

# Next generation semantic support technology

# What we are NOT

- A Search Engine
- A Pathway Tool
- An Annotated Database

# What do we do ?

- Disambiguate Text
- Meta-analyse at concept level
- Provide meta-analysed information
- Support Information Based Knowledge Discovery (especially new associations)

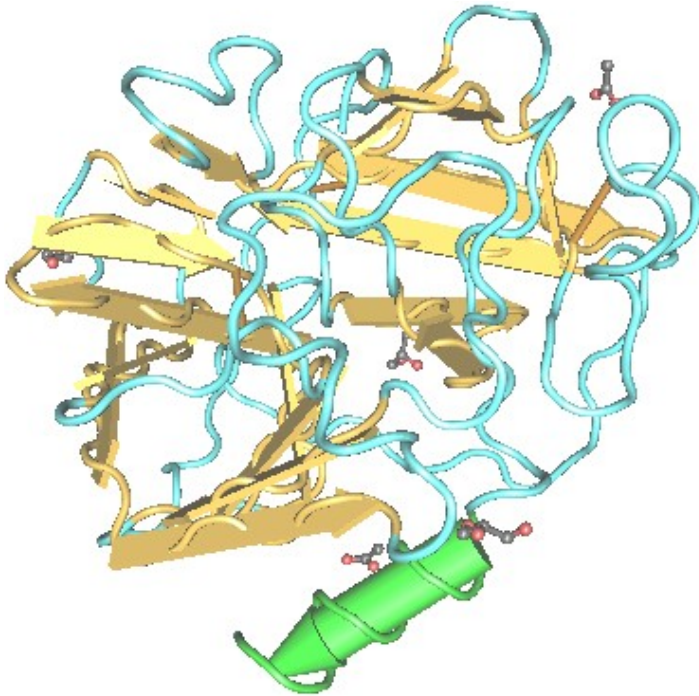


# Ambiguity 1: Synonyms

Name and origin of the protein	
Protein name	<b>Annexin A5</b>
Synonyms	<b>Annexin V</b> <b>Lipocortin V</b> <b>Endonexin II</b> <b>Calphobindin I</b> <b>CBP-I</b> <b>Placental anticoagulant protein I</b> <b>PAP-I</b> <b>PP4</b> <b>Thromboplastin inhibitor</b> <b>Vascular anticoagulant-alpha</b> <b>VAC-alpha</b> <b>Anchorin CII</b>
Gene name	<b>ANXA5 or ANX5 or ENX2 or PP4</b>
From	<a href="#">Homo sapiens (Human)</a> [TaxID: <a href="#">9606</a> ]
Taxonomy	<a href="#">Eukaryota</a> ; <a href="#">Metazoa</a> ; <a href="#">Chordata</a> ; <a href="#">Craniata</a> ; <a href="#">Vertebrata</a> ; <a href="#">Euteleostomi</a> ; <a href="#">Mammalia</a> ; <a href="#">Eutheria</a> ; <a href="#">Primates</a> ; <a href="#">Catarrhini</a> ; <a href="#">Hominidae</a> ; <a href="#">Homo</a> .

**Relatively straightforward: Thesaurus**

# Ambiguity 2: Homonyms



**PSA**

**P**rostate **S**pecific **A**ntigen

**P**Soriatic **A**rthritis

alpha-2,8-**P**oly**S**ialic **A**cid

**P**oly**S**ubstance **A**buse

**P**icryl **S**ulfonic **A**cid

**P**olymeric **S**ilicic **A**cid

**P**artial **S**ensory **A**gnosia

**P**oultry **S**cience **A**ssociation

**Not so easy: context needed**

File Edit View Go Bookmarks Tools Help

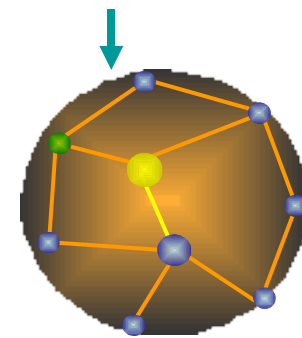
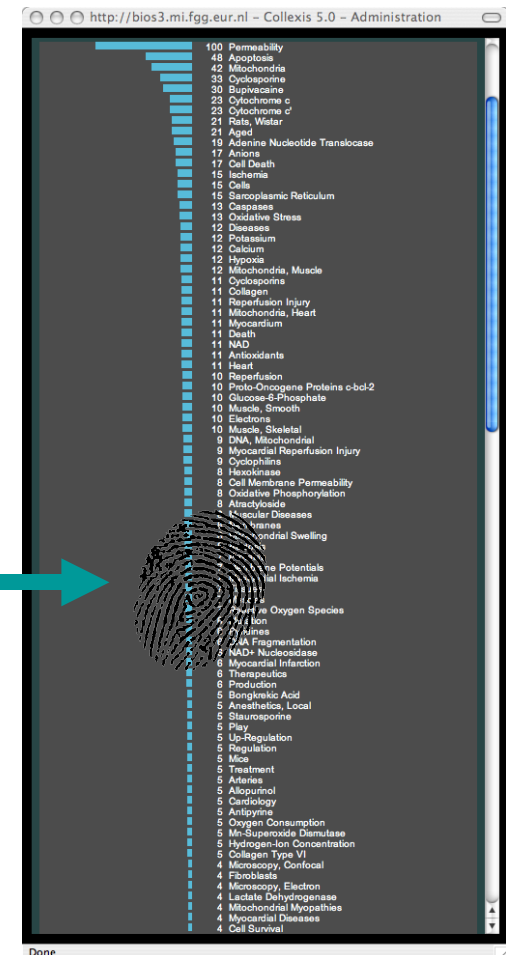
**Text analysis** for the following text:

If a title such as: 'Epidemiological considerations of **BSE**' is typed, the system is unlikely to be able to decide whether the author meant **Breast Self Examination** or **Bovine Spongiform Encephalopathy**. If no further context follows, the author could be prompted to resolve the ambiguity. However, if someone decides that he likes **EBV** more than **Human Herpesvirus 4**, or she prefers **CD154** over **TNFSF5**, the author should not be forced to change that in the text

---

The following **concepts** from the 'MeshGenes\_1.5UK' thesaurus have been found in this text. Their relevance has been corrected for their occurrence in the whole document collection (inverse document frequency).

- **Encephalopathy, Bovine Spongiform** with relevance **1.00** and concept number **C0085209**
  - ◇ based on **BSE** at position **58** in the text
  - ◇ based on **bovine** at position **178** in the text
  - ◇ based on **spongiform** at position **185** in the text
  - ◇ based on **encephalopathy** at position **196** in the text
- **CD40 Ligand** with relevance **0.79** and concept number **C0167627**
  - ◇ based on **CD154** at position **399** in the text
  - ◇ based on **TNFSF5** at position **410** in the text
- **Breast Self-Examination** with relevance **0.56** and concept number **C0085105**
  - ◇ based on **BSE** at position **58** in the text
  - ◇ based on **breast** at position **151** in the text
  - ◇ based on **self** at position **158** in the text
  - ◇ based on **examination** at position **163** in the text
- **Herpesvirus 4, Human** with relevance **0.52** and concept number **C0014644**
  - ◇ based on **EBV** at position **349** in the text
  - ◇ based on **human** at position **363** in the text
  - ◇ based on **herpesvirus** at position **369** in the text
  - ◇ based on **4** at position **381** in the text



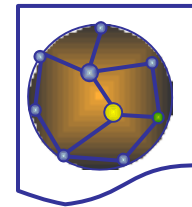
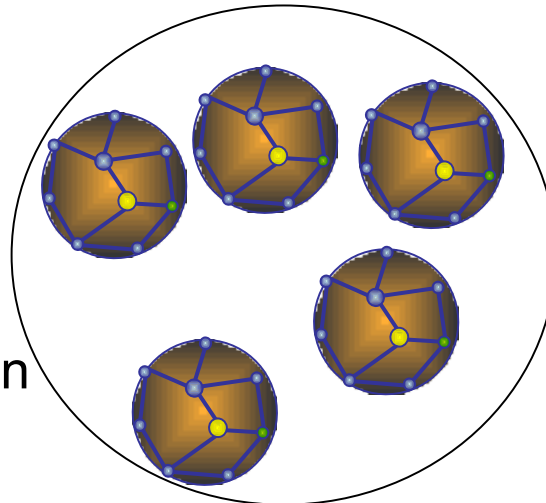
The **Knowlet**

- **Contextual annotation of web pages for interactive browsing**, van Mulligen E, Diwersy M, Schijvenaars B, Weeber M, van der Eijk CC, Jelier R, Schuemie M, Kors J, Mons B, **Medinfo 2004**, 11:94-8
- **Which gene did you mean?**, Mons B, **BMC Bioinformatics 2005** Jun 7, 6:142

# Creating Reference Knowlets

**PSA**

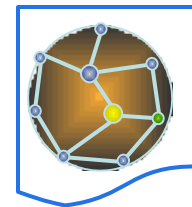
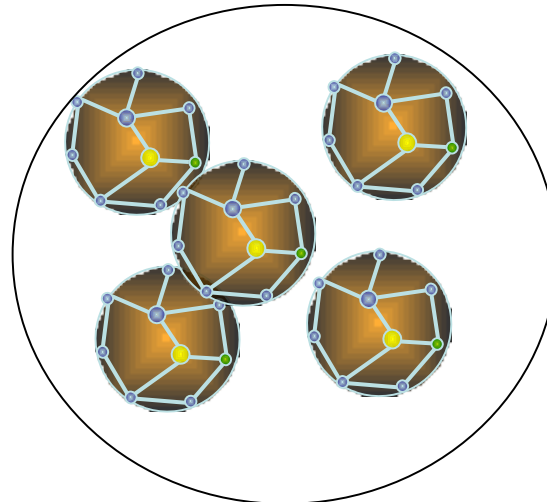
Prostate Specific Antigen



