MSC clone 1 GSM1180694 MSC clone 2 GSM1180695 MSC clone 3 GSM1180696 RPTEC clone 1 GSM1180697 RPTEC clone 2 GSM1180698 RPTEC clone 3 GSM1180699 tARPC clone 1 GSM1180700 tARPC clone 2 GSM1180701 tARPC clone 3 GSM1180702 tARPC clone 4 GSM1180703 tARPC clone 5 GSM1180704 tARPC clone 6 GSM1180705 RCSC clone 1 GSM1180706 RCSC clone 2 GSM1180707 RCSC clone 3 GSM1180708 RCSC clone 4 GSM1180709 RCSC clone 5 GSM1180710 RCSC clone 6	ftp://ftp.ncbi.nlm.nih.gov	Isolation and characterizat
6	культура culturee	Subcutaneous and omental adipose tissue	-	29 obese nondiabetic women, 13 of whom were hyperinsulinem	12	GSM1886833 Omental adipose tissue 201 GSM1886834 Subcutaneous adipose tissue 201 GSM1886835 Omental adipose tissue 204 GSM1886836 Subcutaneous adipose tissue 210 GSM1886837 Subcutaneous adipose tissue 204 GSM1886838 Omental adipose tissue 206 GSM1886839 Subcutaneous adipose tissue 206 GSM1886840 Omental adipose tissue 202 GSM1886841 Subcutaneous adipose tissue 202 GSM1886842 Omental adipose tissue 203 GSM1886843 Subcutaneous adipose tissue 203 GSM1886844 Omental adipose tissue 210	ftp://ftp.ncbi.nlm.nih.gov	Gene expression analysis

133 эксперимента

Классификация:

-тип ткани -обработка

-дополнительная информация

Данные для анализа

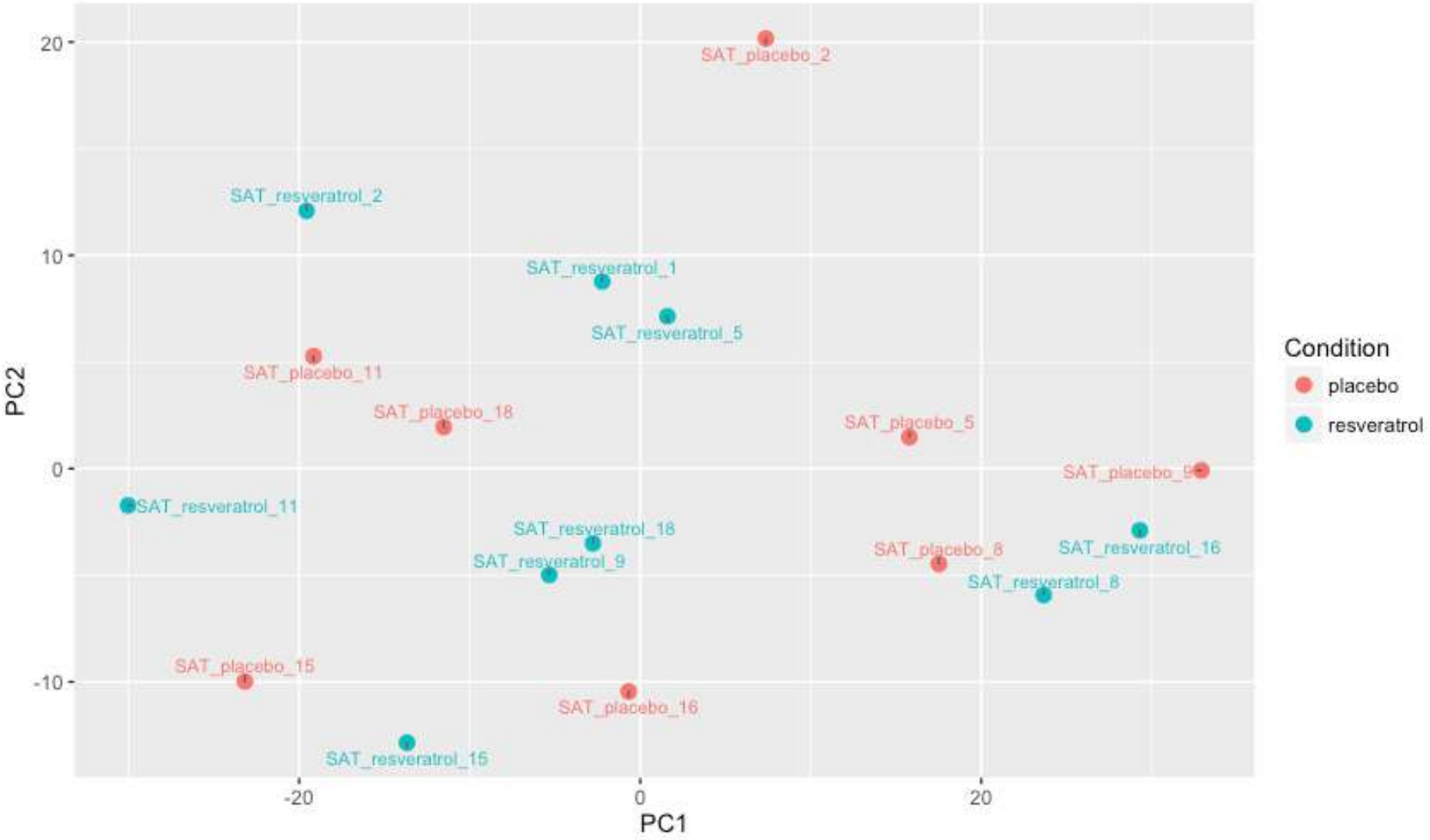
№	ТИП	Ссылка в GEO	Название	Группы	Обработка	Дополнительно	кол-во образцов
48	биопсия biopsy	https://www.ncbi.nlm.nih.gov/geo/query/acc.cgi?acc=GSE42432	Effects of 30 days resveratrol supplementation on adipose tissue morphology and gene expression patterns in obese men	healthy obese men were supplemented with placebo and 150 mg/day resveratrol for 30 days, with a 4-week washout period in between.	resveratrol	abdominal subcutaneous adipose tissue biopsy	18
34	биопсия biopsy	https://www.ncbi.nlm.nih.gov/geo/query/acc.cgi?acc=GSE42902	FKBP5 expression in human adipose tissue increases following dexamethasone exposure and is associated with insulin resistance	Paired human subcutaneous (sc) and omental (om) adipose tissue samples obtained from 4 non-diabetic adipose tissue donors	were incubated without (Ctr) or with dexamethasone (Dex, 3 μM) for 24 h.		16
127	биопсия biopsy	https://www.ncbi.nlm.nih.gov/geo/query/acc.cgi?acc=GSE9007	Gene expression profiling of human adipose tissue of obese subjects in relation to bariatric surgery	scWAT sample before surgery scWAT sample obtained 3 months after surgery	scWAT sample before surgery was labeled with Cy3 dye, while the aRNA from each scWAT sample obtained 3 months after surgery was labeled with Cy5 dye.	Seventeen Caucasian morbidly obese women undergoing laparoscopic Roux-en-Y bypass	10
29	биопсия biopsy	https://www.ncbi.nlm.nih.gov/geo/query/acc.cgi?acc=GSE53376	Adipose transcriptome and microRNA profiles after surgery-induced weight loss [mRNA]	subcutaneous AT of 16 morbidly obese women before and after surgery-induced weight loss. PRE (n=16) and POST (n=16). Analyses in macrophages and differentiated human adipocytes were also performed	-	Validation of microarray data was performed by quantitative real-time PCR both longitudinally (n=25 paired samples) and cross-sectionally (25 obese vs. 26 age-matched lean women).	32
63	биопсия biopsy	https://www.ncbi.nlm.nih.gov/geo/query/acc.cgi?acc=GSE44000	Transcriptome profile of subcutaneous adipocytes isolated from obese vs. lean postmenopausal women	subcutaneous adipose tissue surgical biopsies of 7 obese (BMI>30) and 7 lean (BMI<25) postmenoposal women	-		14
XX	биопсия biopsy	http://www.ncbi.nlm.nih.gov/geo/query/acc.cgi?acc=GSE35710	Human s.c adipose tissue gene expression during diet-induced weight loss	male/female obese subjects before and after weight loss	-		48
130	биопсия biopsy	https://www.ncbi.nlm.nih.gov/geo/query/acc.cgi?acc=GSE2508	Expression profiling in adipocytes of obese humans	non-diabetic lean vs non-diabetic obese Pima Indian		20 lean (10 Males / 10 Females, aged 31±6 year, Body Mass Index 25±3 kg/m2) and 19 obese (9M/10F, 29±5y, 55±8 kg/m2	195

