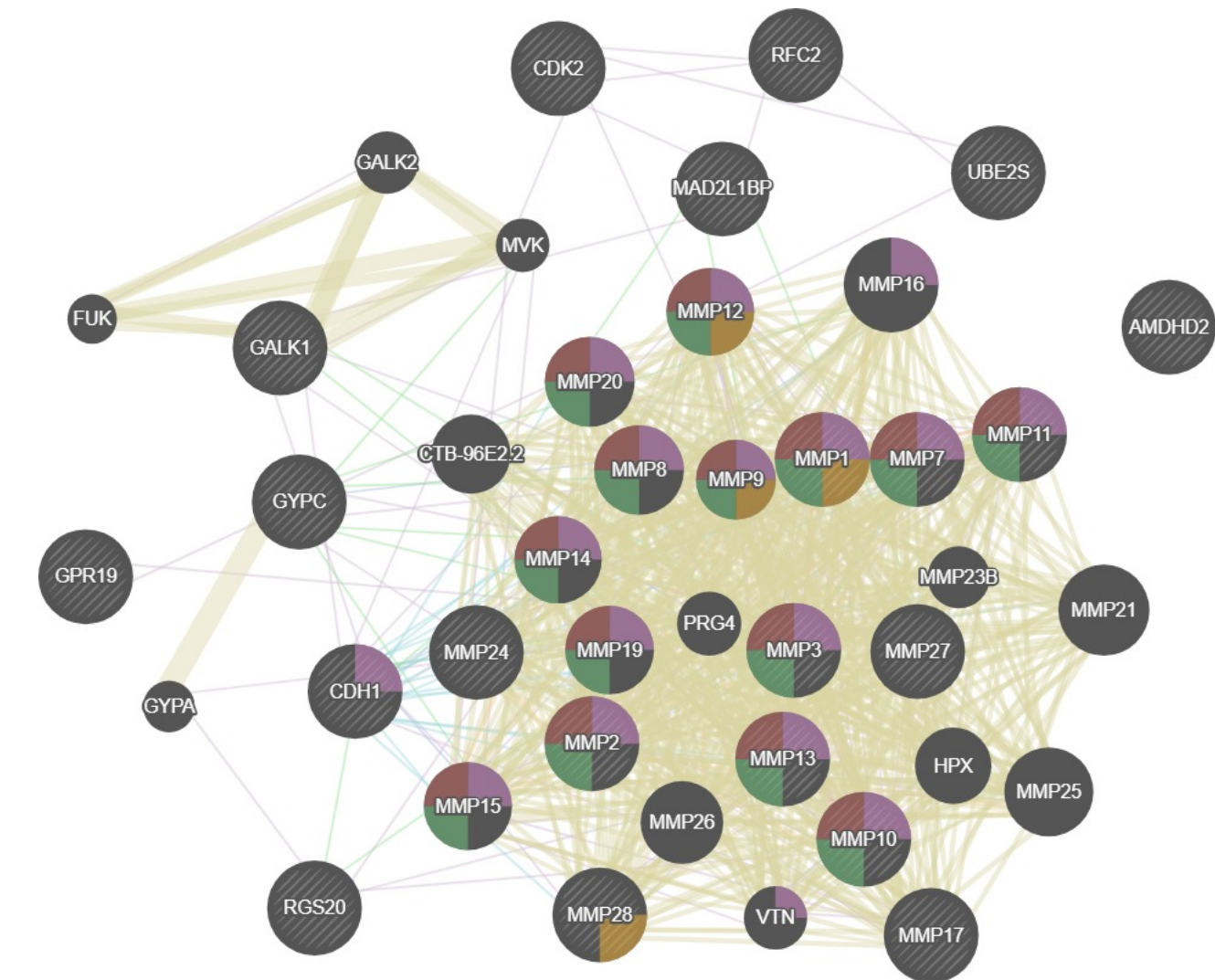


GeneMANIA report

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Application version : 3.6.0



Networks

- Shared protein domains
- Co-expression
- Pathway
- Predicted
- Physical Interactions
- Co-localization
- Genetic Interactions