Reference Knowlet

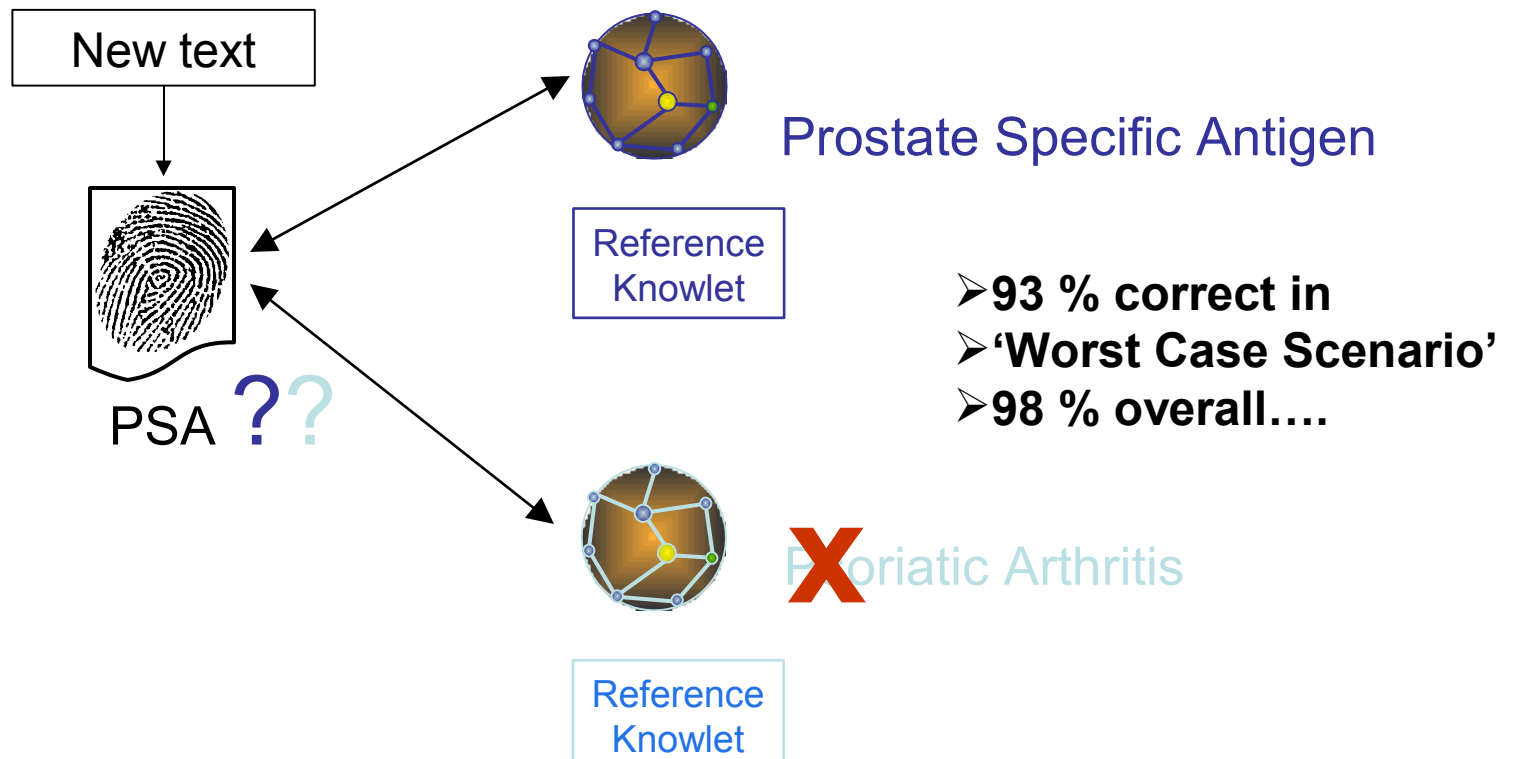
**PSA**

Psoriatic Arthritis



Reference Knowlet

# Context matching



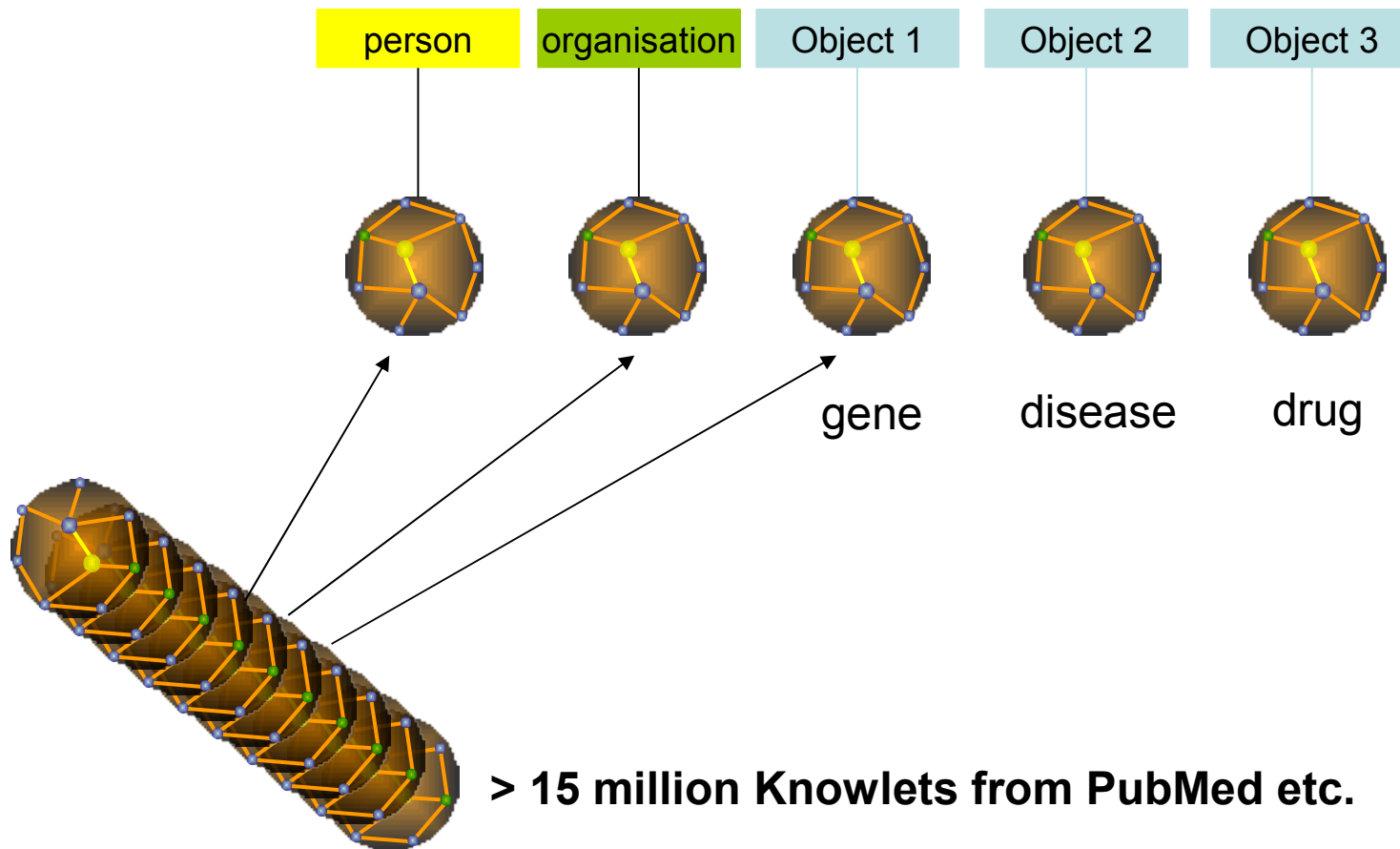
• **Thesaurus-based disambiguation of gene symbols.** Schijvenaars BJ, Mons B, Weeber M, Schuemie MJ, van Mulligen EM, Wain HM, Kors JA

**BMC Bioinformatics 2005** Jun 16, 6:149

• **Word sense disambiguation in the biomedical domain: an overview.** Schuemie MJ, Kors JA, Mons B, **Journal of Computational Biology 2005** Jun, 12:554-65



# Building an association matrix of large data sources



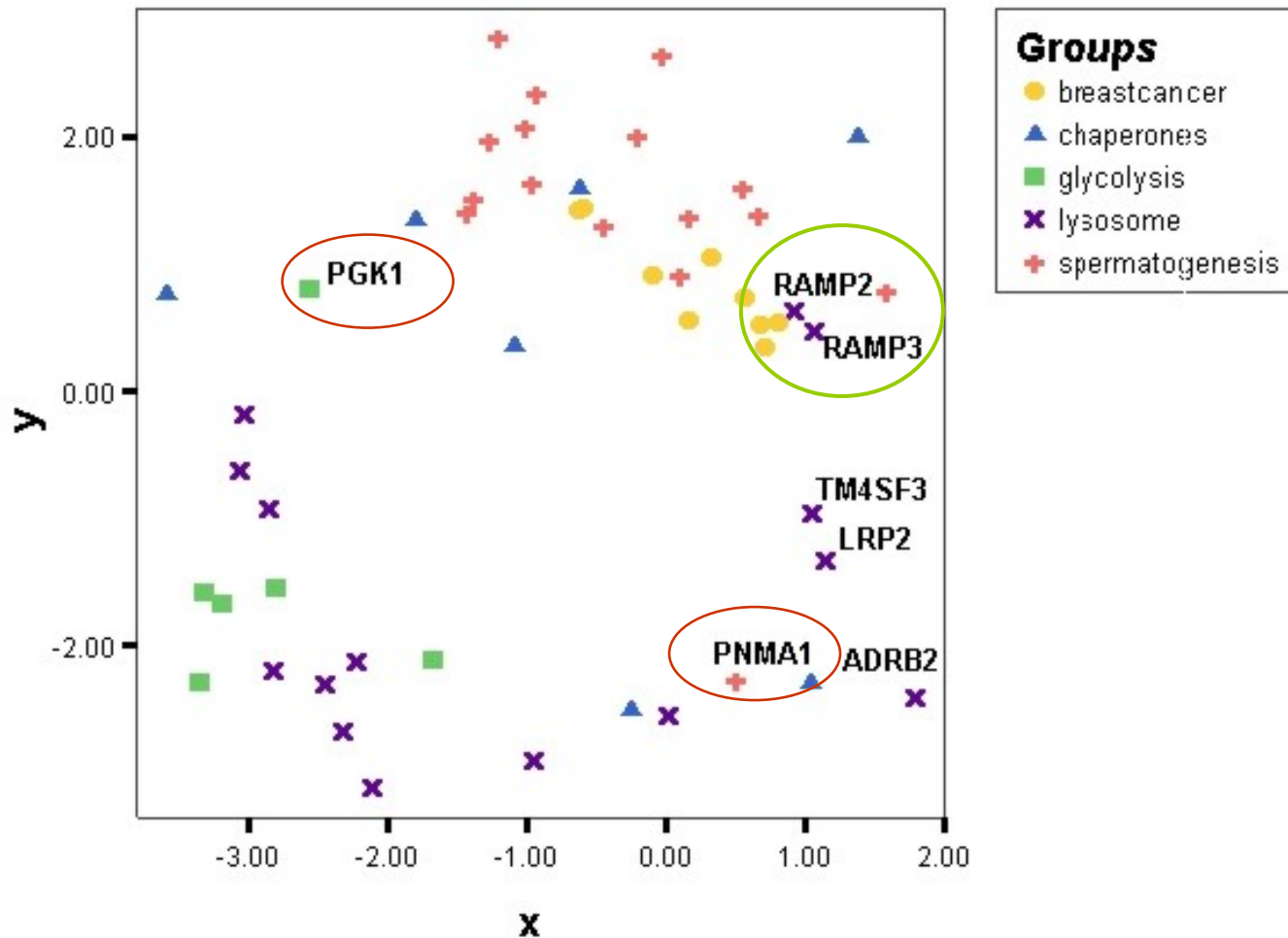
# A matrix of associative distances

						
	0					
	16	0				
	30	3	0			
	28	35	20	0		
	188	4	15	13	0	

meta-analysis

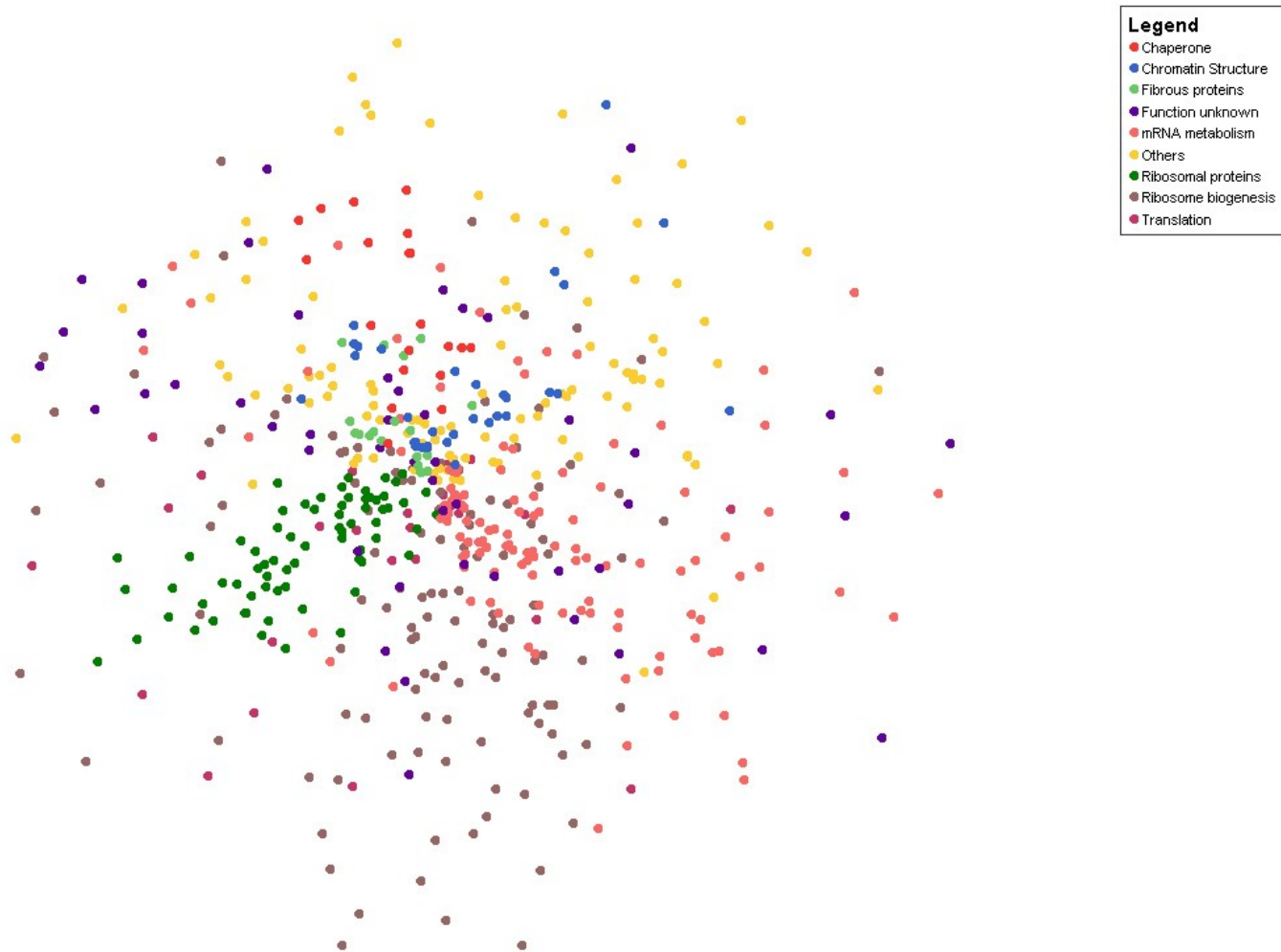
Hierarchical  
Clustering  
ACS  
MDS  
Etc.

# Meta-analysis 1: ACS



- **Constructing an Associative Concept Space for Literature-based Discovery**, van der Eijk CC, van Mulligen EM, Kors JA, Mons B, van den Berg J *Journal of the American Society for Information Science and Technology* 2004, 55(5): 436-444
- **Co-occurrence based meta-analysis of scientific texts: retrieving biological relationships between genes**. Jelier R, Jenster G, Dorssers LC, van der Eijk CC, van Mulligen EM, Mons B, Kors JA *Bioinformatics* 2005 May 1, 21:2049-58

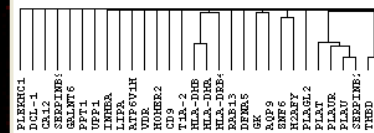
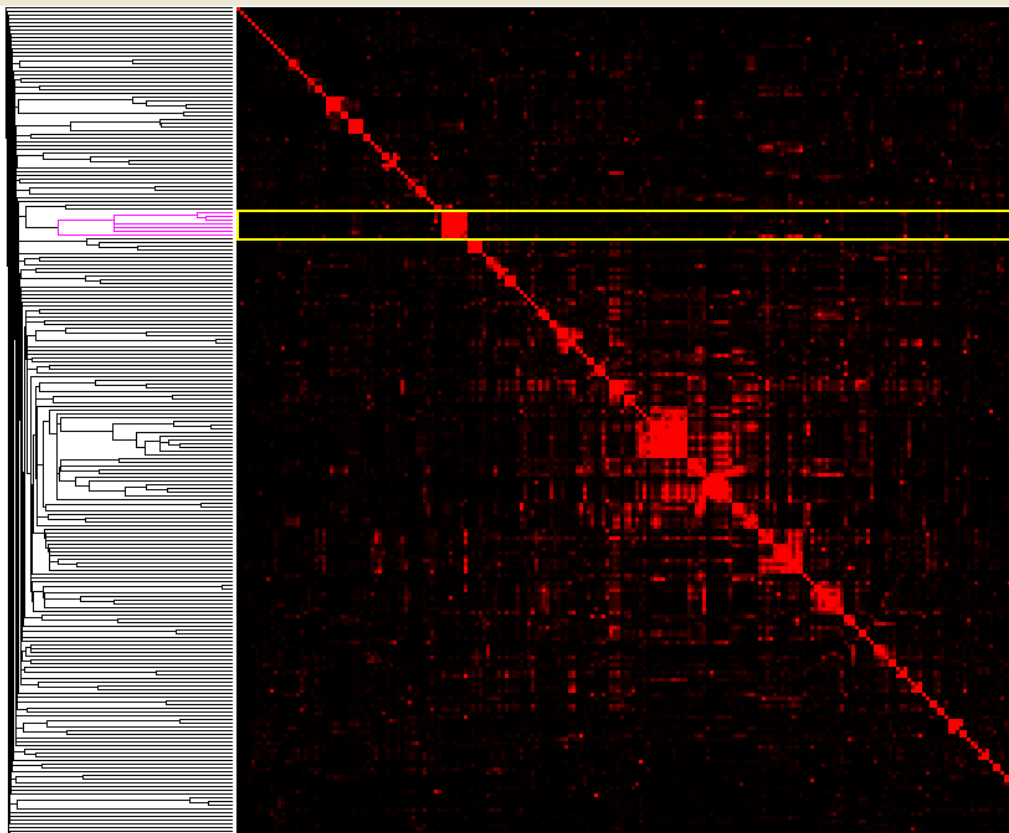
# Meta Analysis 2: Multidimensional Scaling (MDS)



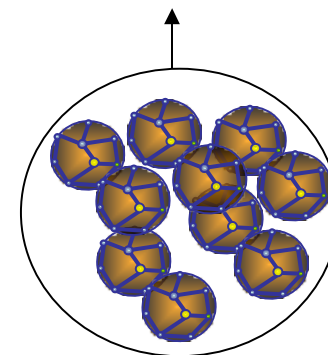
> 700 proteins from the Nucleolus, re-annotated.....and more.....