- Обработка ресвератролом: до/после (кардиопротектор, антидеабетическое действие)
- Хирургическое снижение веса: до/после
- Женщины после менопаузы: норма/ожирение
- Диета: до/после
- Индийцы: норма/ожирение
- Обработка дексаметазоном: до/после (противовоспалительное действие,иммунодеперсант)

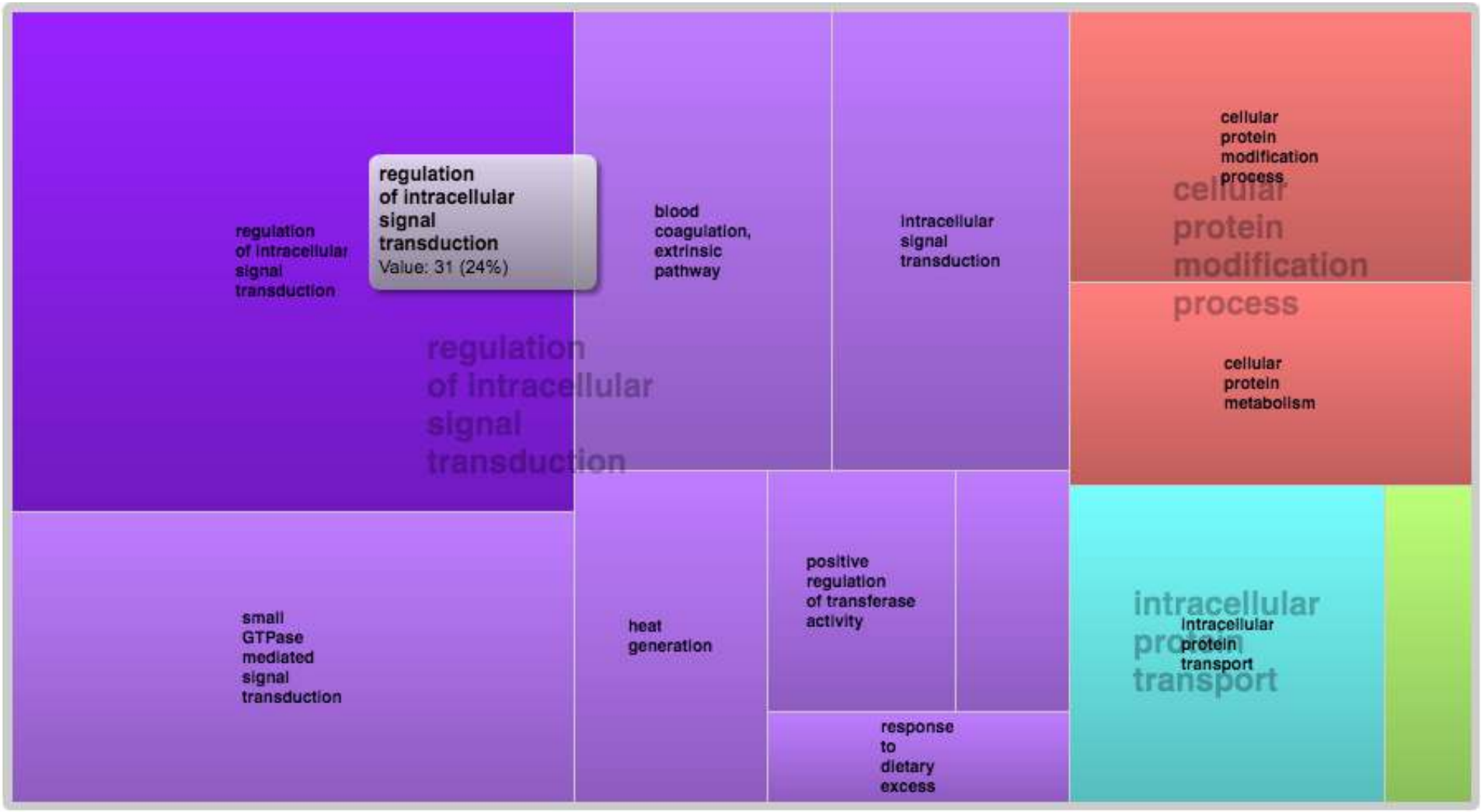
Что сделано

- PCA
- Differential expression
- DAVID – Gene ontology (GO)
- ReviGO

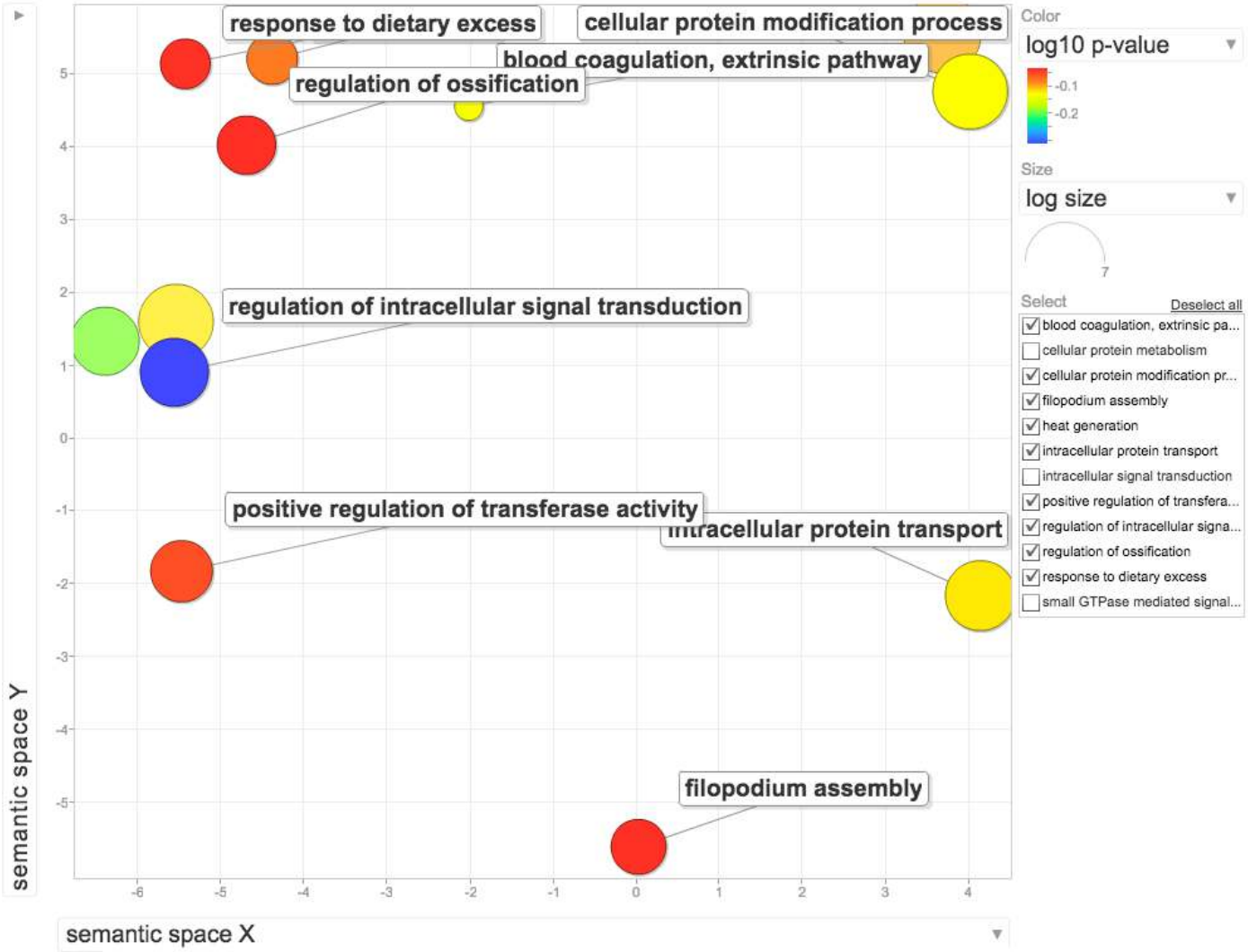
Ресвератрол



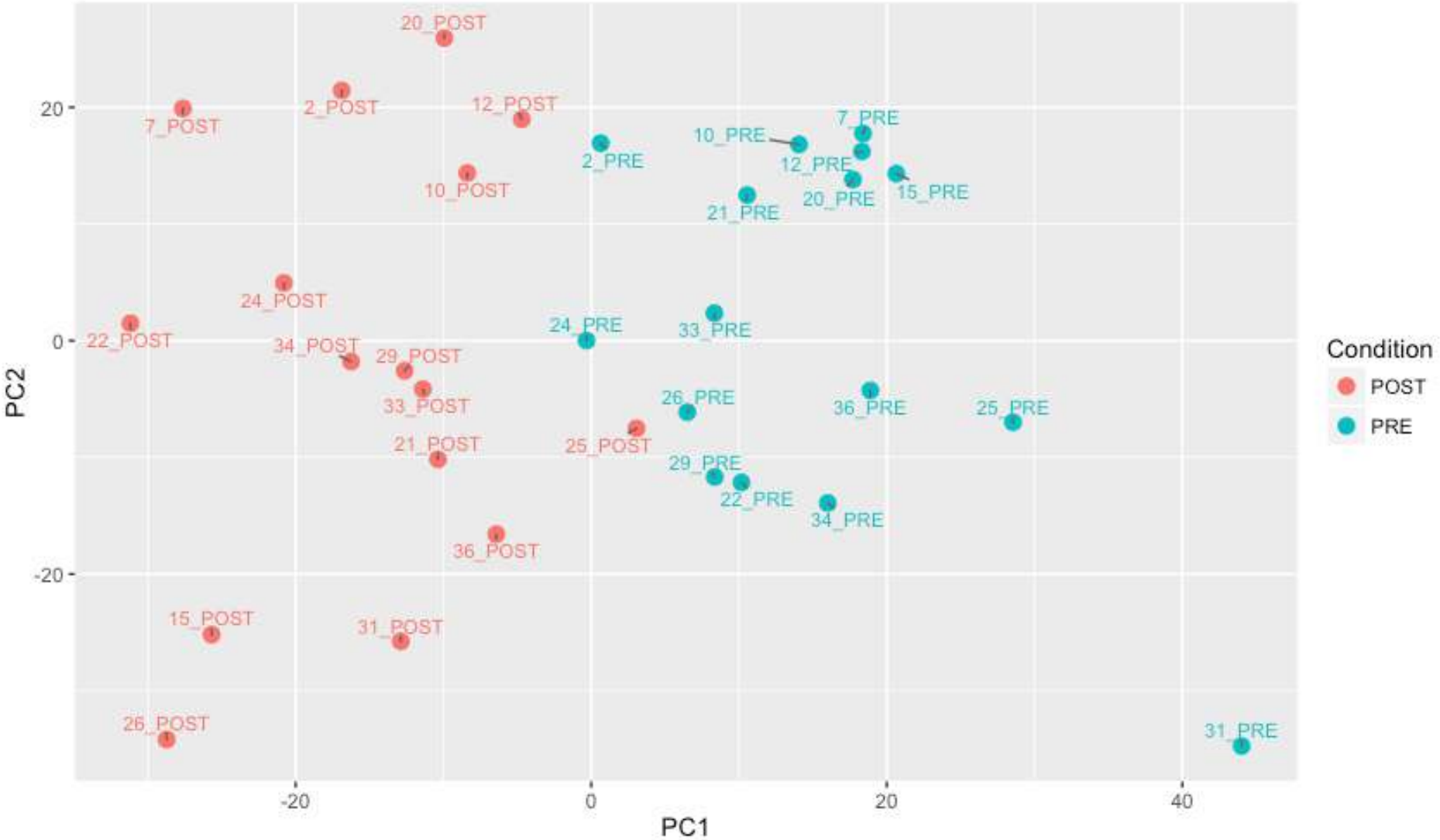
Tree map


regulation of intracellular signal transduction
Value: 31 (24%)
regulation of intracellular signal transduction
blood coagulation, extrinsic pathway
intracellular signal transduction
cellular protein modification process
cellular protein modification process
cellular protein metabolism
small GTPase mediated signal transduction
heat generation
positive regulation of transferase activity
response to dietary excess
intracellular protein transport
intracellular protein transport