Functions

- extracellular matrix organization
- metalloendopeptidase activity
- collagen metabolic process
- collagen catabolic process

Search parameters

Organism Homo sapiens (human)

Genes CDH1 , RFC2 , MMP2 , MMP11 , UBE2S , GALK1 , CDK2 , MAD2L1BP ,
MMP24 , GYPC , MMP7 , MMP27 , MMP13 , RGS20 , MMP3 , AMDHD2 ,
MMP10 , GPR19 , MMP1 , MMP17 , MMP28

Network Automatically selected weighting method
weighting

Networks **A**

Abu-Odeh-Aqeilan-2014 , Agrawal-Sedivy-2010 , Aichem-Groettrup-2012 , Albers-Koegl-2005 , Alexandru-Deshaies-2008 , Alizadeh-Staudt-2000 , Andresen-Flores-Morales-2014 , Arbuckle-Grant-2010 , Arroyo-Aloy-2014 , Arroyo-Aloy-2015

B

Bahr-Bowler-2013 , Bailey-Hieter-2015 , Bandyopadhyay-Ideker-2010 , Bantscheff-Drewes-2011 , Barr-Knapp-2009 , Barrios-Rodiles-Wrana-2005 , Behrends-Harper-2010 , Behzadnia-Lührmann-2007 , Bennett-Harper-2010 , Benzinger-Hermeking-2005 , Berggård-James-2006 , Bett-Hay-2013 , Bhatnagar-Attie-2014 , Bild-Nevins-2006 B , BIOGRID-SMALL-SCALE-STUDIES , BIOGRID-SMALL-SCALE-STUDIES , Blandin-Richard-2013 , Blomen-Brummelkamp-2015 , Blomen-Brummelkamp-2015 , Bogachek-Weigel-2014 , Boldrick-Relman-2002 , Bonacci-Soubeyran-2014 , Bouwmeester-Superti-Furga-2004 , Brajenovic-Drewes-2004 , Brehme-Superti-Furga-2009 , Bruderer-Hay-2011 , Burington-Shaughnessy-2008 , Butland-Hayden-2014 , Byron-Humphries-2012

C

Cai-Conaway-2007 , Camargo-Brandon-2007 , Campos-Reinberg-2015 , Cao-Chinnaiyan-2014 , Carmon-Liu-2014 , CELL_MAP , Chen-Brown-2002 , Chen-Ge-2013 , Chen-Huang-2014 , Chen-Zhang-2013 , Christianson-Kopito-2011 , Cloutier-Coulombe-2013 , Colland-Gauthier-2004 , Corominas-Iakoucheva-2014 , Couzens-Gingras-2013 , Cox-Rizzino-2013 , Coyaud-Raught-2015

D

Danielsen-Nielsen-2011 , Dart-Wells-2015 , de Hoog-Mann-2004 , Diner-Cristea-2015 , Dobbin-Giordano-2005 , Drissi-Boisvert-2015 , Dyer-Sobral-2010

E

Emanuele-Elledge-2011 , Emdal-Olsen-2015 , Ewing-Figeys-2007

F

Fenner-Prehn-2010 , Floyd-Pagliarini-2016 , Foerster-Ritter-2013 , Fogeron-Lange-2013 , Foster-Marshall-2013 , Freibaum-Taylor-2010

G

G

Gabriel-Baumgras-2016 , Galligan-Howley-2015 , Gao-Reinberg-2012 , Gautier-Hall-2009 , Giannone-Liu-2010 , Glatter-Gstaiger-2009 , Gloeckner-Ueffing-2007 , Goehler-Wanker-2004 , Golebiowski-Hay-2009 , Goudreaault-Gingras-2009 , Grant-2010 , Greco-Cristea-2011 , Grossmann-Stelzl-2015 , Guarani-Harper-2014 , Gupta-Pelletier-2015

H

Hanson-Clayton-2014 , Hauri-Gstaiger-2013 , Havrylov-Redowicz-2009 , Havugimana-Emili-2012 , Hayes-Urbé-2012 , Hegele-Stelzl-2012 A , Hegele-Stelzl-2012 B , Hein-Mann-2015 , Hill-Livingston-2014 , HUMANCYC , Humphries-Humphries-2009 , Hutchins-Peters-2010 , Huttlin-Gygi-2015