# Meta Analysis 2: Hierarchical Clustering

Tree View --- CurrentNode NODE66X --- Correlation 0.22784423828125  
File Setting Find Help



```
10094601|HT1E  
10094671|HT1L  
10094621|HT1G  
10094611|HT1F  
10094681|HT1X  
10030281|HT2A  
10090291|HTF1
```



1:  2:  3:

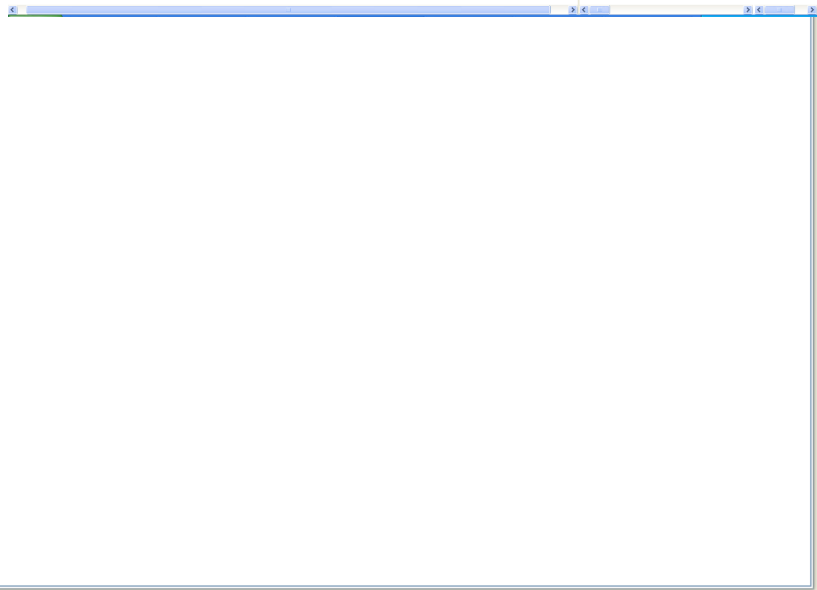
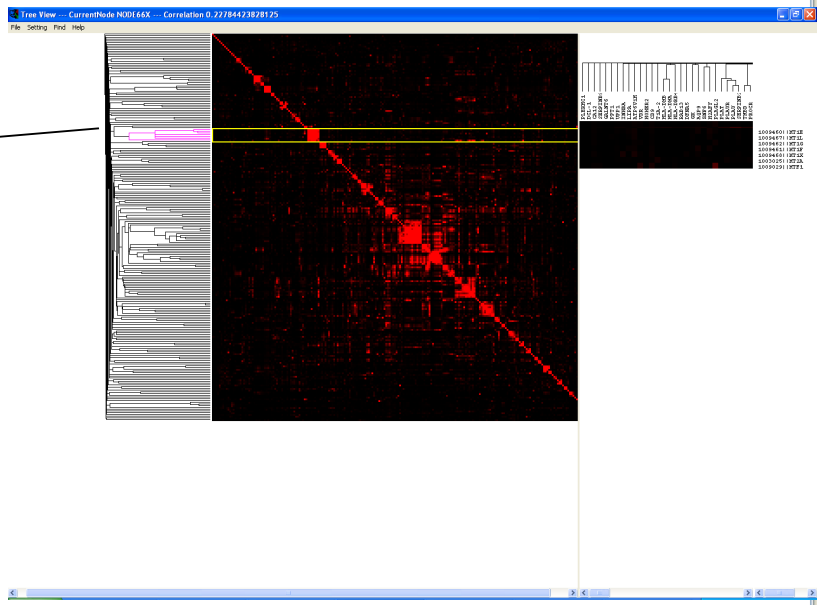
Annotation

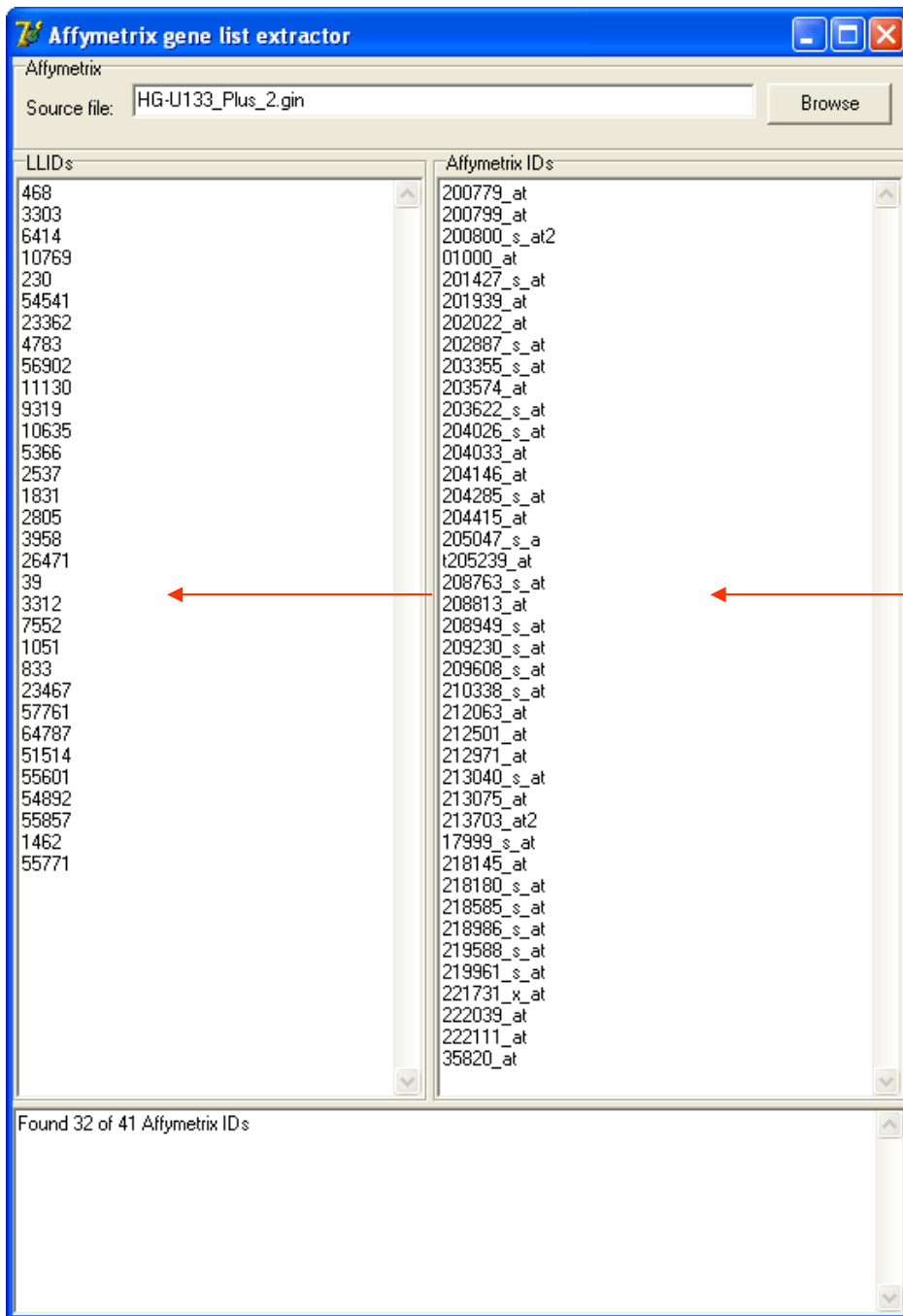
Cosine (avg):  Cutoff P-value:    
 Extended Information Random (p):  % above FE test:

Concept names

Name	Feature
MYOD1	
MTF1	
NFKBIA	
NEFH	
NCF4	
MT2A	
MT1F	
MT1E	
MSCP	
MT1X	
MT1L	
MT1G	
PTX3	
TNFRSF1B	
TNFAIP6	
TLR2	
TOM1	
TNIP1	
TNFRSF6B	
THBD	
TGFA	
T1A-2	
SOD2	
TGM2	
TGIF	
TGFBI	
TRAF1	
VEGF	
VDR	
VCL	
ZNF6	
WTAP	
WNT5A	
UPP1	
TXN	
TREM2	
TREM1	
UGCG	
UCP2	
TXNIP	
SOCS3	
SERPINA1	
SDC4	
SARS	
SGNE1	
SERPINB9	
SERPINB2	
SAMSN1	
RGS1	
RAB31	
RAB13	
RTP801	
RTN1	
RGS16	
SLAMF1	
SLC04A1	
SLC7A8	
SLC7A7	

Concept	Weight	p F-exact	"relative risk"	95%CI
Metallothionein	35.49	0.00015	5.66154	2.75-11.70
MT1E	17.77	0.00102	19.71430	5.13-75.70
MT1G	15.27	0.00012	20.44440	6.34-65.90
MT1L	10.76	0.00000	184.00000	20.60-1.64E0
MT2A	4.71	0.00001	6.30137	3.30-12.00
Zinc	3.56	0.00002	3.87640	2.33-6.46
MT1S	2.71	0.00000	11.87100	5.52-25.50
Cadmium	2.49	0.00002	6.57143	3.31-13.00
Protein Isoforms	1.91	0.00641	1.46454	1.12-1.92
MT1K	1.80	0.00000	184.00000	20.60-1.64E0
Zinc Acetate	0.55	0.00102	19.71430	5.13-75.70
Anions	0.46	0.01663	2.24390	1.21-4.17
Metals, Heavy	0.40	0.00024	6.19231	2.84-13.50
Copper	0.36	0.00457	3.57778	1.68-7.63
Metallothionein A	0.29	0.00178	8.76190	3.03-25.30
Monocytes	0.27	0.00000	5.05263	3.87-6.60
MT3	0.27	0.00095	5.75000	2.49-13.30
Metals	0.12	0.01381	2.44970	1.27-4.73
Tissues	0.11	0.00043	1.58724	1.25-2.02
Metallothionein II	0.08	0.00074	11.50000	3.88-34.10
Chromosomes, Human, Pair 16	0.08	0.42862	1.12982	0.54-2.36
Carcinoma, Transitional Cell	0.08	0.42633	1.39394	0.34-5.66
Liver	0.07	0.00000	1.87472	1.48-2.38
PYGL	0.07	0.00000	1.86767	1.47-2.37
Kidney Tubules, Proximal	0.06	0.05051	2.31933	1.03-5.21
Metallothionein I	0.06	0.00561	6.13333	2.18-17.30
SLC30A1	0.05	0.00129	9.68421	3.32-28.20
Arsenites	0.04	0.00294	4.52459	1.98-10.40
Oxidative Stress	0.03	0.00018	2.94400	1.81-4.79
Glycophorin A	0.02	0.09386	2.38961	0.88-6.47
Sodium Compounds	0.02	0.02104	5.52000	1.68-18.10
GYPA	0.02	0.11066	2.24390	0.83-6.07





200779\_at  
200799\_at  
200800\_s\_at2  
01000\_at  
201427\_s\_at  
201939\_at  
202022\_at  
202887\_s\_at  
203355\_s\_at  
203574\_at  
203622\_s\_at  
204026\_s\_at  
204033\_at  
204146\_at  
204285\_s\_at  
204415\_at  
205047\_s\_a  
t205239\_at  
208763\_s\_at  
208813\_at  
208949\_s\_at  
209230\_s\_at  
209608\_s\_at  
210338\_s\_at  
212063\_at  
212501\_at  
212971\_at  
213040\_s\_at  
213075\_at  
213703\_at2  
17999\_s\_at  
218145\_at  
218180\_s\_at  
218585\_s\_at  
218986\_s\_at  
219588\_s\_at  
219961\_s\_at  
221731\_x\_at  
222039\_at  
222111\_at  
35820\_at

Q-norm

# TextBLAST

powered by  
**Collexis**

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Please select one or more gene(s):

## Q-norm

- RAMP (Hs)
- ZWINT / ZW10 interactor (Hs)
- HSPA8 / heat shock 70kDa protein 8 (Hs)
- RAD51AP1 / RAD51 associated protein 1 (Hs)
- ACAT2 / acetyl-Coenzyme A acetyltransferase 2 (acetoacetyl Coenzyme A thiolase) (Hs)
- FLJ11029 (Hs)
- ALDOC / aldolase C, fructose-bisphosphate (Hs)
- CEBPB / CCAAT/enhancer binding protein (C/EBP), beta (Hs)
- TRIP13 / thyroid hormone receptor interactor 13 (Hs)
- HSPA1A / heat shock 70kDa protein 1A (Hs)
- EPS8L2 / EPS8-like 2 (Hs)
- CSPG2 / chondroitin sulfate proteoglycan 2 (versican) (Hs)
- SEPP1 / selenoprotein P, plasma, 1 (Hs)
- MTB (Hs)
- ATF4 / activating transcription factor 4 (tax-responsive enhancer element B67) (Hs)
- FLJ20035 (Hs)
- DDIT4 / DNA-damage-inducible transcript 4 (Hs)
- C20orf19 / chromosome 20 open reading frame 19 (Hs)
- NPTXR / neuronal pentraxin receptor (Hs)
- PLK2 / polo-like kinase 2 (Drosophila) (Hs)
- GOT1 / glutamic-oxaloacetic transaminase 1, soluble (aspartate aminotransferase 1) (Hs)
- LOC56902 (Hs)
- G1P3 / interferon, alpha-inducible protein (clone IFI-6-16) (Hs)
- CARS / cysteinyl-tRNA synthetase (Hs)
- TSC22D3 / TSC22 domain family 3 (Hs)
- TRIB3 / tribbles homolog 3 (Drosophila) (Hs)
- LGALS3 / lectin, galactoside-binding, soluble, 3 (galectin 3) (Hs)
- NFIL3 / nuclear factor, interleukin 3 regulated (Hs)
- PMAIP1 / phorbol-12-myristate-13-acetate-induced protein 1 (Hs)
- P8 (Hs)
- PSD3 / pleckstrin and Sec7 domain containing 3 (Hs)
- ZNF6 / zinc finger protein 6 (CMPX1) (Hs)



Internet Explorer browser window showing a search for "PLK2 / polo-like kinase 2 (Drosophila) (Hs)" on the NCBI TextBLAST website. The search results are displayed in a table with columns for score, description, and disease/pathway associations.