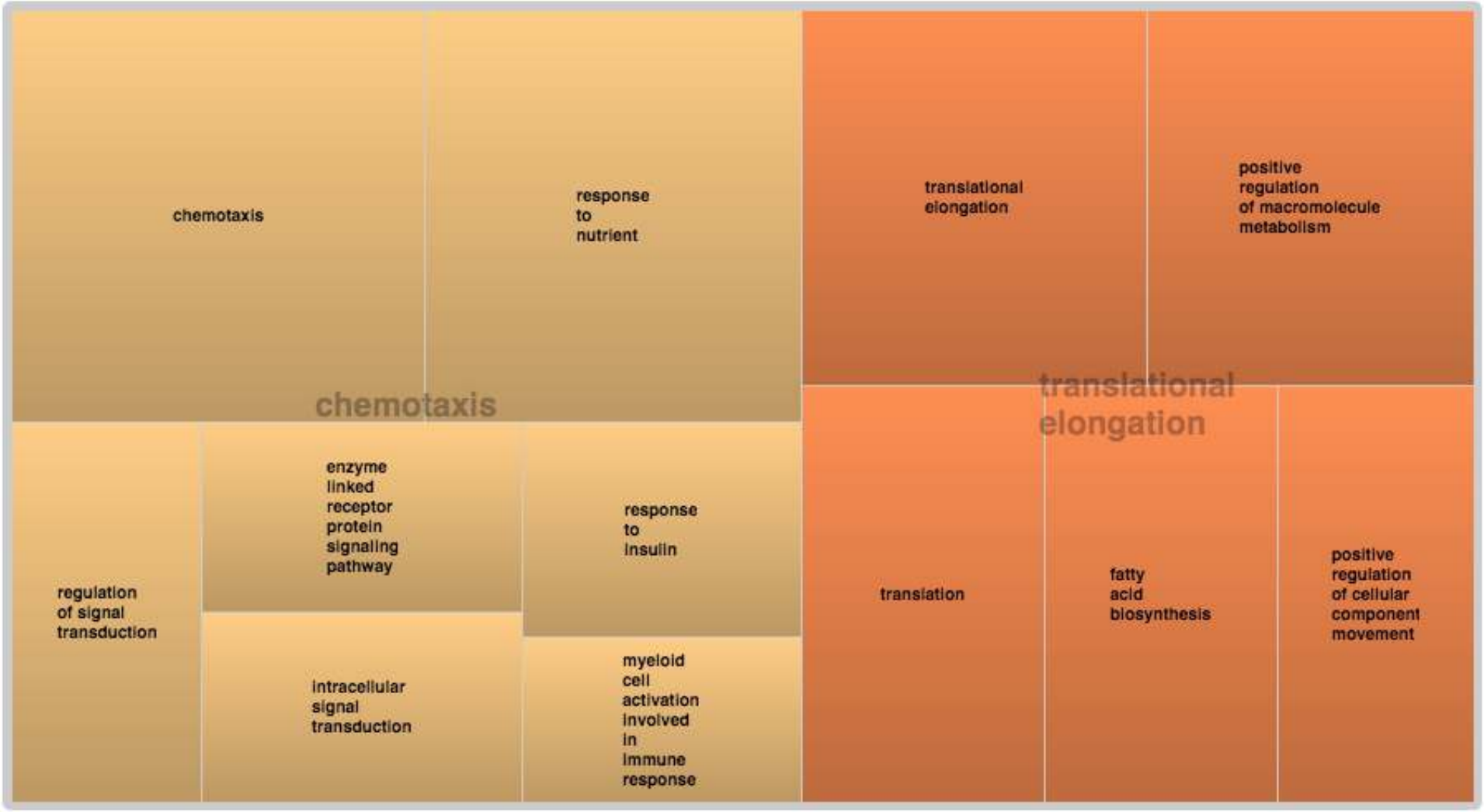
Scatterplot



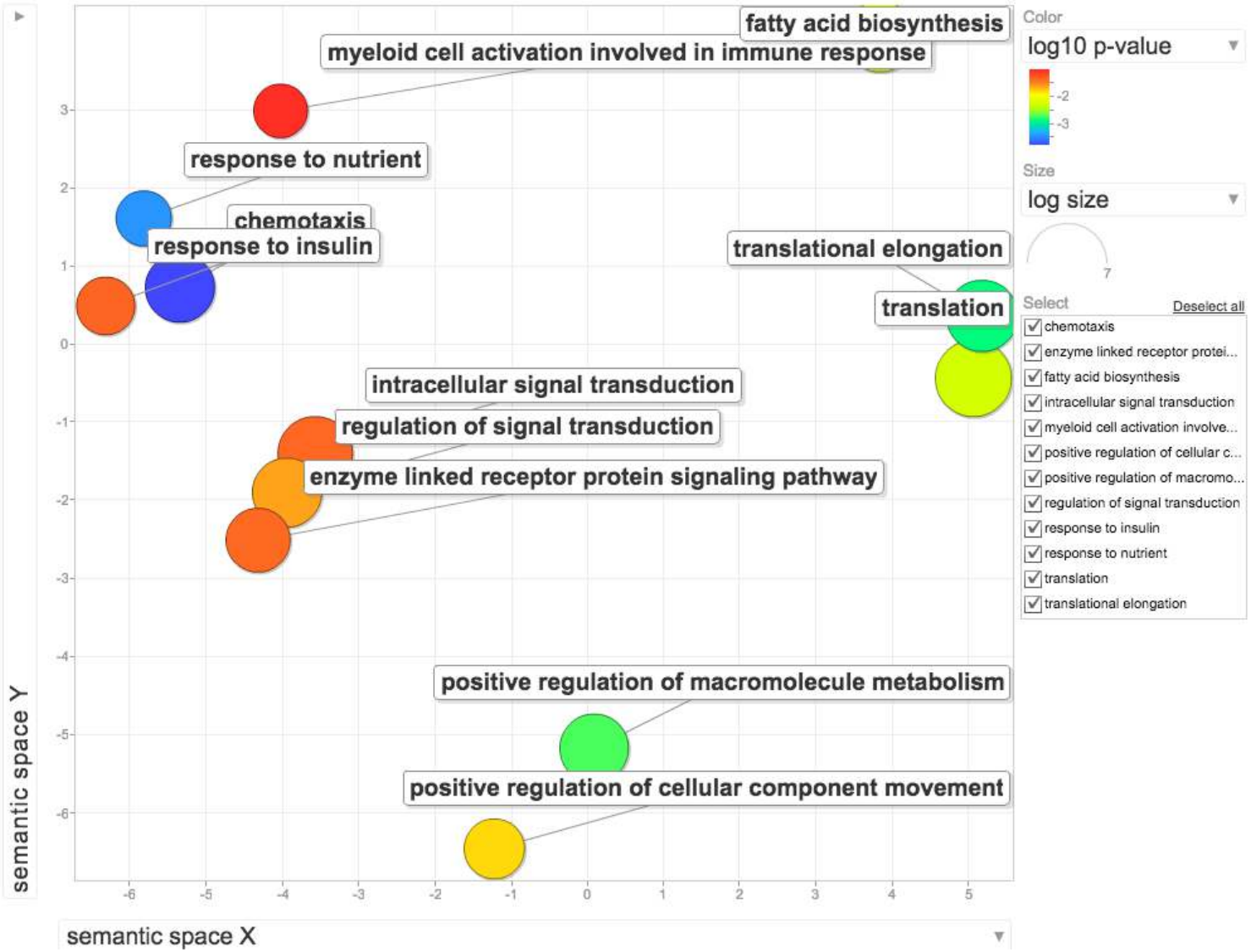
Хирургическое снижение веса



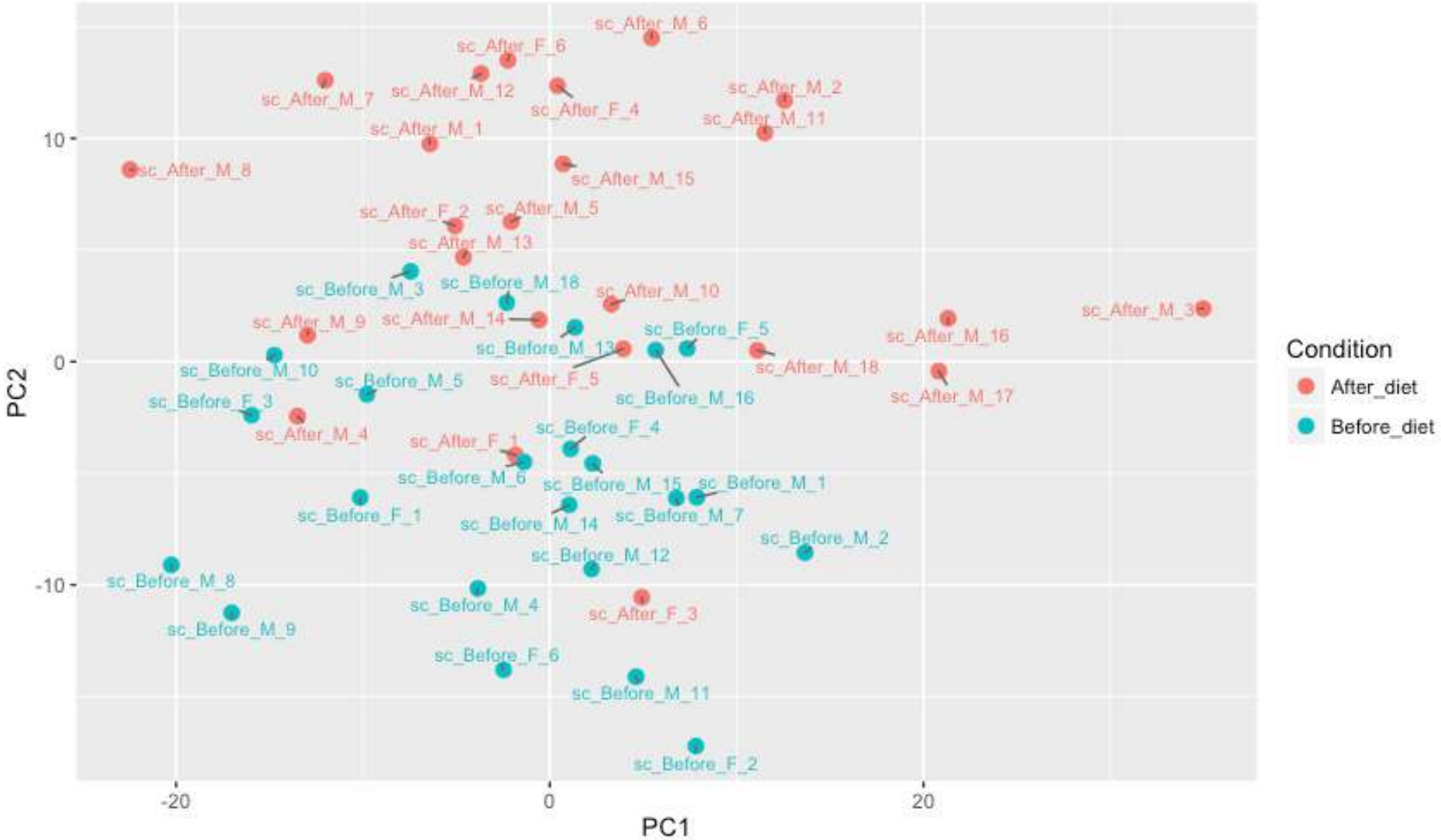
Tree map


chemotaxis
response to nutrient
translational elongation
positive regulation of macromolecule metabolism
chemotaxis
translational elongation
regulation of signal transduction
enzyme linked receptor protein signaling pathway
response to insulin
intracellular signal transduction
myeloid cell activation involved in immune response
translation
fatty acid biosynthesis
positive regulation of cellular component movement