I

I2D-BIND-Fly2Human , I2D-BIND-Mouse2Human , I2D-BIND-Rat2Human , I2D-BIND-Worm2Human , I2D-BIND-Yeast2Human , I2D-BioGRID-Fly2Human , I2D-BioGRID-Mouse2Human , I2D-BioGRID-Rat2Human , I2D-BioGRID-Worm2Human , I2D-BioGRID-Yeast2Human , I2D-Chen-Pawson-2009-PiwiScreen-Mouse2Human , I2D-Formstecher-Daviet-2005-Embryo-Fly2Human , I2D-Giot-Rothbert-2003-Low-Fly2Human , I2D-INNATEDB-Mouse2Human , I2D-IntAct-Fly2Human , I2D-IntAct-Mouse2Human , I2D-IntAct-Rat2Human , I2D-IntAct-Worm2Human , I2D-IntAct-Yeast2Human , I2D-Krogan-Greenblatt-2006-Core-Yeast2Human , I2D-Krogan-Greenblatt-2006-NonCore-Yeast2Human , I2D-Li-Vidal-2004-CORE-1-Worm2Human , I2D-Li-Vidal-2004-non-core-Worm2Human , I2D-Manual-Mouse2Human , I2D-Manual-Rat2Human , I2D-MGI-Mouse2Human , I2D-MINT-Fly2Human , I2D-MINT-Mouse2Human , I2D-MINT-Rat2Human , I2D-MINT-Worm2Human , I2D-MINT-Yeast2Human , I2D-Ptacek-Snyder-2005-Yeast2Human , I2D-Tarassov-PCA-Yeast2Human , I2D-Tewari-Vidal-2004-TGFb-Worm2Human , I2D-vonMering-Bork-2002-High-Yeast2Human , I2D-vonMering-Bork-2002-Low-Yeast2Human , I2D-vonMering-Bork-2002-Medium-Yeast2Human , I2D-Wang-Orkin-2006-EScmplx-Mouse2Human , I2D-Wang-Orkin-2006-EScmplxlow-Mouse2Human , I2D-Yu-Vidal-2008-GoldStd-Yeast2Human , IMID , Ingham-Pawson-2005 , Innocenti-Brown-2011 , INTERPRO , IREF-BIND , IREF-BIOGRID , IREF-DIP , IREF-HPRD , IREF-INTACT , IREF-MATRIXDB , IREF-MPPI , IREF-PUBMED , IREF-SMALL-SCALE-STUDIES , IREF-SMALL-SCALE-STUDIES

J

Jeronimo-Coulombe-2007 , Jin-Pawson-2004 , Johnson-Kerner-Wichterle-2015 , Johnson-Shoemaker-2003 , Jones-MacBeath-2006 , Joshi-Cristea-2013 , Jäger-Krogan-2011

K

Kahle-Zoghbi-2011 , Kaltenbach-Hughes-2007 , Katsogiannou-Rocchi-2014 , Kim-Gygi-2011 , Kim-Major-2015 , Kneissl-Grummt-2003 , Koch-Hermeking-2007 ,

K

Kotlyar-Jurisica-2015 , Kristensen-Foster-2012 , Kärblane-Sarmiento-2015 , Kırılı-Görlich-2015

L

Lambert-Gingras-2015 , Lamoliatte-Thibault-2014 , Lau-Ronai-2012 , Lee-Songyang-2011 , Lehner-Sanderson-2004 A , Lehner-Sanderson-2004 B , Leng-Wang-2014 , Leung-Jones-2014 , Li-Chen-2015 , Li-Dorf-2011 A , Li-Dorf-2011 B , Li-Dorf-2014 , Li-Haura-2013 , Lim-Zoghbi-2006 , Lin-Smith-2010 , Lipp-Guthrie-2015 , Liu-Wang-2012 , Llères-Lamond-2010 , Loch-Strickler-2012 , Low-Heck-2014 , Lu-Zhang-2013 , Luo-Elledge-2009