**Search Results Table:**

Score	Description	Associated Diseases/Pathways
1.00	Genomic Instability	Diseases
0.99	Sequence Deletion	Diseases
0.79	Chromosomal Instability	Diseases
0.63	Neoplasm Metastasis	Diseases
0.57	Glucose Intolerance	Diseases
0.56	Cell Transformation, Neoplastic	Diseases
0.53	Colonic Neoplasms	Diseases
0.52	Neoplasm Invasiveness	Diseases
0.50	Anoxia	Diseases
0.50	Inflammation	Diseases
0.48	Insulin Resistance	Diseases
0.43	Diabetes Mellitus, Type 2	Diseases
0.43	Adenocarcinoma	Diseases
0.42	Neovascularization, Pathologic	Diseases
0.42	Overnutrition	Diseases
0.42	Carcinoma	Diseases
0.36	Neoplasms	Diseases
0.36	Mastocytoma	Diseases
0.35	Lung Neoplasms	Diseases
0.35	Liver Neoplasms, Experimental	Diseases
0.34	DNA Damage	Diseases
0.34	Carcinoma, Hepatocellular	Diseases
0.32	Hyperinsulinism	Diseases
0.32	Translocation, Genetic	Diseases
0.32	Ovarian Neoplasms	Diseases
1.00	Hypoxia and p53 in the Cardiovascular system	Pathways
0.79	p38 MAPK Signaling Pathway	Pathways
0.67	Chaperones modulate interferon Signaling Pathway	Pathways
0.64	AKT Signaling Pathway	Pathways
0.59	MAPKinase Signaling Pathway	Pathways
0.54	Hypoxia-Inducible Factor in the Cardiovascular System	Pathways
0.50	Low-density lipoprotein (LDL) pathway during atherogenesis	Pathways
0.48	Malate-aspartate shuttle	Pathways
0.46	Dendritic cells in regulating TH1 and TH2 Development	Pathways
0.46	PTEN dependent cell cycle arrest and apoptosis	Pathways
0.45	Mechanism of Gene Regulation by Peroxisome Proliferators via PPAR(alpha)	Pathways
0.43	Stress Induction of HSP Regulation	Pathways
0.43	Glycolysis Pathway	Pathways
0.43	Cell Cycle: G2/M Checkpoint	Pathways
0.40	Overview of telomerase protein component gene hTert Transcriptional Regulation	Pathways
0.37	p53 Signaling Pathway	Pathways
0.37	Human Cytomegalovirus and Map Kinase Pathways	Pathways
0.37	Inhibition of Cellular Proliferation by Gleevec	Pathways
0.35	Visceral Fat Deposits and the Metabolic Syndrome	Pathways
0.34	Erk1/Erk2 ManK Signaling pathway	Pathways

**Q-norm**

**Pathways**

**Diseases**

1 - 25

1 - 25

1000

Internet

Database: LocusLink

ID1; ID2; ...: 30 51312 6515 10938

Not found: 34; 51606; 54434; 6515; 10938

A2M  
ADM  
ANPEP  
ATP2C1  
C3  
CCL2  
CCL3  
CCR7  
CD1C  
CD1D  
CD36  
CD9  
CNK  
CTSL  
CXCL2  
DTR  
GSTO1  
HLA-DMA

List Search Internet databases

Seeds Viewer

Selected seed concepts (46)

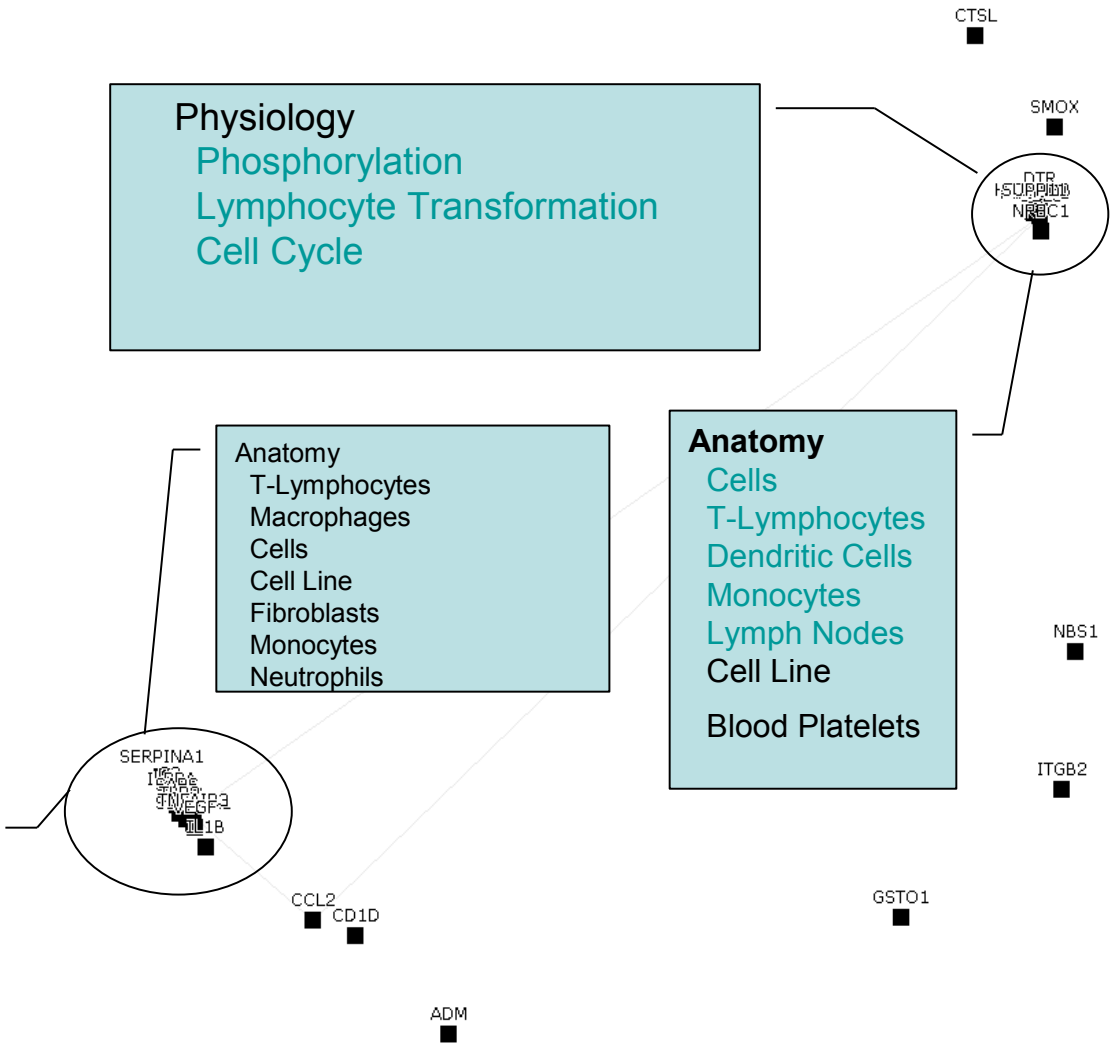
A2M  
ADM  
ANPEP  
ATP2C1  
C3  
CCL2  
CCL3  
CCR7  
CD1C  
CD1D  
CD36  
CD9  
CNK  
CTSL  
CXCL2  
DTR  
GSTO1  
HLA-DMA  
HLA-DMB  
IL1A  
IL1B  
IL1RN  
IL2RA

Immunity, Natural  
Genotype  
Transfection  
Antigen Presentation  
Genetic Predisposition to  
Disease  
Fibrinolysis

Physiology  
Phosphorylation  
Lymphocyte Transformation  
Cell Cycle

Anatomy  
T-Lymphocytes  
Macrophages  
Cells  
Cell Line  
Fibroblasts  
Monocytes  
Neutrophils

Anatomy  
Cells  
T-Lymphocytes  
Dendritic Cells  
Monocytes  
Lymph Nodes  
Cell Line  
Blood Platelets



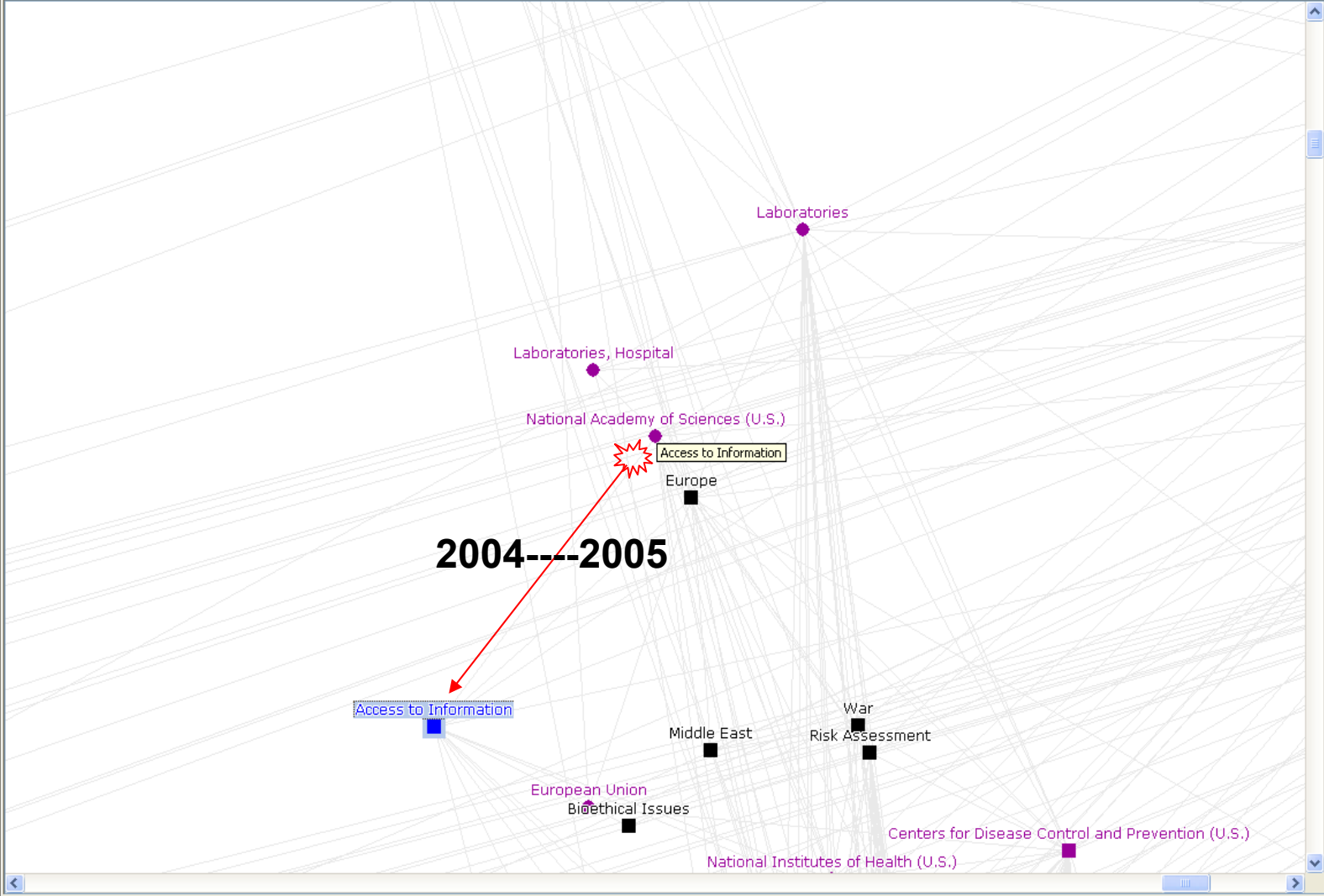
Devices	Objects	Procedures
Disorders	Occupations	
Genes & Molecular Sequences	Organizations	
Chemicals & Drugs	Geographic Areas	Phenomena
Concepts & Ideas	Living Beings	Physiology

- Groups
  - Activities & Behaviors
  - Anatomy
  - Chemicals & Drugs
  - Concepts & Ideas
  - Devices
  - Disorders
  - Genes & Molecular Sequences
  - Geographic Areas
  - Living Beings
  - Objects
  - Occupations
  - Organizations
  - Phenomena
  - Physiology

Groups Hierarchy List

Selected Viewer

- Selected semantic types (4)
- Health Care Related Organization
  - Organization
  - Professional Society
  - Self-help or Relief Organization



Legend Display options Concept information Association information Distance Connecting paths Selection Projection

Selection type

- Co-occurrence
- Nearest n
- Hypercircle

Selection options

Number of nearest concepts:

0 10 20 30 40 50 60 70 80 90 100

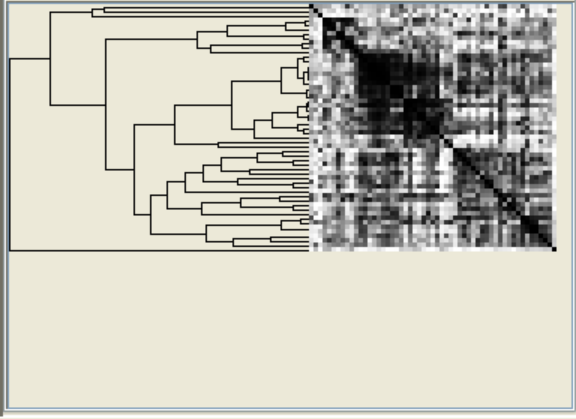
File

Zoom to fit    Select Center Zoom    Animate projection    Stop projection    Corrected projection stress: 0.5918260238208451



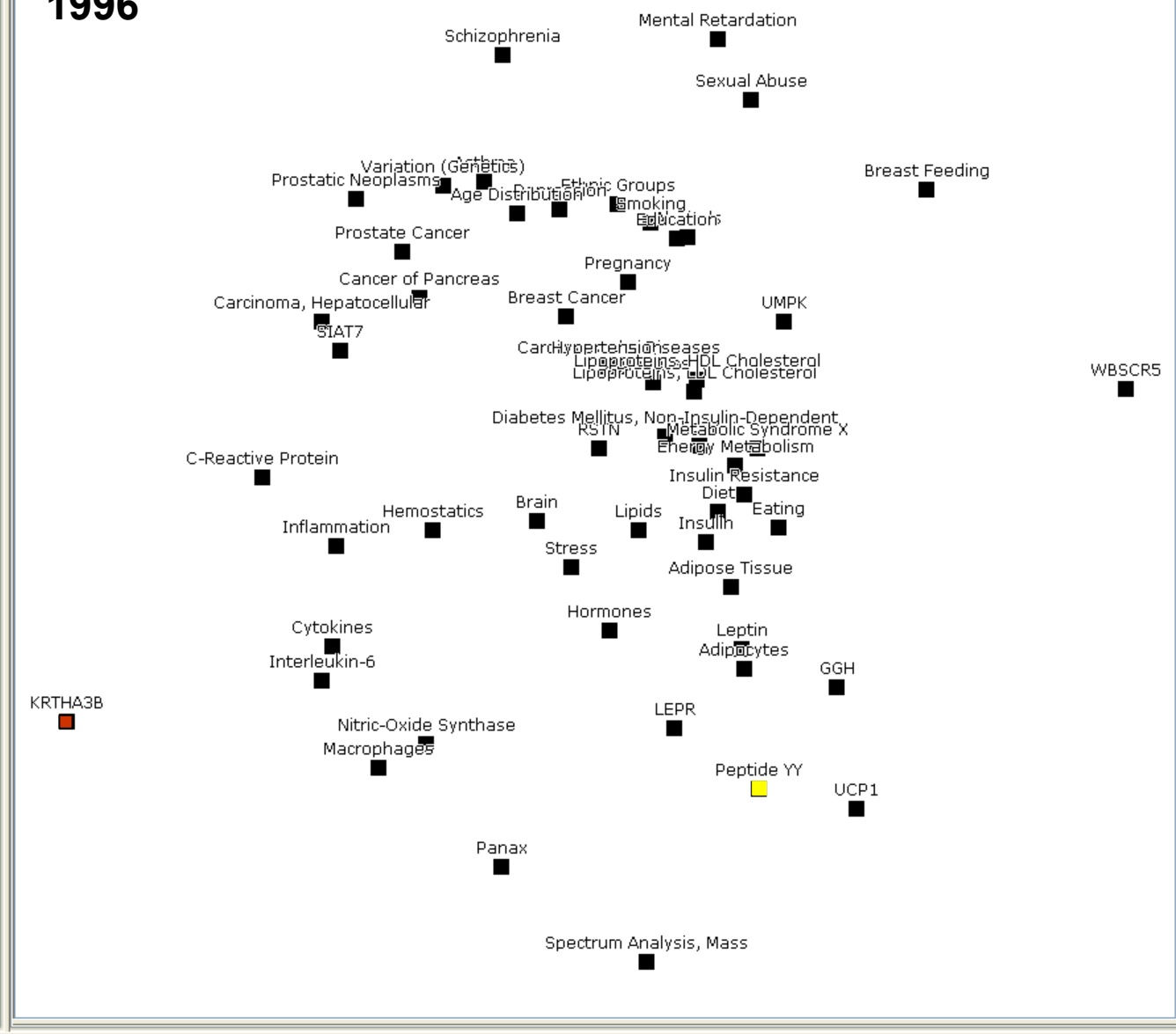
Explorer    Distances "1996"    Seed concepts