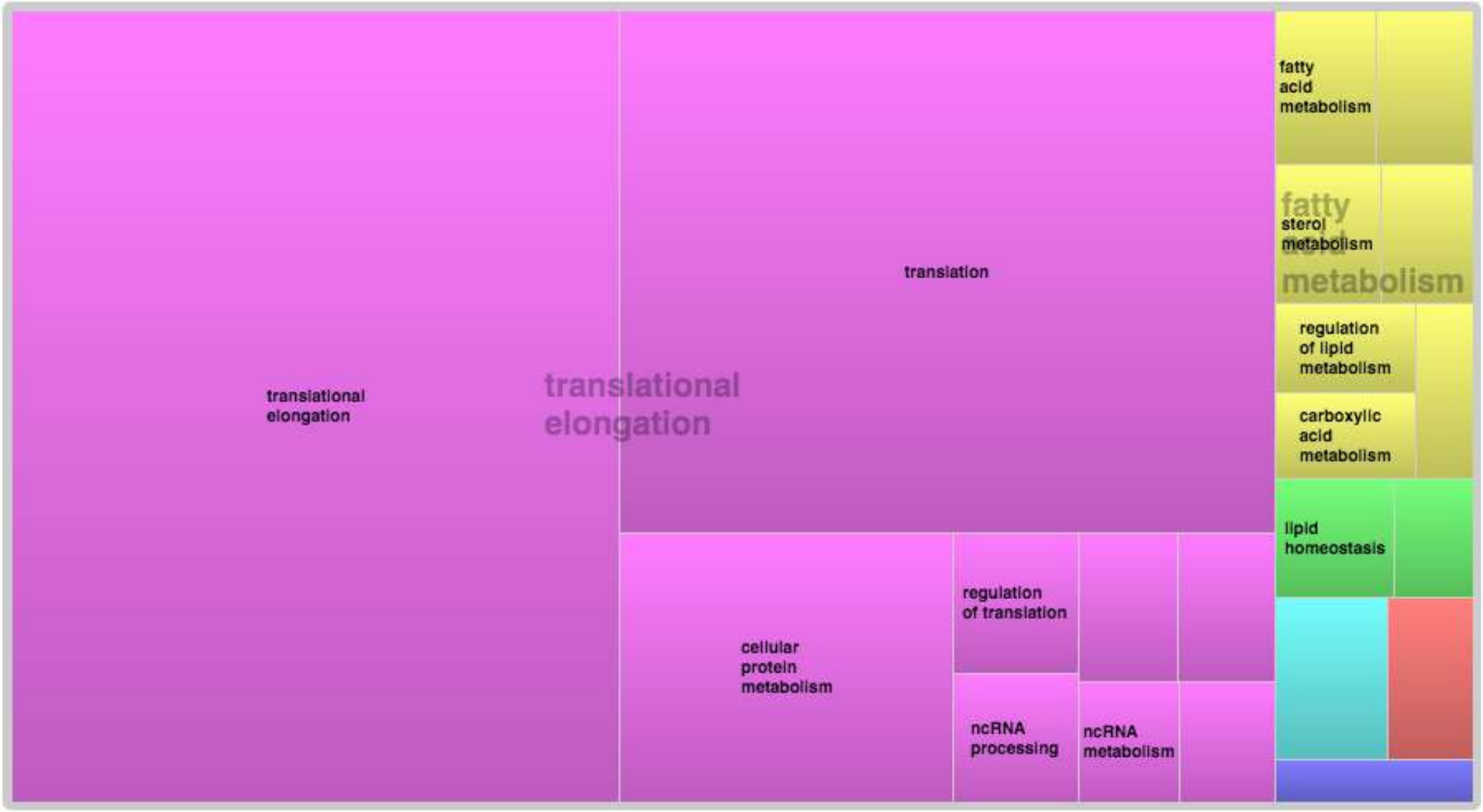
Scatterplot



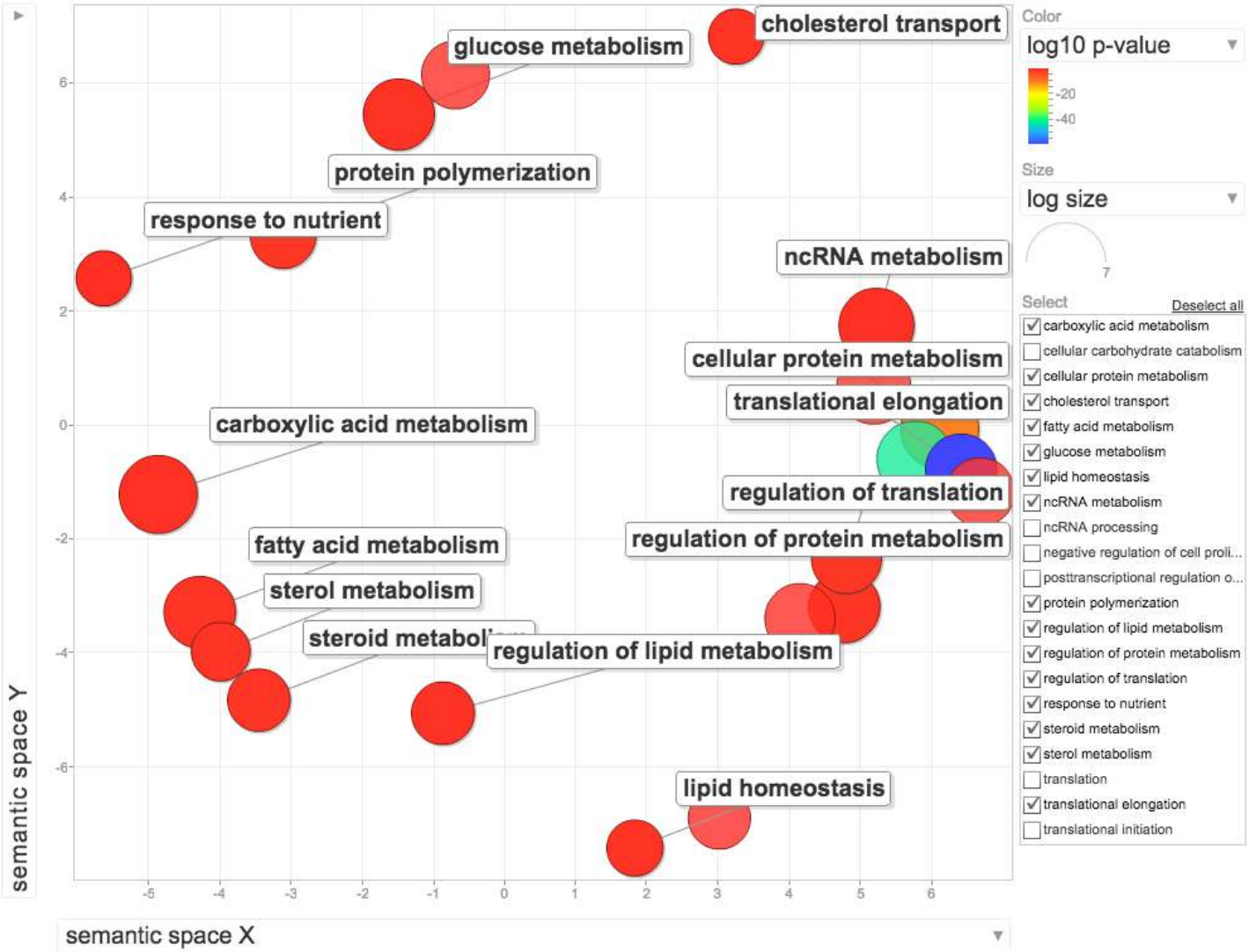
Диета


sc_After_M_6
sc_After_F_6
sc_After_M_7
sc_After_M_12
sc_After_F_4
sc_After_M_2
sc_After_M_11
sc_After_M_1
sc_After_M_8
sc_After_M_15
sc_After_F_2
sc_After_M_5
sc_After_M_13
sc_Before_M_3
sc_Before_M_18
sc_After_M_10
sc_After_M_3
sc_After_M_9
sc_After_M_14
sc_Before_F_5
sc_After_M_16
sc_Before_M_13
sc_Before_M_10
sc_After_M_18
sc_Before_M_5
sc_After_F_5
sc_After_M_17
sc_Before_M_16
sc_Before_F_3
sc_After_M_4
sc_Before_F_4
sc_After_F_1
sc_Before_M_6