M

Mak-Moffat-2010 , Mallon-McKay-2013 , Malovannaya-Qin-2010 , Markson-Sanderson-2009 , Maréchal-Zou-2014 , Matsumoto-Nakayama-2005 , McCracken-Blencowe-2005 , McFarland-Nussbaum-2008 , Meek-Piwnica-Worms-2004 , Milev-Mouland-2012 , Miyamoto-Sato-Yanagawa-2010 , Murakawa-Landthaler-2015

N

Nakayama-Ohara-2002 , Nakayasu-Adkins-2013 , Napolitano-Meroni-2011 , Narayan-Bennett-2012 , Nathan-Goldberg-2013 , NCI_NATURE , Neganova-Lako-2011 , Newman-Keating-2003 , Nicholson-Hupp-2014 , Noble-Diehl-2008

O

Oliviero-Cagney-2015 , Olma-Pintard-2009 , Oláh-Ovádi-2011 , Oshikawa-Nakayama-2012 , Ouyang-Gill-2009

P

Panigrahi-Pati-2012 , Papp-Lamia-2015 , Perez-Hernandez-Yáñez-Mó-2013 , Perou-Botstein-1999 , Perou-Botstein-2000 , Persaud-Rotin-2009 , Petschnigg-Stagljar-2014 , PFAM , Phillips-Corn-2013 , Pichlmair-Superti-Furga-2011 , Pichlmair-Superti-Furga-2012 , Pilot-Storck-Goillot-2010 , Povlsen-Choudhary-2012

R

Ramachandran-LaBaer-2004 , Raman-Harper-2015 , Ramaswamy-Golub-2001 , Ravasi-Hayashizaki-2010 , REACTOME , Reinke-Keating-2013 , Reyniers-Taymans-2014 , Richter-Chrzanowska-Lightowlers-2010 , Rieger-Chu-2004 , Rolland-Vidal-2014 , Rosenwald-Staudt-2001 , Roth-Zlotnik-2006 , Roux-Burke-2012 , Rowbotham-Mermoud-2011 , Roy-Pardo-2014 , Roy-Parent-2013 , Rual-Vidal-2005 A , Rual-Vidal-2005 B

S

Sang-Jackson-2011 , Sato-Conaway-2004 , Schadt-Shoemaker-2004 , Scholz-Taylor-2016 , Singh-Moore-2012 , Smirnov-Cheung-2009 , So-Colwill-2015 , Soler-López-Aloy-2011 , Sowa-Harper-2009 , Stehling-Lill-2012 , Stehling-Lill-2013 , Stelzl-Wanker-2005 , Stes-Gevaert-2014 , Stuart-Kim-2003 , Suter-Wanker-2013

T

Taipale-Lindquist-2012 , Taipale-Lindquist-2014 , Takahashi-Conaway-2011 , Tarallo-Weisz-2011 , Tatham-Hay-2011 , Teixeira-Gomes-2010 , Thalappilly-Duseti-2008 , Thompson-Luchansky-2014 , Tong-Moran-2014 , Toyoshima-Grandori-2012 , Tsai-Cristea-2012

U

Udeshi-Carr-2012

V

van Wijk-Timmers-2009 , Vandamme-Angrand-2011 , Varjosalo-Gstaiger-2013 , Varjosalo-Superti-Furga-2013 , Venkatesan-Vidal-2009 , Vermeulen-Mann-2010 , Vinayagam-Wanker-2011 , Virok-Fülöp-2011 , Vizeacoumar-Moffat-2013

W

Wagner-Choudhary-2011 , Wallach-Kramer-2013 , Wan-Emili-2015 , Wang-Balch-2006 , Wang-Cheung-2015 , Wang-He-2008 , Wang-Maris-2006 , Wang-Xu-2015 , Wang-Yang-2011 , Weimann-Stelzl-2013 A , Weimann-Stelzl-2013 B , Weinmann-Meister-2009 , Wen-Wu-2014 , Whisenant-Salomon-2015 , Wilker-Yaffe-2007 , Willingham-Muchowski-2003 , Witt-Labeit-2008 , Wong-O'Bryan-2012 , Woods-Monteiro-2012 , Woodsmith-Sanderson-2012 , Wu-Garvey-2007 , Wu-Li-2007 , Wu-Ma-2012 , Wu-Stein-2010 , Wu-Stein-2010