From	To	Distance
Panax	Panax	0
Panax	Cytokines	168
Panax	Cardiovascular Diseases	183
Panax	Peptide YY	192
Panax	C-Reactive Protein	232
Panax	Breast Feeding	222
Panax	Breast Cancer	72
Panax	Brain	72
Panax	Metabolic Syndrome X	200
Panax	Variation (Genetics)	203
Panax	Asthma	233
Panax	Stress	60
Panax	Spectrum Analysis, M...	156
Panax	Prostate Cancer	235
Panax	Smoking	234
Panax	Schizophrenia	218
Panax	Cancer of Pancreas	242
Panax	Prostatic Neoplasms	233
Panax	Pregnancy	228
Panax	Leptin	177
Panax	Obesity	199
Panax	Sexual Abuse	231
Panax	Mental Retardation	230
Panax	Macrophages	46
Panax	Lipoproteins, LDL Cho...	135
Panax	Lipoproteins, HDL Ch...	137
Panax	Lipids	54
Panax	Interleukin-6	172
Panax	Insulin Resistance	189
Panax	Insulin	164
Panax	Inflammation	192
Panax	Adipocytes	156



Viewer

# 1996



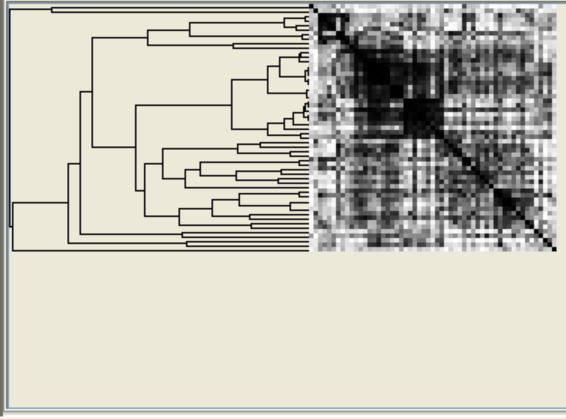
File

Zoom to fit Select Center Zoom Animate projection Stop projection Corrected projection stress: 0.5914647531556538



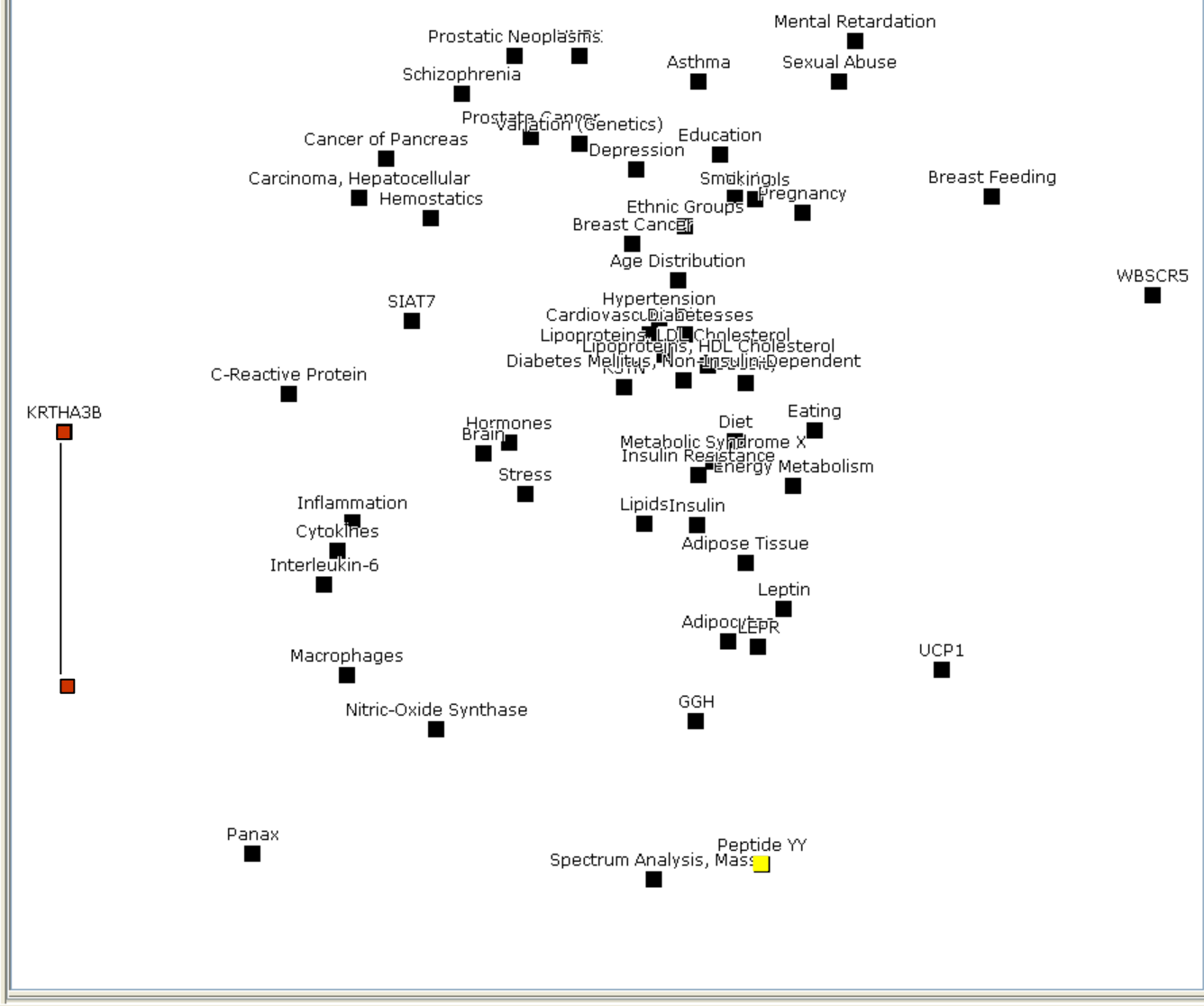
Explorer Distances "1997" Seed concepts

From	To	Distance
Panax	Panax	0
Panax	Cytokines	198
Panax	Cardiovascular Diseases	246
Panax	Peptide YY	233
Panax	C-Reactive Protein	240
Panax	Breast Feeding	254
Panax	Breast Cancer	253
Panax	Brain	75
Panax	Metabolic Syndrome X	207
Panax	Variation (Genetics)	241
Panax	Asthma	238
Panax	Stress	194
Panax	Spectrum Analysis, M...	244
Panax	Prostate Cancer	253
Panax	Smoking	248
Panax	Schizophrenia	195
Panax	Cancer of Pancreas	255
Panax	Prostatic Neoplasms	253
Panax	Pregnancy	250
Panax	Leptin	208
Panax	Obesity	230
Panax	Sexual Abuse	248
Panax	Mental Retardation	254
Panax	Macrophages	180
Panax	Lipoproteins, LDL Cho...	241
Panax	Lipoproteins, HDL Ch...	236
Panax	Lipids	218
Panax	Interleukin-6	199
Panax	Insulin Resistance	208
Panax	Insulin	223
Panax	Inflammation	172
Panax	Adipocytes	203



Viewer

# 1997



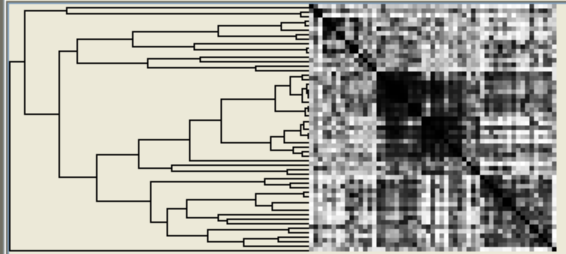
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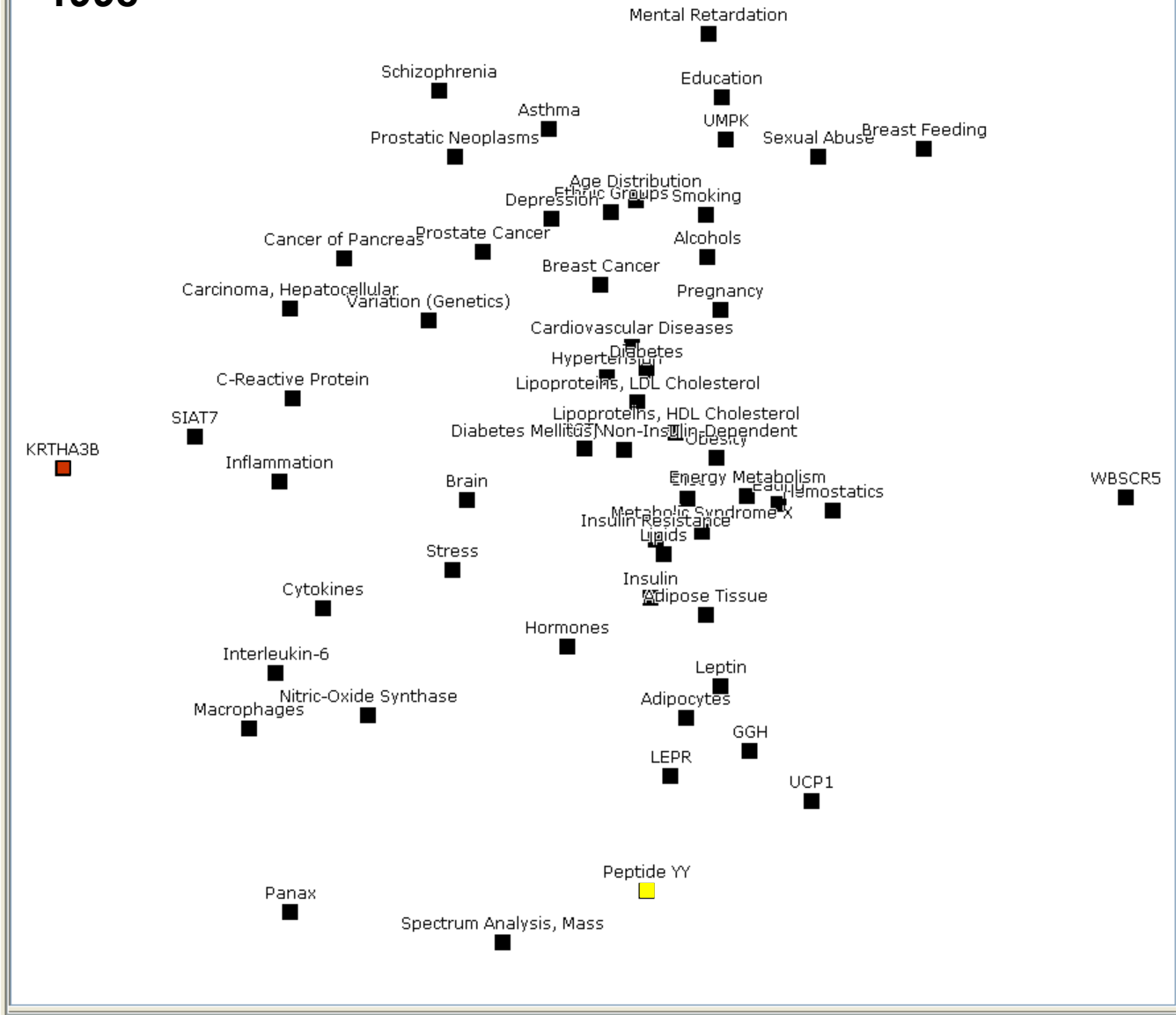
Explorer Distances "1998" Seed concepts

From	To	Distance
Panax	Panax	0
Panax	Cytokines	211
Panax	Cardiovascular Diseases	201
Panax	Peptide YY	177
Panax	C-Reactive Protein	240
Panax	Breast Feeding	254
Panax	Breast Cancer	228
Panax	Brain	66
Panax	Metabolic Syndrome X	196
Panax	Variation (Genetics)	225
Panax	Asthma	243
Panax	Stress	76
Panax	Spectrum Analysis, M...	160
Panax	Prostate Cancer	234
Panax	Smoking	236
Panax	Schizophrenia	237
Panax	Cancer of Pancreas	223
Panax	Prostatic Neoplasms	253
Panax	Pregnancy	222
Panax	Leptin	188
Panax	Obesity	215
Panax	Sexual Abuse	250
Panax	Mental Retardation	250
Panax	Macrophages	158
Panax	Lipoproteins, LDL Cho...	194
Panax	Lipoproteins, HDL Ch...	164
Panax	Lipids	188
Panax	Interleukin-6	193
Panax	Insulin Resistance	199
Panax	Insulin	194
Panax	Inflammation	199
Panax	Adipocytes	170



Viewer

# 1998

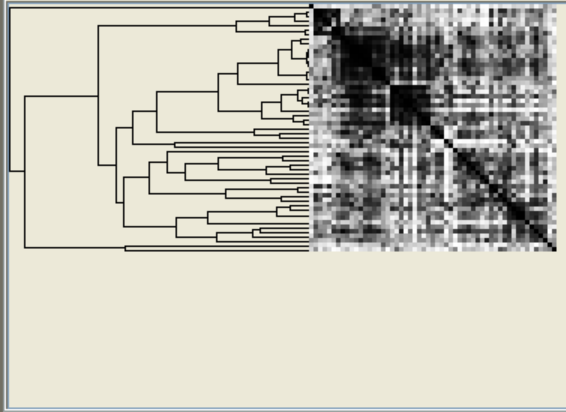


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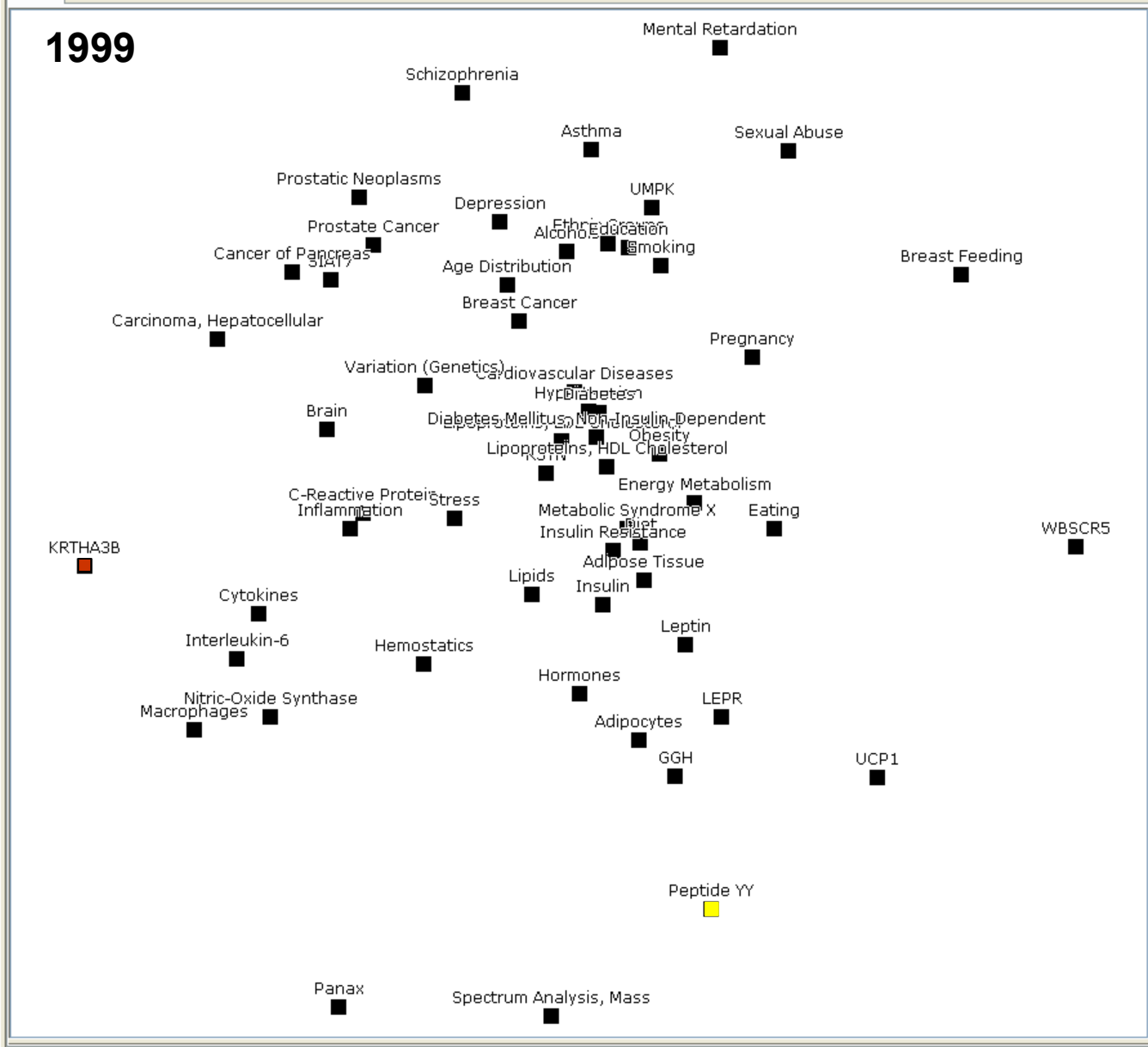
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Explorer Distances "1999" Seed concepts