sc_Before_M_15
sc_Before_M_1
sc_Before_F_1
sc_Before_M_14
sc_Before_M_7
sc_Before_M_2
sc_Before_M_12
sc_Before_M_8
sc_Before_M_4
sc_After_F_3
sc_Before_M_9
sc_Before_F_6
sc_Before_M_11
sc_Before_F_2
10
0
-10
PC2
-20
0
20
PC1
Condition
After_diet
Before_diet

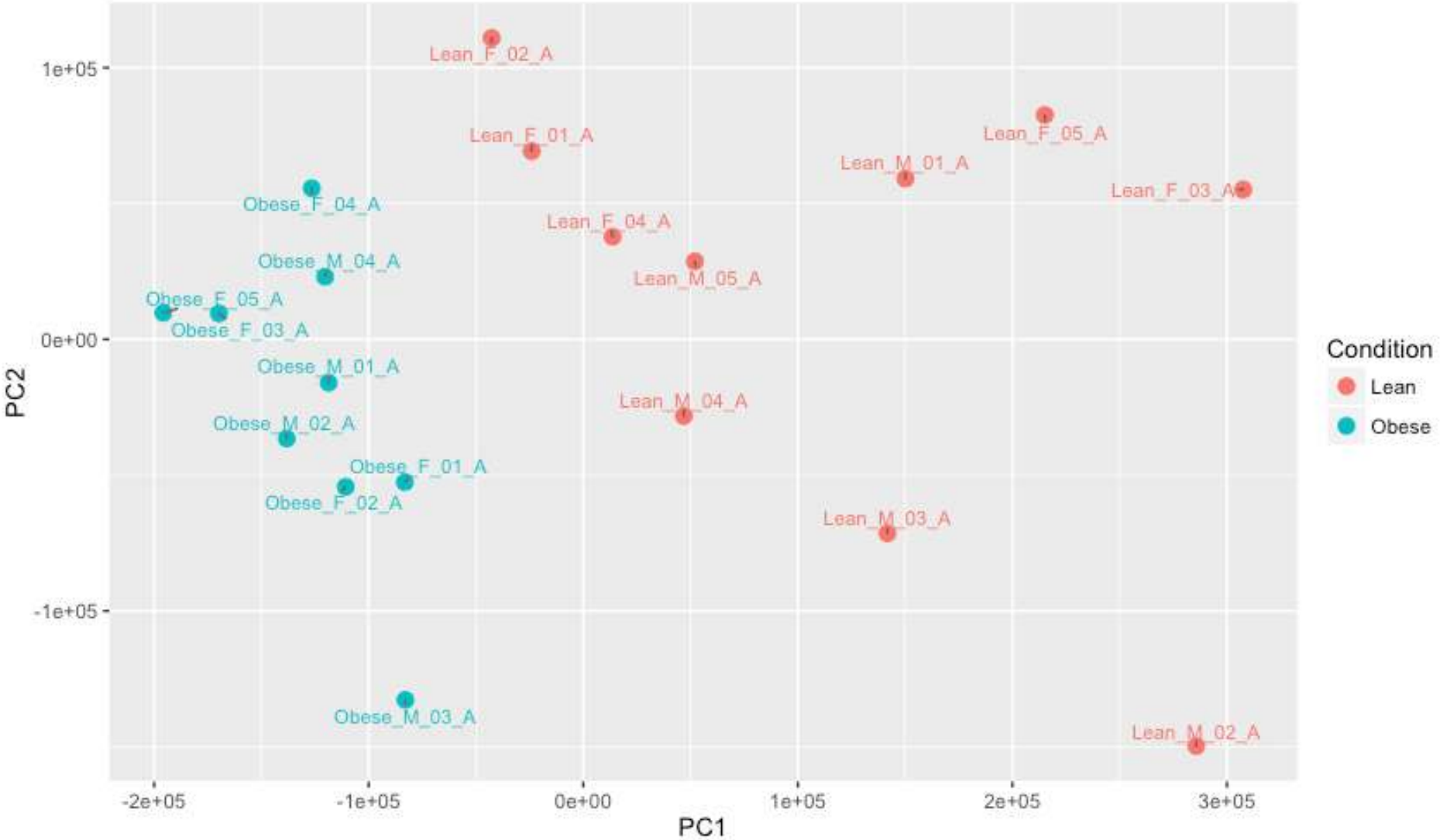
Tree map


translational elongation
translation
fatty acid metabolism
sterol metabolism
regulation of lipid metabolism
carboxylic acid metabolism
lipid homeostasis
cellular protein metabolism
regulation of translation
ncRNA processing
ncRNA metabolism