X

Xiao-Lefkowitz-2007 , Xie-Cong-2013 , Xie-Green-2012 , Xu-Ye-2012

Y

Yang-Chen-2010 , Yatim-Benkirane-2012 , Yu-Chow-2013 , Yu-Vidal-2011

Z

Zanon-Pichler-2013 , Zhang-Shang-2006 , Zhang-Zou-2011 , Zhao-Krug-2005 , Zhao-Yang-2011 , Zhou-Conrads-2004 , Zhou-Hanemann-2016

Genes

| Gene | Description | Rank |
|----------|---|------|
| MAD2L1BP | MAD2L1 binding protein [Source:HGNC Symbol;Acc:HGNC:21059] | N/A |
| MMP28 | matrix metalloproteinase 28 [Source:HGNC Symbol;Acc:HGNC:14366] | N/A |
| MMP27 | matrix metalloproteinase 27 [Source:HGNC Symbol;Acc:HGNC:14250] | N/A |
| MMP11 | matrix metalloproteinase 11 [Source:HGNC Symbol;Acc:HGNC:7157] | N/A |
| MMP24 | matrix metalloproteinase 24 [Source:HGNC Symbol;Acc:HGNC:7172] | N/A |
| MMP10 | matrix metalloproteinase 10 [Source:HGNC Symbol;Acc:HGNC:7156] | N/A |
| MMP17 | matrix metalloproteinase 17 [Source:HGNC Symbol;Acc:HGNC:7163] | N/A |
| GYPC | glycophorin C (Gerbich blood group) [Source:HGNC Symbol;Acc:HGNC:4704] | N/A |
| MMP13 | matrix metalloproteinase 13 [Source:HGNC Symbol;Acc:HGNC:7159] | N/A |
| MMP1 | matrix metalloproteinase 1 [Source:HGNC Symbol;Acc:HGNC:7155] | N/A |
| MMP3 | matrix metalloproteinase 3 [Source:HGNC Symbol;Acc:HGNC:7173] | N/A |
| MMP7 | matrix metalloproteinase 7 [Source:HGNC Symbol;Acc:HGNC:7174] | N/A |
| AMDHD2 | amidohydrolase domain containing 2 [Source:HGNC Symbol;Acc:HGNC:24262] | N/A |
| MMP2 | matrix metalloproteinase 2 [Source:HGNC Symbol;Acc:HGNC:7166] | N/A |
| GALK1 | galactokinase 1 [Source:HGNC Symbol;Acc:HGNC:4118] | N/A |
| RGS20 | regulator of G-protein signaling 20 [Source:HGNC Symbol;Acc:HGNC:14600] | N/A |
| UBE2S | ubiquitin conjugating enzyme E2 S [Source:HGNC Symbol;Acc:HGNC:17895] | N/A |
| RFC2 | replication factor C subunit 2 [Source:HGNC Symbol;Acc:HGNC:9970] | N/A |
| GPR19 | G protein-coupled receptor 19 [Source:HGNC Symbol;Acc:HGNC:4473] | N/A |
| CDH1 | cadherin 1 [Source:HGNC Symbol;Acc:HGNC:1748] | N/A |
| CDK2 | cyclin dependent kinase 2 [Source:HGNC Symbol;Acc:HGNC:1771] | N/A |
| MMP16 | matrix metalloproteinase 16 [Source:HGNC Symbol;Acc:HGNC:7162] | 1 |
| MMP21 | matrix metalloproteinase 21 [Source:HGNC Symbol;Acc:HGNC:14357] | 2 |
| MMP20 | matrix metalloproteinase 20 [Source:HGNC Symbol;Acc:HGNC:7167] | 3 |
| MMP8 | matrix metalloproteinase 8 [Source:HGNC Symbol;Acc:HGNC:7175] | 4 |
| MMP25 | matrix metalloproteinase 25 [Source:HGNC Symbol;Acc:HGNC:14246] | 5 |
| MMP19 | matrix metalloproteinase 19 [Source:HGNC Symbol;Acc:HGNC:7165] | 6 |
| MMP15 | matrix metalloproteinase 15 [Source:HGNC Symbol;Acc:HGNC:7161] | 7 |