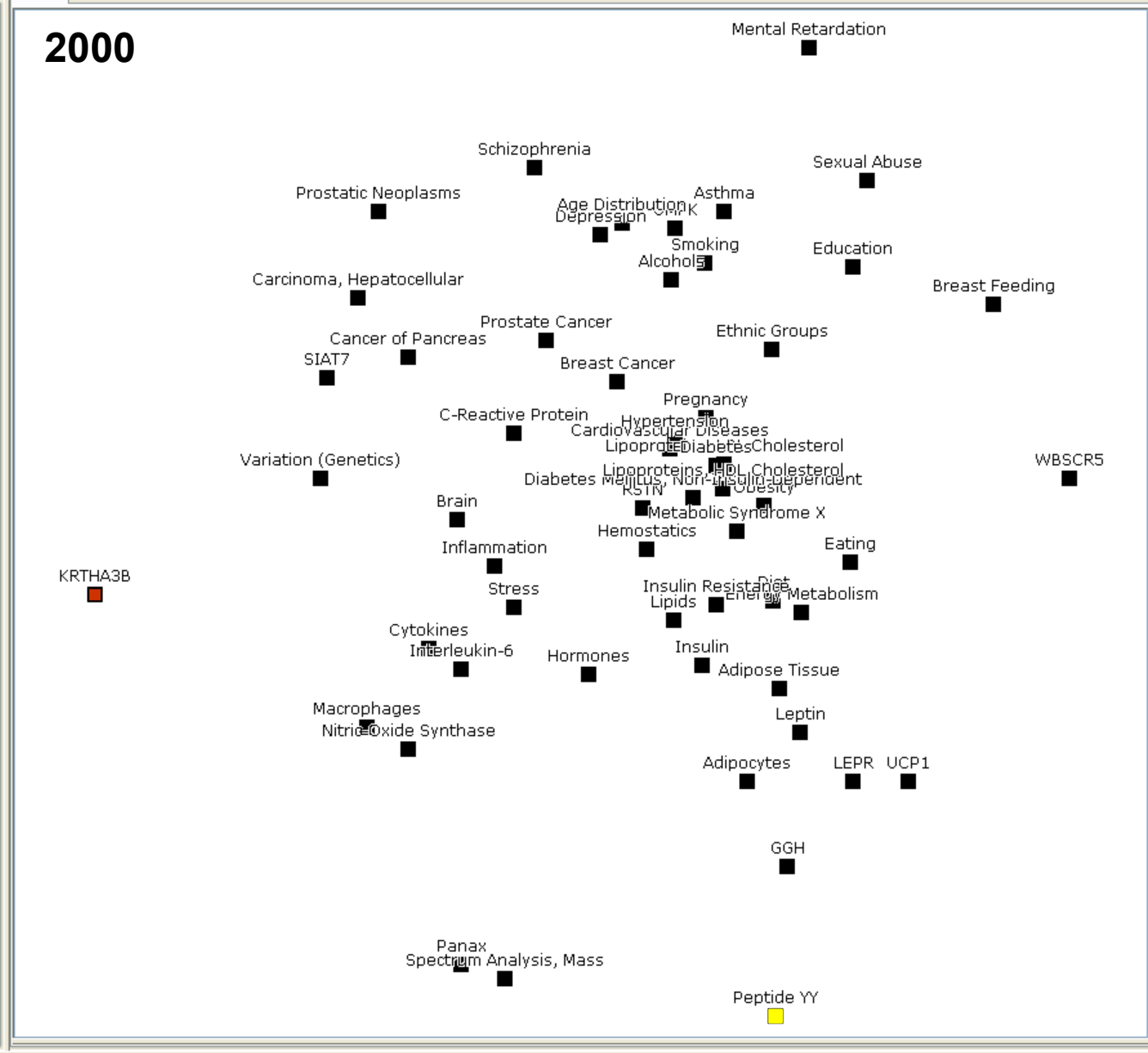
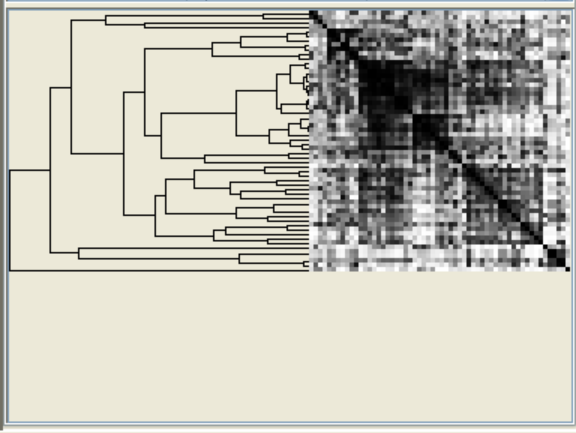
From	To	Distance
Panax	Panax	0
Panax	Cytokines	214
Panax	Cardiovascular Diseases	233
Panax	Peptide YY	244
Panax	C-Reactive Protein	247
Panax	Breast Feeding	255
Panax	Breast Cancer	236
Panax	Brain	220
Panax	Metabolic Syndrome X	196
Panax	Variation (Genetics)	247
Panax	Asthma	250
Panax	Stress	212
Panax	Spectrum Analysis, M...	193
Panax	Prostate Cancer	217
Panax	Smoking	199
Panax	Schizophrenia	246
Panax	Cancer of Pancreas	195
Panax	Prostatic Neoplasms	213
Panax	Pregnancy	244
Panax	Leptin	201
Panax	Obesity	200
Panax	Sexual Abuse	253
Panax	Mental Retardation	254
Panax	Macrophages	225
Panax	Lipoproteins, LDL Cho...	117
Panax	Lipoproteins, HDL Ch...	123
Panax	Lipids	190
Panax	Interleukin-6	221
Panax	Insulin Resistance	221
Panax	Insulin	224
Panax	Inflammation	234
Panax	Adipocytes	230



Viewer



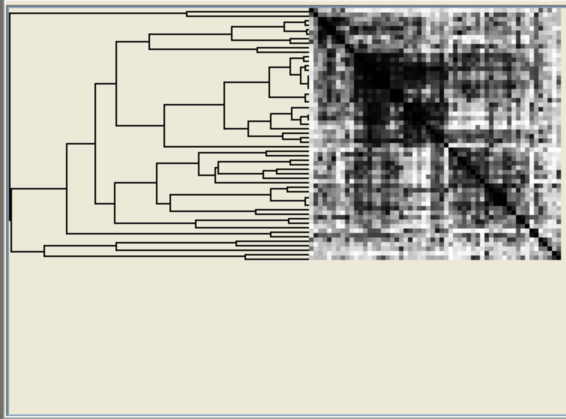
From	To	Distance
Panax	Panax	0
Panax	Cytokines	141
Panax	Cardiovascular Diseases	222
Panax	Peptide YY	229
Panax	C-Reactive Protein	249
Panax	Breast Feeding	251
Panax	Breast Cancer	235
Panax	Brain	188
Panax	Metabolic Syndrome X	155
Panax	Variation (Genetics)	201
Panax	Asthma	242
Panax	Stress	163
Panax	Spectrum Analysis, M...	33
Panax	Prostate Cancer	222
Panax	Smoking	229
Panax	Schizophrenia	248
Panax	Cancer of Pancreas	207
Panax	Prostatic Neoplasms	239
Panax	Pregnancy	238
Panax	Leptin	161
Panax	Obesity	197
Panax	Sexual Abuse	252
Panax	Mental Retardation	254
Panax	Macrophages	49
Panax	Lipoproteins, LDL Cho...	231
Panax	Lipoproteins, HDL Ch...	230
Panax	Lipids	180
Panax	Interleukin-6	164
Panax	Insulin Resistance	88
Panax	Insulin	62
Panax	Inflammation	192



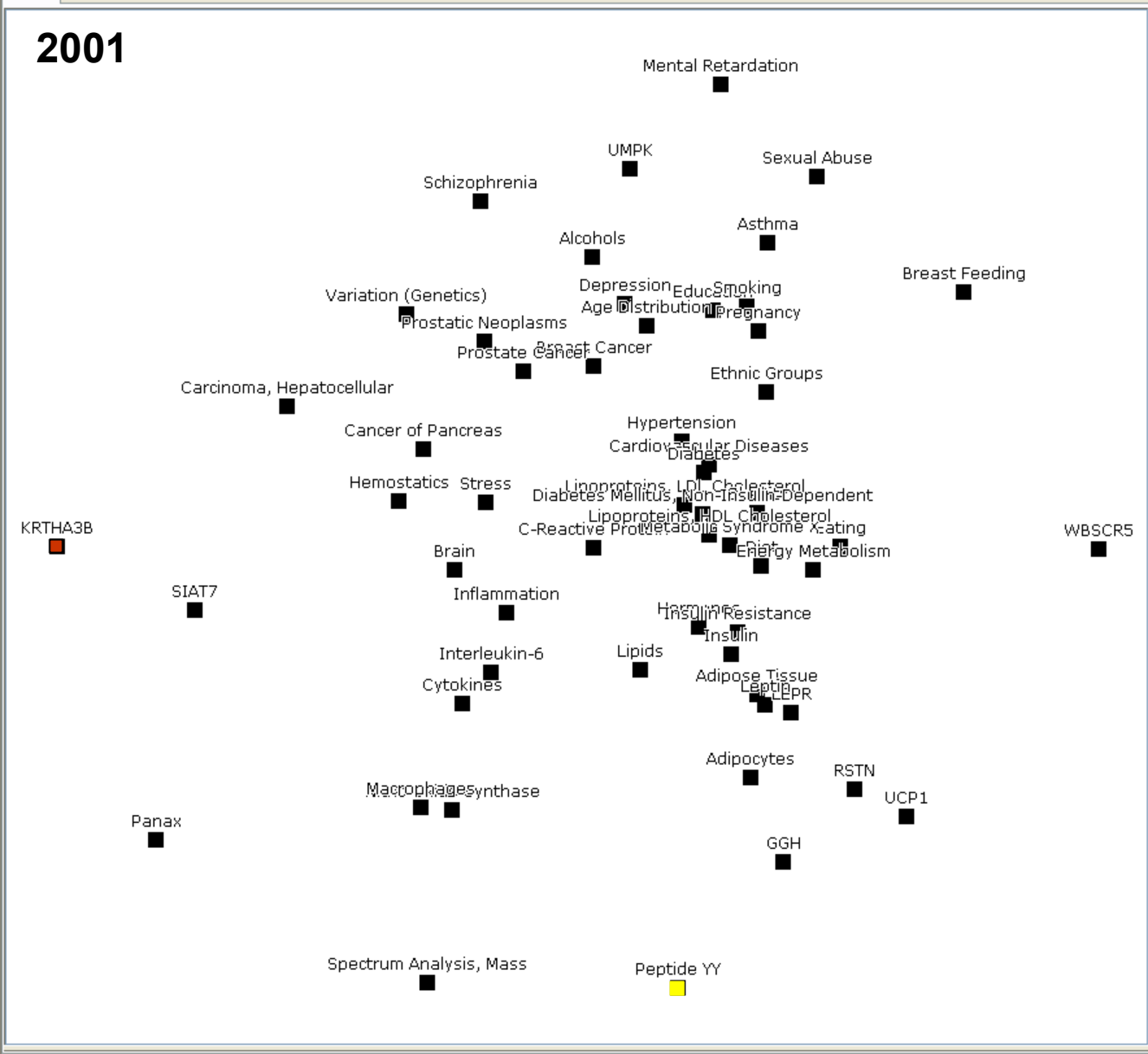


Explorer Distances "2001" Seed concepts

From	To	Distance
Panax	Panax	0
Panax	Cytokines	195
Panax	Cardiovascular Diseases	247
Panax	Peptide YY	207
Panax	C-Reactive Protein	213
Panax	Breast Feeding	247
Panax	Breast Cancer	223
Panax	Brain	200
Panax	Metabolic Syndrome X	250
Panax	Variation (Genetics)	87
Panax	Asthma	248
Panax	Stress	227
Panax	Spectrum Analysis, M...	121
Panax	Prostate Cancer	208
Panax	Smoking	244
Panax	Schizophrenia	226
Panax	Cancer of Pancreas	226
Panax	Prostatic Neoplasms	209
Panax	Pregnancy	252
Panax	Leptin	236
Panax	Obesity	241
Panax	Sexual Abuse	237
Panax	Mental Retardation	255
Panax	Macrophages	165
Panax	Lipoproteins, LDL Cho...	239
Panax	Lipoproteins, HDL Ch...	228
Panax	Lipids	235
Panax	Interleukin-6	199
Panax	Insulin Resistance	225
Panax	Insulin	233
Panax	Inflammation	100