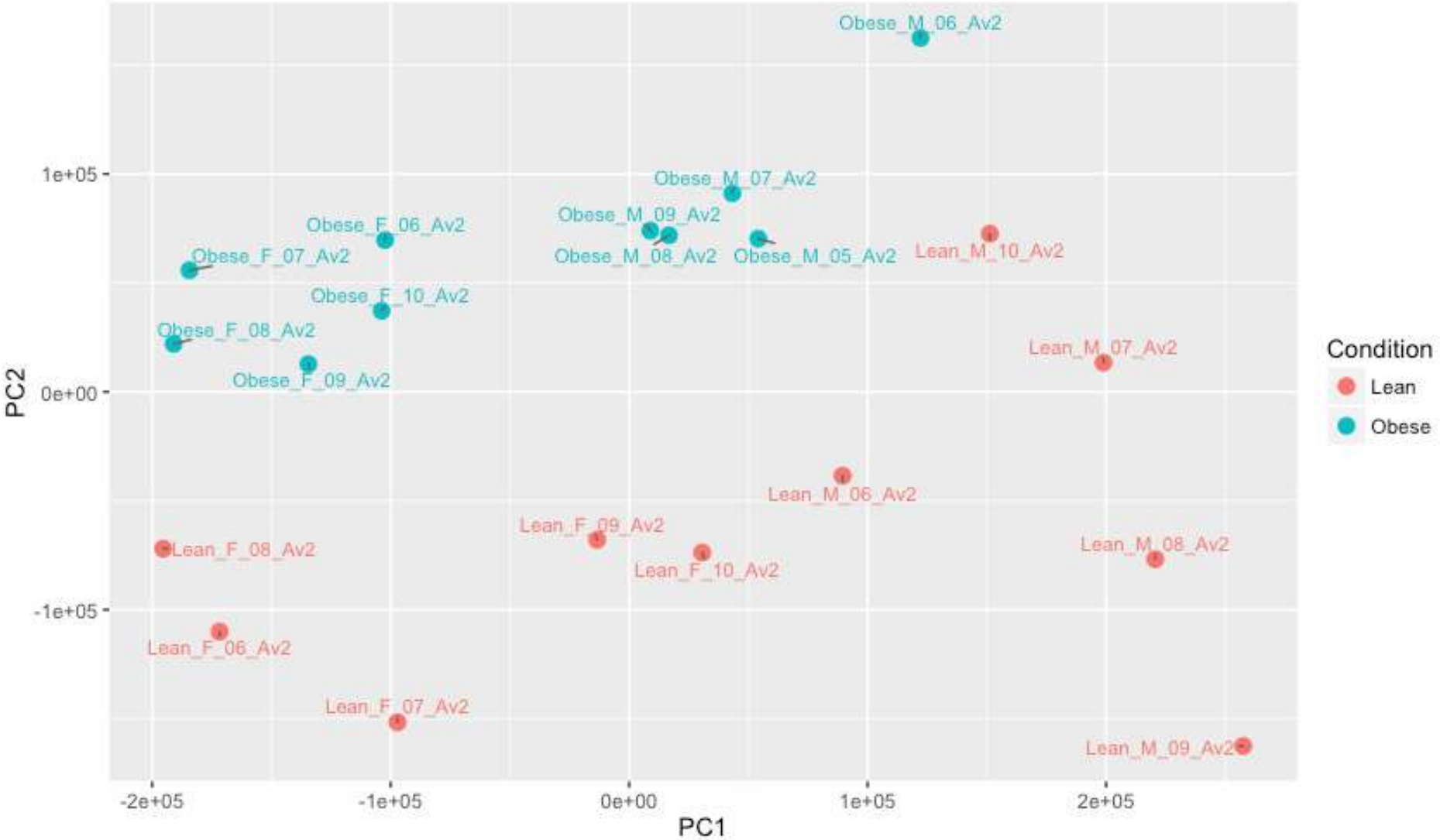
Scatterplot



Индийцы gpl91



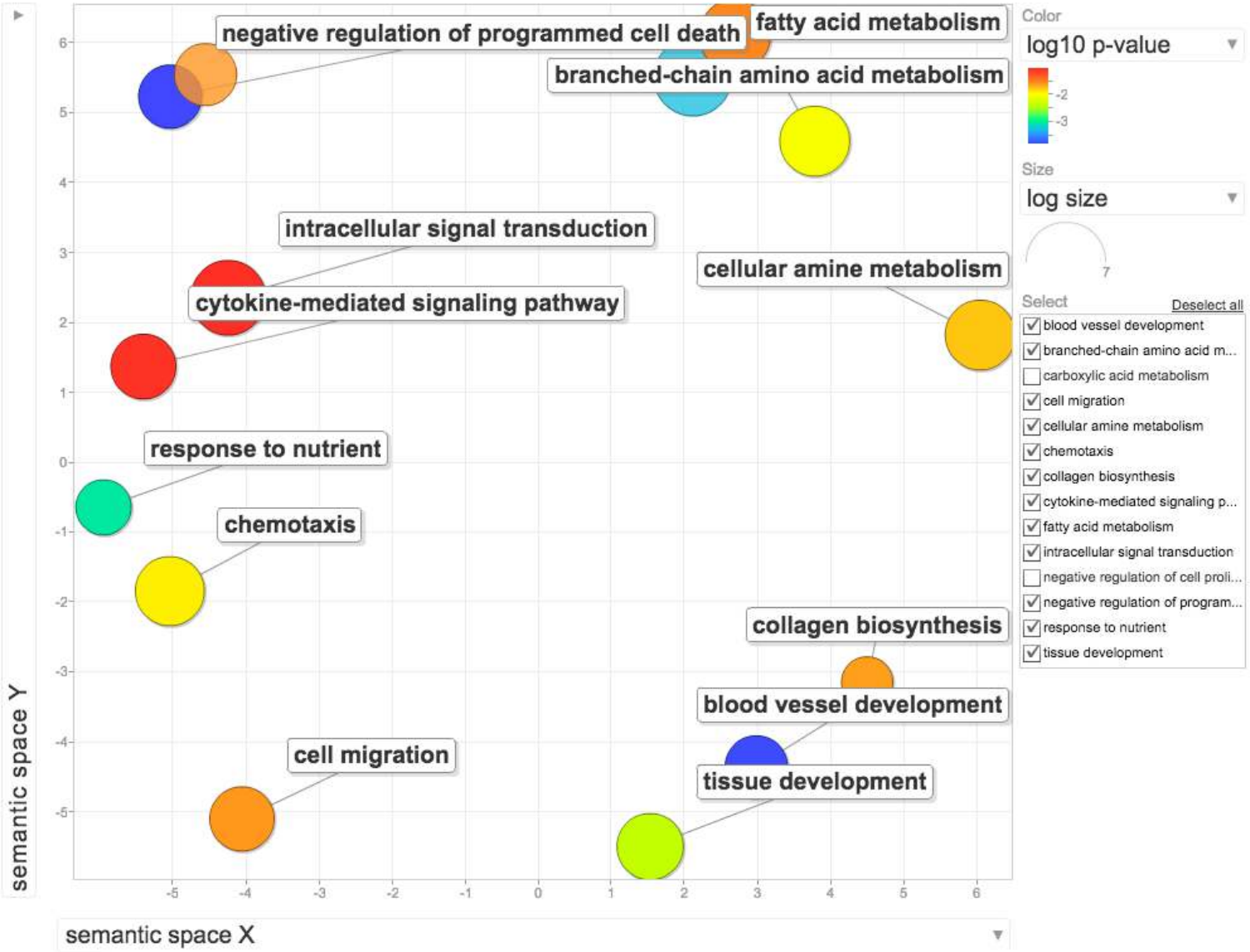
Индийцы gpl8300



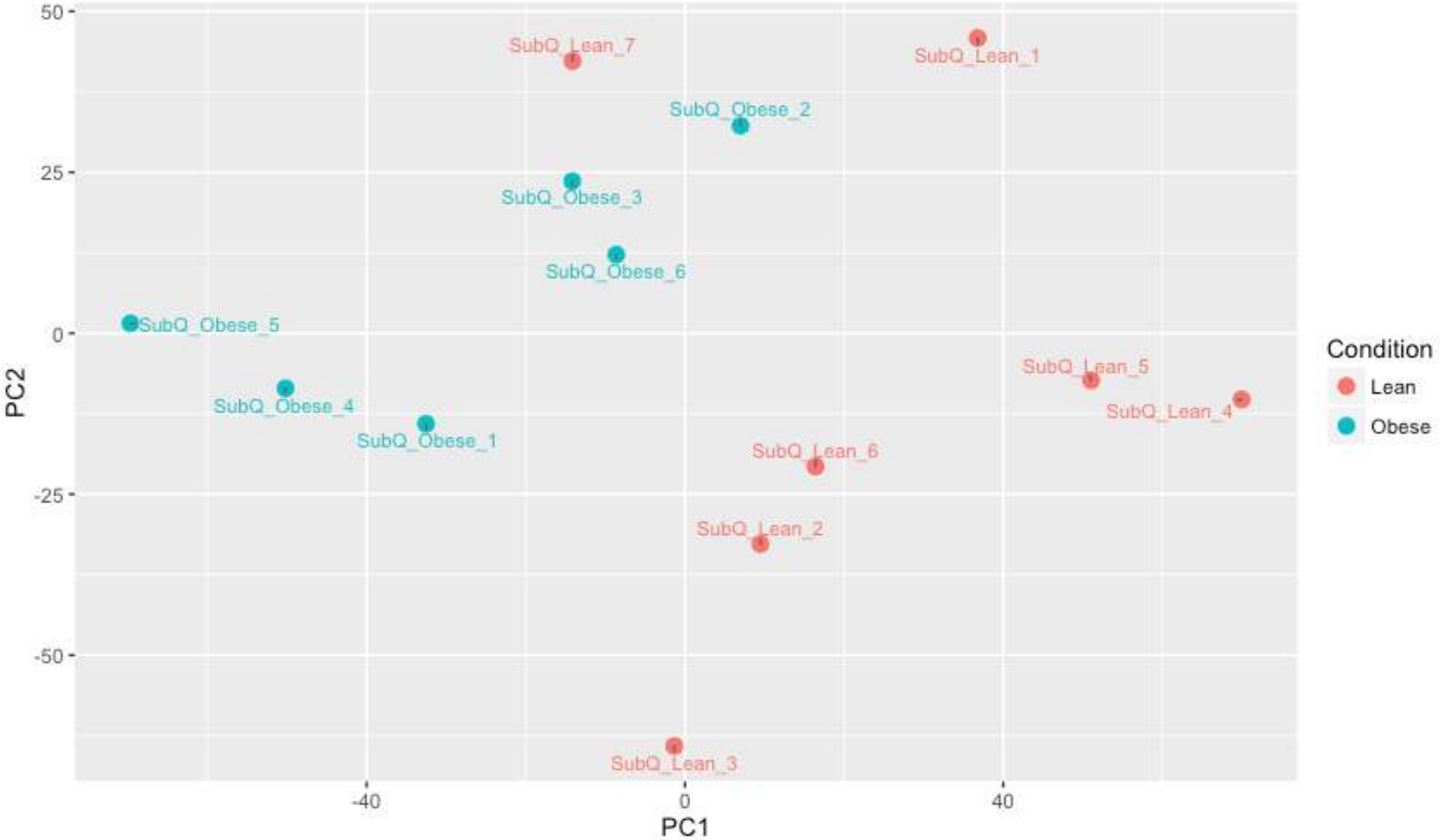
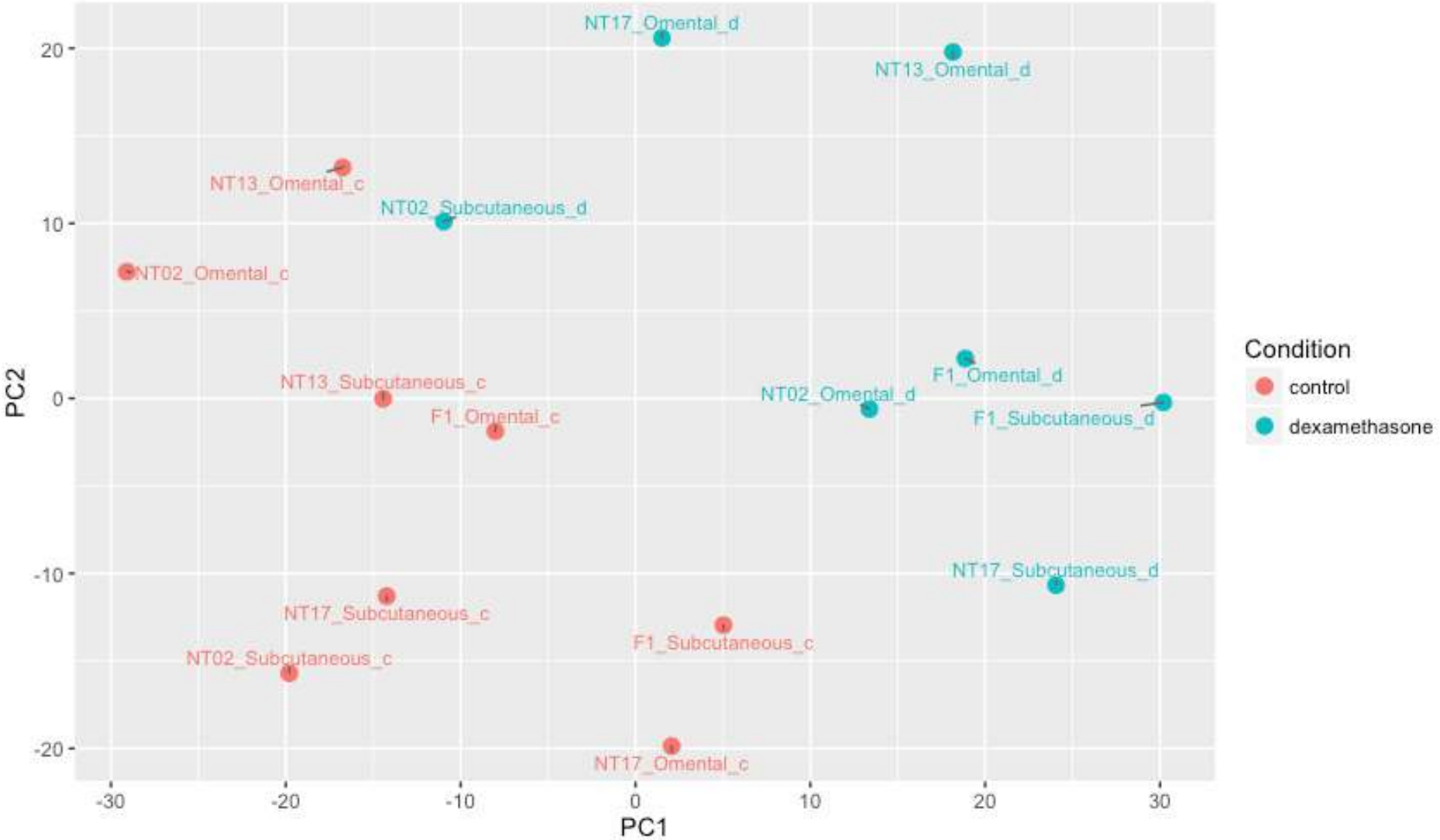
Tree map

response to nutrient
carboxylic acid metabolism
blood vessel development
tissue development
response to nutrient
chemotaxis
cell migration
branched-chain amino acid metabolism
branched-chain amino acid metabolism
cellular amine metabolism
collagen biosynthesis
negative regulation of programmed cell death
negative regulation of programmed cell death
negative regulation of cell proliferation
cytokine-mediated signaling pathway
intracellular signal transduction
fatty acid metabolism

Scatterplot



Женщины после менопаузы



Дексаметазон