| Gene | Description | Rank |
|------------|--|------|
| MMP12 | matrix metalloproteinase 12 [Source:HGNC Symbol;Acc:HGNC:7158] | 8 |
| MMP14 | matrix metalloproteinase 14 [Source:HGNC Symbol;Acc:HGNC:7160] | 9 |
| MMP26 | matrix metalloproteinase 26 [Source:HGNC Symbol;Acc:HGNC:14249] | 10 |
| MMP9 | matrix metalloproteinase 9 [Source:HGNC Symbol;Acc:HGNC:7176] | 11 |
| CTB-96E2.2 | | 12 |
| HPX | hemopexin [Source:HGNC Symbol;Acc:HGNC:5171] | 13 |
| PRG4 | proteoglycan 4 [Source:HGNC Symbol;Acc:HGNC:9364] | 14 |
| VTN | vitronectin [Source:HGNC Symbol;Acc:HGNC:12724] | 15 |
| GALK2 | galactokinase 2 [Source:HGNC Symbol;Acc:HGNC:4119] | 16 |
| MMP23B | matrix metalloproteinase 23B [Source:HGNC Symbol;Acc:HGNC:7171] | 17 |
| MVK | mevalonate kinase [Source:HGNC Symbol;Acc:HGNC:7530] | 18 |
| GYPA | glycophorin A (MNS blood group) [Source:HGNC Symbol;Acc:HGNC:4702] | 19 |
| FUK | fucokinase [Source:HGNC Symbol;Acc:HGNC:29500] | 20 |

Networks

| | |
|---|--------|
| Shared protein domains | 63.72% |
| INTERPRO | 33.80% |
| Shared protein domains with 608,863 interactions from InterPro | |
| PFAM | 29.91% |
| Shared protein domains with 457,054 interactions from Pfam | |
| Co-expression | 17.42% |
| Innocenti-Brown-2011 | 2.88% |
| Identification, replication, and functional fine-mapping of expression quantitative trait loci in primary human liver tissue. Innocenti et al (2011). <i>PLoS Genet</i> | |
| Co-expression with 603,765 interactions from GEO | |
| Ramaswamy-Golub-2001 | 2.20% |
| Multiclass cancer diagnosis using tumor gene expression signatures. Ramaswamy et al (2001). <i>Proc Natl Acad Sci U S A</i> | |
| Co-expression with 275,113 interactions from supplementary material | |
| Bild-Nevins-2006 B | 2.07% |
| Oncogenic pathway signatures in human cancers as a guide to targeted therapies. Bild et al (2006). <i>Nature</i> | |
| Co-expression with 280,683 interactions from GEO | |
| Wang-Maris-2006 | 1.99% |
| Integrative genomics identifies distinct molecular classes of neuroblastoma and shows that multiple genes are targeted by regional alterations in DNA copy number. Wang et al (2006). <i>Cancer Res</i> | |
| Co-expression with 264,023 interactions from GEO | |
| Dobbin-Giordano-2005 | 1.95% |
| Interlaboratory comparability study of cancer gene expression analysis using oligonucleotide microarrays. Dobbin et al (2005). <i>Clin Cancer Res</i> | |
| Co-expression with 444,931 interactions from GEO | |
| Noble-Diehl-2008 | 1.92% |
| Regional variation in gene expression in the healthy colon is dysregulated in ulcerative colitis. Noble et al (2008). <i>Gut</i> | |
| Co-expression with 661,539 interactions from GEO | |
| Alizadeh-Staudt-2000 | 0.97% |
| Distinct types of diffuse large B-cell lymphoma identified by gene expression profiling. Alizadeh et al (2000). <i>Nature</i> | |
| Co-expression with 90,336 interactions from supplementary material | |
| Smirnov-Cheung-2009 | 0.86% |
| Genetic analysis of radiation-induced changes in human gene expression. Smirnov et al (2009). <i>Nature</i> | |
| Co-expression with 461,500 interactions from GEO | |
| Wang-Cheung-2015 | 0.72% |
| Genetic variation in insulin-induced kinase signaling. Wang et al (2015). <i>Mol Syst Biol</i> | |
| Co-expression with 411,047 interactions from GEO | |
| Perou-Botstein-1999 | 0.64% |