Viewer



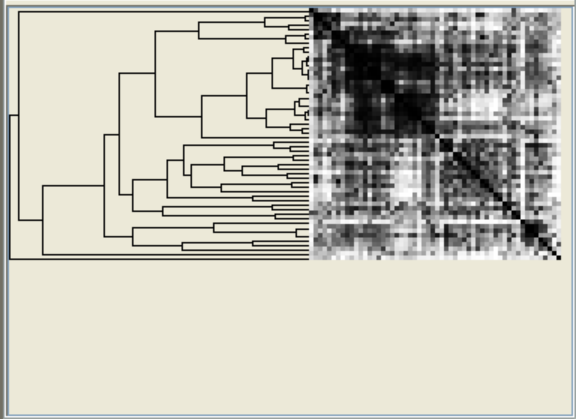
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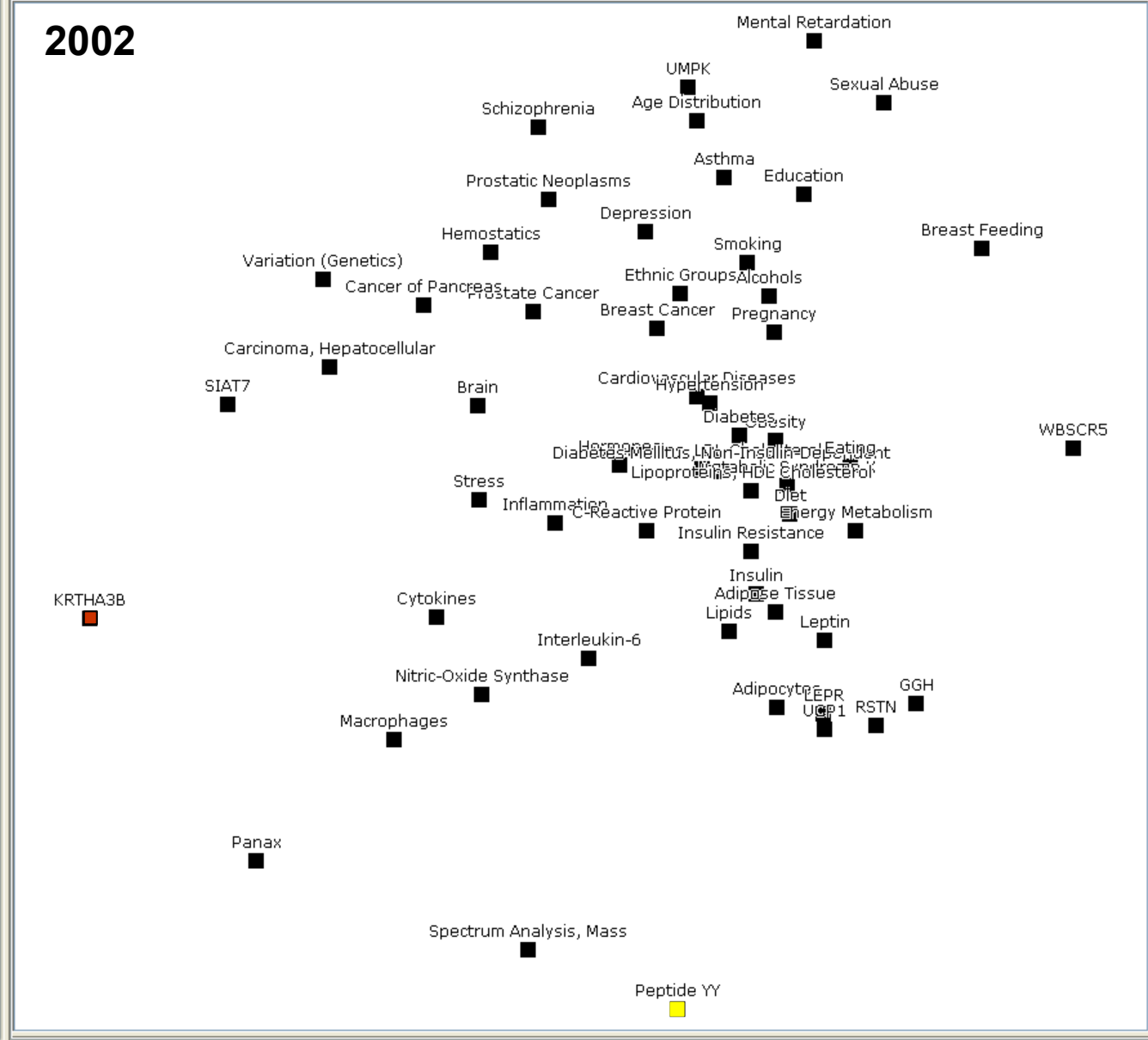
Explorer Distances "2002" Seed concepts

From	To	Distance
Panax	Panax	0
Panax	Cytokines	63
Panax	Cardiovascular Diseases	239
Panax	Peptide YY	240
Panax	C-Reactive Protein	245
Panax	Breast Feeding	252
Panax	Breast Cancer	239
Panax	Brain	215
Panax	Metabolic Syndrome X	218
Panax	Variation (Genetics)	228
Panax	Asthma	229
Panax	Stress	66
Panax	Spectrum Analysis, M...	204
Panax	Prostate Cancer	251
Panax	Smoking	247
Panax	Schizophrenia	238
Panax	Cancer of Pancreas	251
Panax	Prostatic Neoplasms	253
Panax	Pregnancy	243
Panax	Leptin	225
Panax	Obesity	238
Panax	Sexual Abuse	247
Panax	Mental Retardation	249
Panax	Macrophages	161
Panax	Lipoproteins, LDL Cho...	215
Panax	Lipoproteins, HDL Ch...	205
Panax	Lipids	225
Panax	Interleukin-6	170
Panax	Insulin Resistance	202
Panax	Insulin	162
Panax	Inflammation	185



Viewer

# 2002



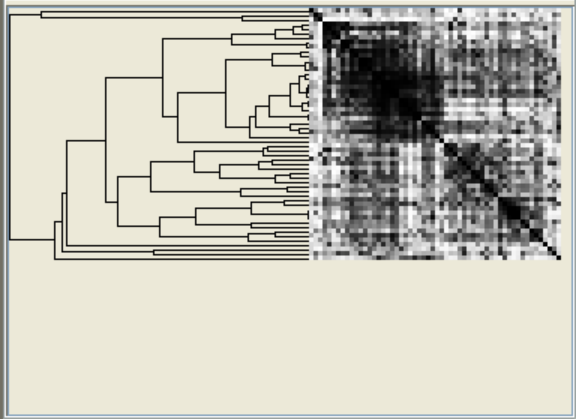
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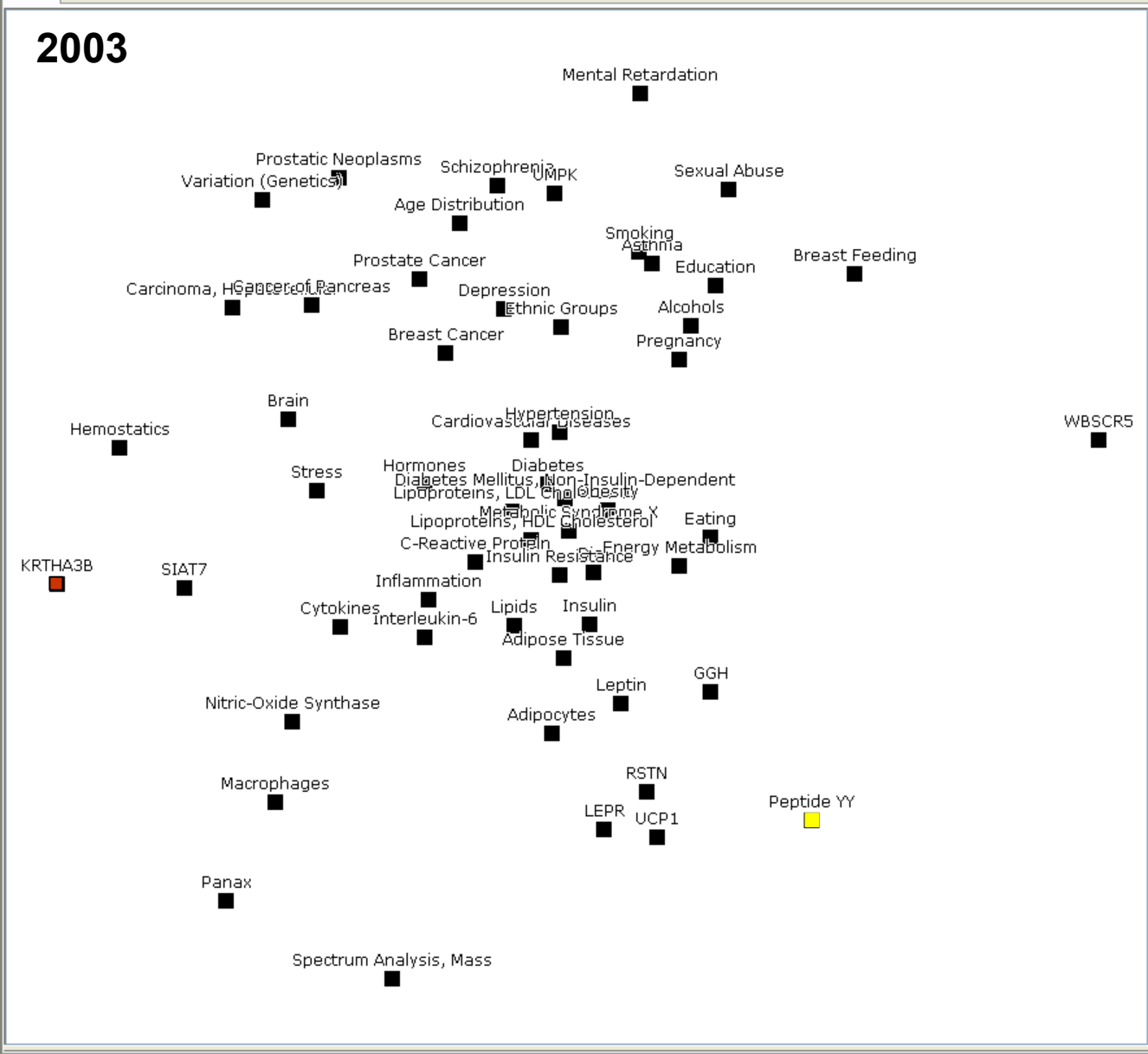


Explorer Distances "2003" Seed concepts

From	To	Distance
Panax	Panax	0
Panax	Cytokines	192
Panax	Cardiovascular Diseases	225
Panax	Peptide YY	242
Panax	C-Reactive Protein	220
Panax	Breast Feeding	255
Panax	Breast Cancer	206
Panax	Brain	190
Panax	Metabolic Syndrome X	216
Panax	Variation (Genetics)	237
Panax	Asthma	226
Panax	Stress	40
Panax	Spectrum Analysis, M...	122
Panax	Prostate Cancer	227
Panax	Smoking	240
Panax	Schizophrenia	251
Panax	Cancer of Pancreas	223
Panax	Prostatic Neoplasms	243
Panax	Pregnancy	218
Panax	Leptin	178
Panax	Obesity	220
Panax	Sexual Abuse	249
Panax	Mental Retardation	251
Panax	Macrophages	156
Panax	Lipoproteins, LDL Cho...	153
Panax	Lipoproteins, HDL Ch...	55
Panax	Lipids	78
Panax	Interleukin-6	92
Panax	Insulin Resistance	158
Panax	Insulin	150
Panax	Inflammation	213



Viewer



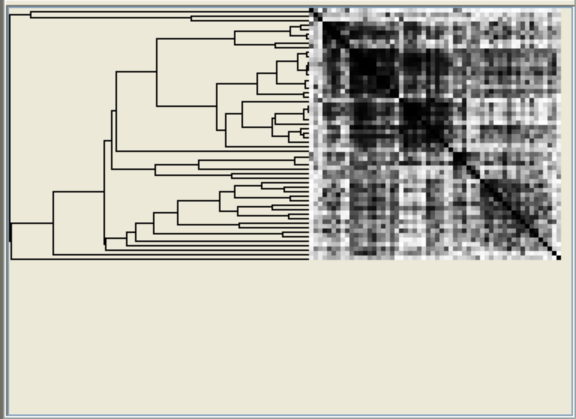
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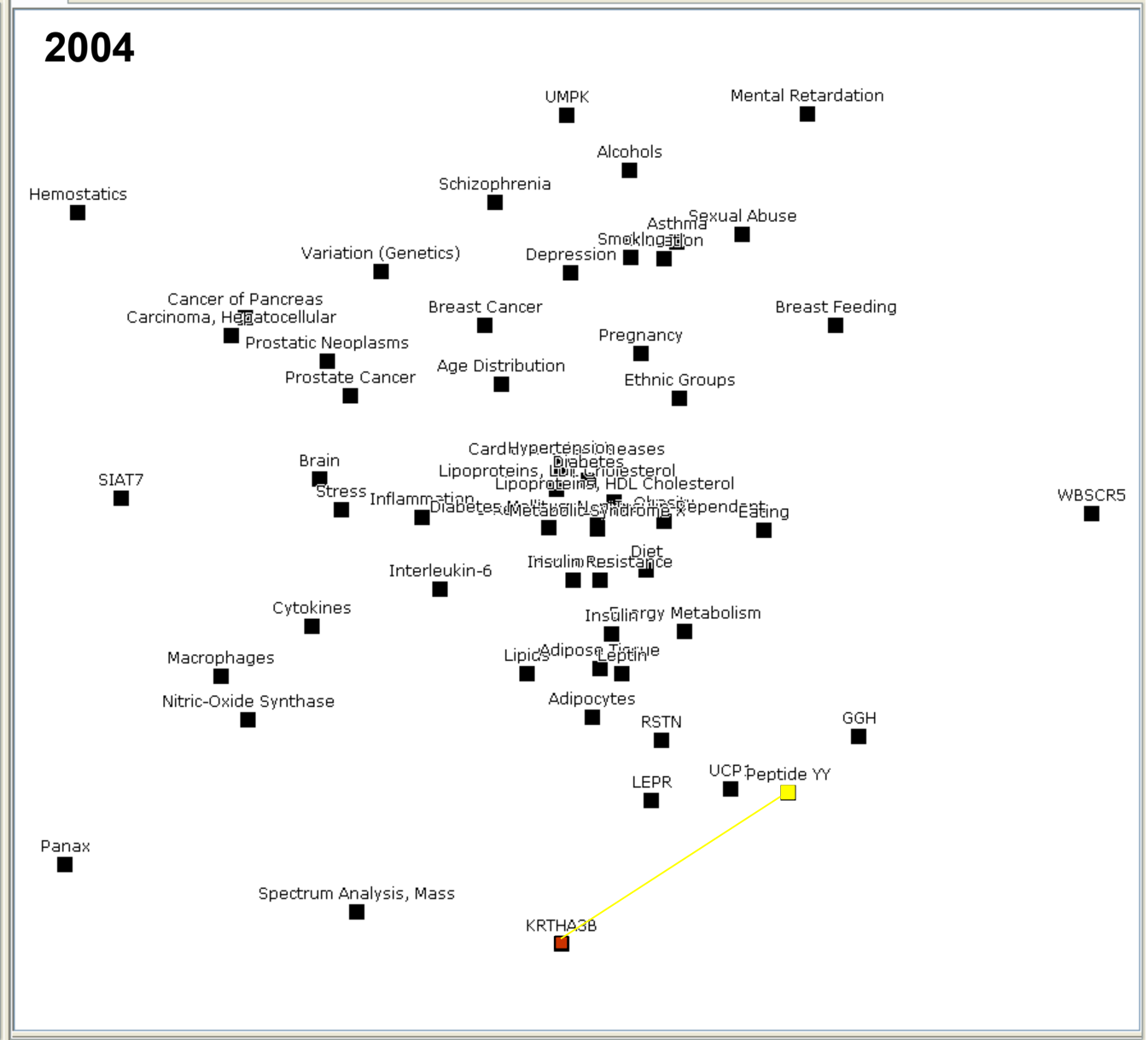


Explorer Distances "2004" Seed concepts

From	To	Distance
Panax	Panax	0
Panax	Cytokines	86
Panax	Cardiovascular Diseases	246
Panax	Peptide YY	237
Panax	C-Reactive Protein	249
Panax	Breast Feeding	253
Panax	Breast Cancer	244
Panax	Brain	232
Panax	Metabolic Syndrome X	230
Panax	Variation (Genetics)	240
Panax	Asthma	247
Panax	Stress	230
Panax	Spectrum Analysis, M...	132
Panax	Prostate Cancer	95
Panax	Smoking	255
Panax	Schizophrenia	244
Panax	Cancer of Pancreas	247
Panax	Prostatic Neoplasms	133
Panax	Pregnancy	254
Panax	Leptin	221
Panax	Obesity	252
Panax	Sexual Abuse	254
Panax	Mental Retardation	249
Panax	Macrophages	179
Panax	Lipoproteins, LDL Cho...	249
Panax	Lipoproteins, HDL Ch...	249
Panax	Lipids	233
Panax	Interleukin-6	206
Panax	Insulin Resistance	200
Panax	Insulin	170
Panax	Inflammation	208
Panax	Adipocytes	200



Viewer



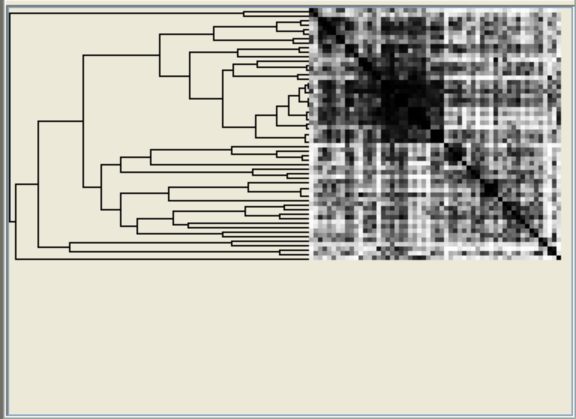
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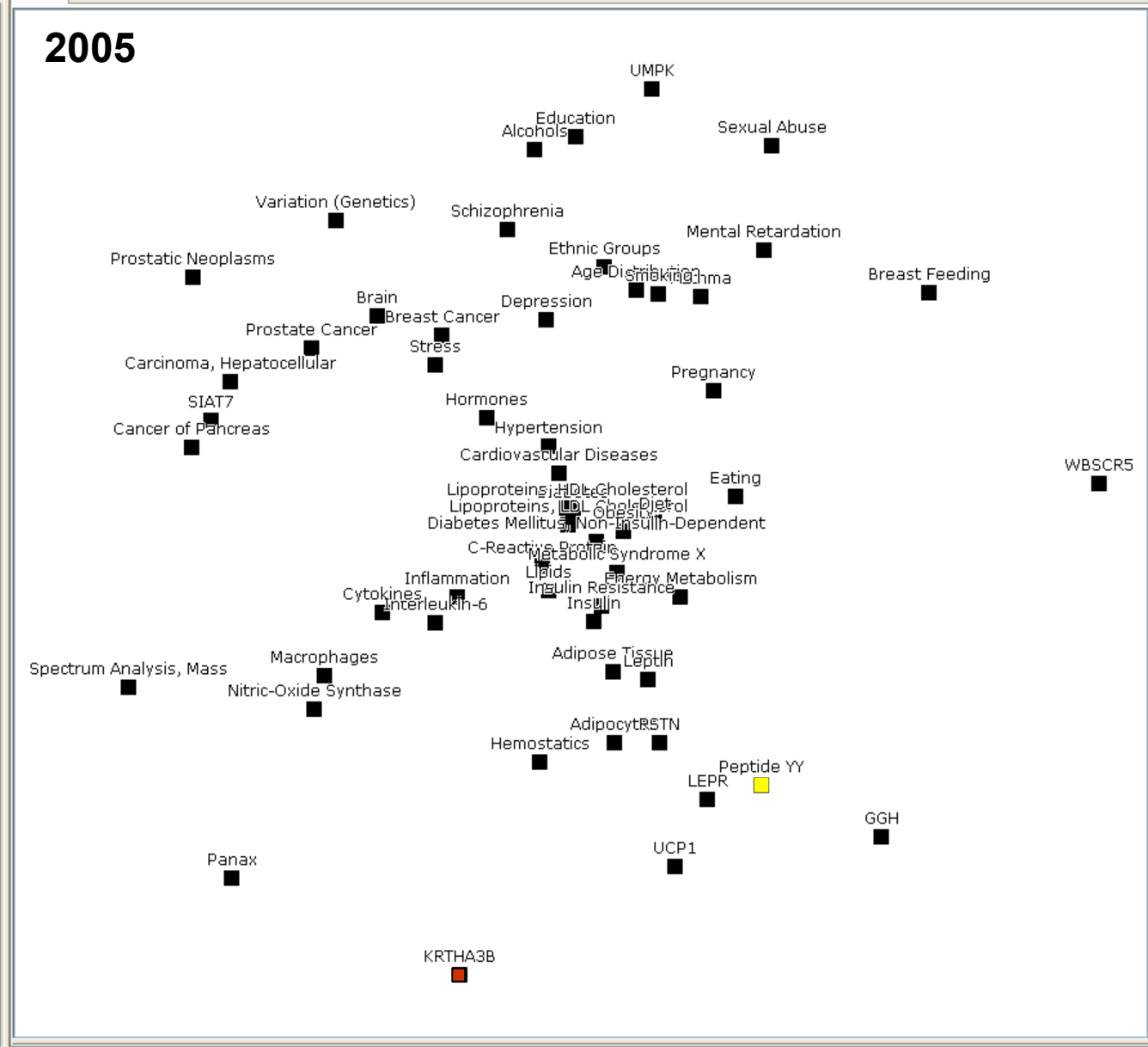


Explorer Distances "2005" Seed concepts

From	To	Distance
Panax	Panax	0
Panax	Cytokines	140
Panax	Cardiovascular Diseases	226
Panax	Peptide YY	167
Panax	C-Reactive Protein	228
Panax	Breast Feeding	243
Panax	Breast Cancer	243
Panax	Brain	207
Panax	Metabolic Syndrome X	167
Panax	Variation (Genetics)	208
Panax	Asthma	245
Panax	Stress	172
Panax	Spectrum Analysis, M...	42
Panax	Prostate Cancer	241
Panax	Smoking	250
Panax	Schizophrenia	254
Panax	Cancer of Pancreas	239
Panax	Prostatic Neoplasms	232
Panax	Pregnancy	252
Panax	Leptin	121
Panax	Obesity	48
Panax	Sexual Abuse	252
Panax	Mental Retardation	250
Panax	Macrophages	53
Panax	Lipoproteins, LDL Cho...	233
Panax	Lipoproteins, HDL Ch...	230
Panax	Lipids	211
Panax	Interleukin-6	172
Panax	Insulin Resistance	139
Panax	Insulin	175
Panax	Inflammation	204

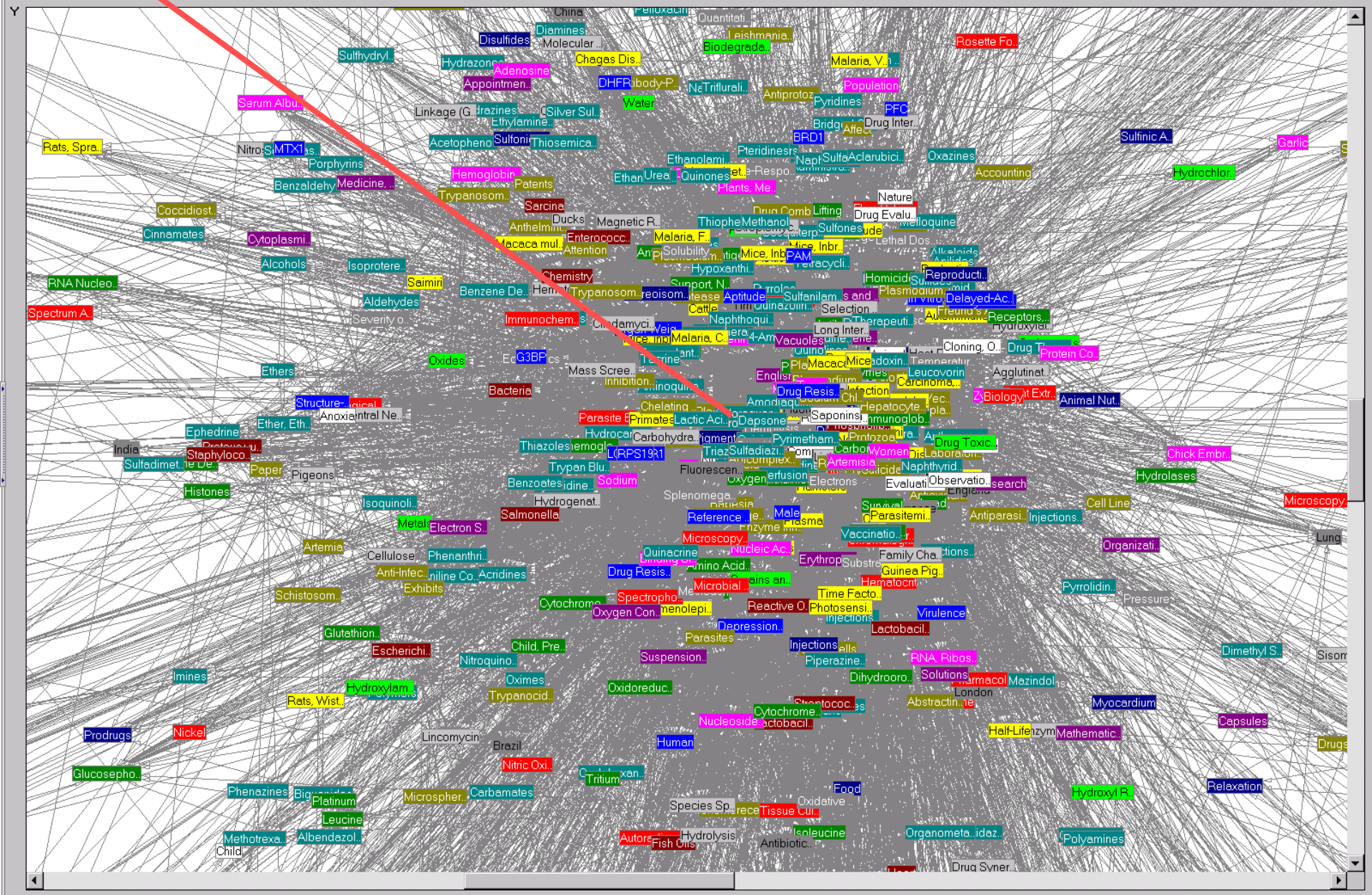


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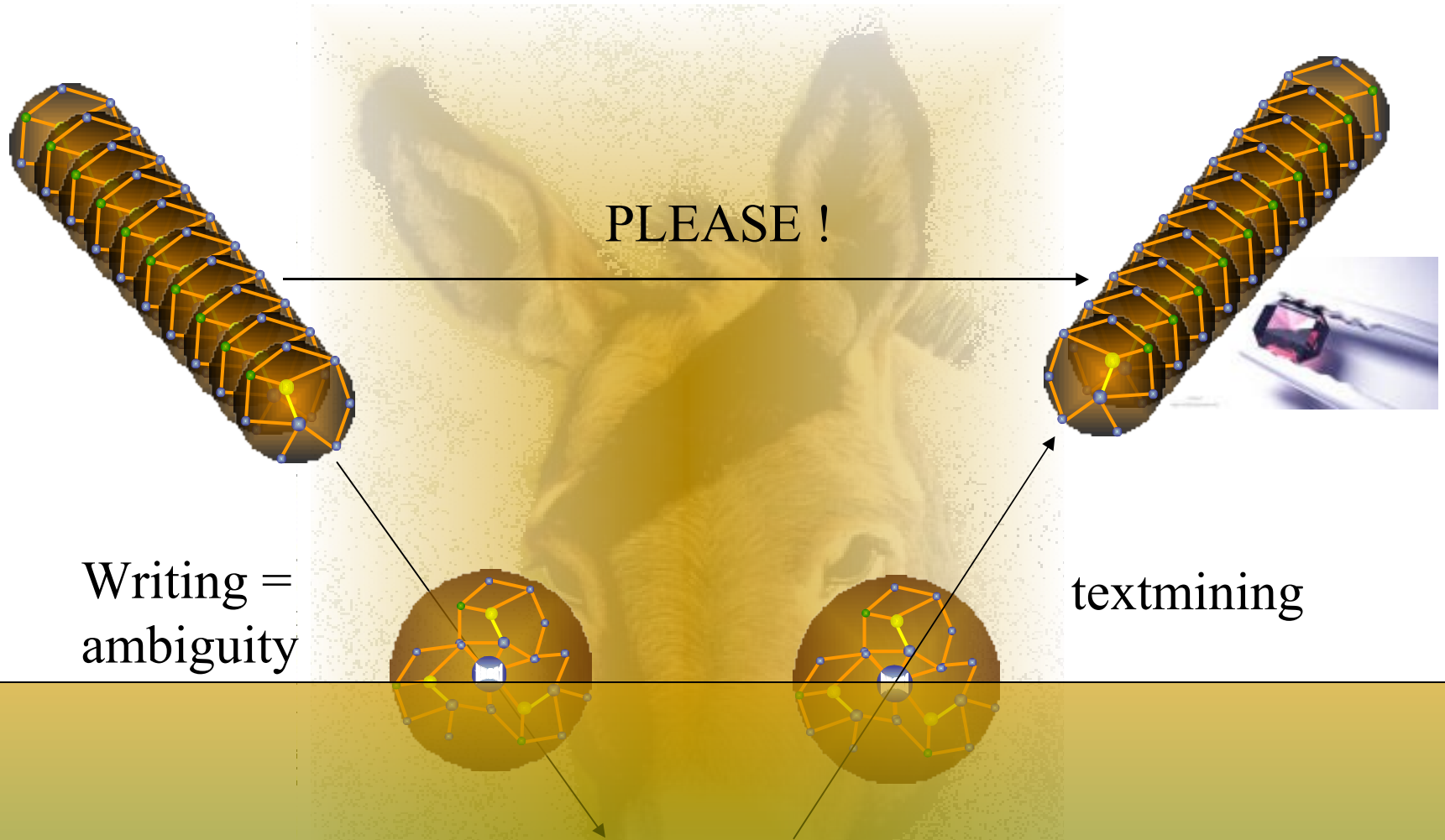


Ready

Source: Antimalarials Target: Display Zoom Out Zoom In Expand Scale Shrink Scale Reset Scale



Future (hope)



Writing =  
ambiguity

textmining

PLEASE !

Papyrust

But.... journal editors who publish scientific studies and grant institutions that fund them very often see less value in efforts to build and analyze scientific databases than in old-fashioned experiments