| | |
|--|--------|
| Co-expression | 17.42% |
| <hr/> | |
| Perou-Botstein-1999 | |
| Distinctive gene expression patterns in human mammary epithelial cells and breast cancers. Perou et al (1999). <i>Proc Natl Acad Sci U S A</i> | |
| Co-expression with 65,069 interactions from supplementary material | |
| Chen-Brown-2002 | 0.37% |
| Gene expression patterns in human liver cancers. Chen et al (2002). <i>Mol Biol Cell</i> | |
| Co-expression with 282,241 interactions from supplementary material | |
| Burington-Shaughnessy-2008 | 0.27% |
| Tumor cell gene expression changes following short-term in vivo exposure to single agent chemotherapeutics are related to survival in multiple myeloma. Burington et al (2008). <i>Clin Cancer Res</i> | |
| Co-expression with 290,538 interactions from GEO | |
| Mallon-McKay-2013 | 0.23% |
| StemCellDB: the human pluripotent stem cell database at the National Institutes of Health. Mallon et al (2013). <i>Stem Cell Res</i> | |
| Co-expression with 585,265 interactions from GEO | |
| Wu-Garvey-2007 | 0.16% |
| The effect of insulin on expression of genes and biochemical pathways in human skeletal muscle. Wu et al (2007). <i>Endocrine</i> | |
| Co-expression with 267,109 interactions from GEO | |
| Rosenwald-Staudt-2001 | 0.14% |
| Relation of gene expression phenotype to immunoglobulin mutation genotype in B cell chronic lymphocytic leukemia. Rosenwald et al (2001). <i>J Exp Med</i> | |
| Co-expression with 114,694 interactions from supplementary material | |
| Perou-Botstein-2000 | 0.05% |
| Molecular portraits of human breast tumours. Perou et al (2000). <i>Nature</i> | |
| Co-expression with 185,068 interactions from supplementary material | |
| Pathway | 7.46% |
| <hr/> | |
| Wu-Stein-2010 | 6.01% |
| A human functional protein interaction network and its application to cancer data analysis. Wu et al (2010). <i>Genome Biol</i> | |
| Pathway with 78,010 interactions from supplementary material | |
| NCI_NATURE | 1.45% |
| Pathway with 10,122 interactions from Pathway Commons | |
| Predicted | 6.24% |
| <hr/> | |
| Wu-Stein-2010 | 6.24% |
| A human functional protein interaction network and its application to cancer data analysis. Wu et al (2010). <i>Genome Biol</i> | |
| Predicted with 87,829 interactions from supplementary material | |
| Physical Interactions | 3.82% |
| <hr/> | |
| Huttlin-Gygi-2015 | 3.82% |
| The BioPlex Network: A Systematic Exploration of the Human Interactome. Huttlin et al (2015). <i>Cell</i> | |
| Physical Interactions with 23,399 interactions from BioGRID | |
| Co-localization | 0.98% |
| <hr/> | |

| | |
|--|-------|
| Co-localization | 0.98% |
| <hr/> | |
| Johnson-Shoemaker-2003 | 0.98% |
| Genome-wide survey of human alternative pre-mRNA splicing with exon junction microarrays. Johnson et al (2003). <i>Science</i> | |
| Co-localization with 426,332 interactions from GEO | |
| Genetic Interactions | 0.36% |
| <hr/> | |
| Lin-Smith-2010 | 0.36% |
| A genome-wide map of human genetic interactions inferred from radiation hybrid genotypes. Lin et al (2010). <i>Genome Res</i> | |
| Genetic Interactions with 4,820,370 interactions from supplementary material | |