Introduction

Description

Tumor protein p53, a transcription factor that acts in cell cycle arrest, apoptosis, senescence, DNA repair, and keratinocyte differentiation, upregulated in breast and several neoplasms; gene mutation is associated with Li-Fraumeni syndrome

Gene symbol

TP53

Synonyms

p53; LFS1; BCC7; (tp53); TRP53; BMFS5; ASp53; NSp53; p53as; RSp53; FLJ92943; Cys51Stop; tumor protein p53; tumor protein p53 (Li-Fraumeni syndrome)

Gene Ontology what is this?

Molecular function

antioxidant activity [E, K], damaged DNA binding [E], DNA binding [K, E], enzyme binding [E, K], estrogen receptor binding [E], nuclease activity [E]... details

Biological process

activation of JUN kinase activity [E], aging [K, E], anatomical structure morphogenesis [K], anoikis [E], apoptotic process [K, E, P], cell cycle [K]... details

Cellular component

centrosome, cytoplasm [E], mitochondrion [E], nucleolus [E], nucleoplasm [E], nucleoplasm [Z], nucleus [K, E], PML body [E] details

+ View orthologous relationships

Biomarker Associations what is this?

Diseases associated with TP53 (170 entries)

Show 5 entries Search:

		Type of Association				Indication		
Disease details-all	Significance	Causal 222 associations	Correlative 1276 associations	Preventative 74 associations	Negative 81 associations	Disease Mechanism 272 associations	Prognosis 401 associations	Therapeutic Target 77 associations
Lung Neoplasms	152 associations	21 associations	107 associations	12 associations	12 associations	25 associations	48 associations	13 associations
Breast Neoplasms	126 associations	16 associations	93 associations	10 associations	7 associations	27 associations	40 associations	11 associations
Colorectal Neoplasms	108 associations	11 associations	86 associations	5 associations	6 associations	14 associations	45 associations	7 associations
Carcinoma, Non-Small-Cell Lung	82 associations	16 associations	52 associations	9 associations	5 associations	20 associations	29 associations	9 associations
Esophageal Neoplasms	71 associations	11 associations	59 associations		1 associations	11 associations	9 associations	

Showing 1 to 5 of 170 entries

Inherited TP53 mutations

The Human Gene Mutation Database (HGMD®) report provides information on the following inherited TP53 mutations (subscription required):

Mutation Type	Count	Mutation Type	Count
Missense/nonsense	420	Small indels	10
Splicing	61	Gross deletions	38
Regulatory	5	Gross insertions	2
Small deletions	105	Complex rearrangements	3
Small insertions	34	Repeat variations	0

Mutant Phenotype what is this?

Mutant phenotype of closely related homolog(s)

Mouse Trp53 (85.4% identity to Human TP53 [1e-97])

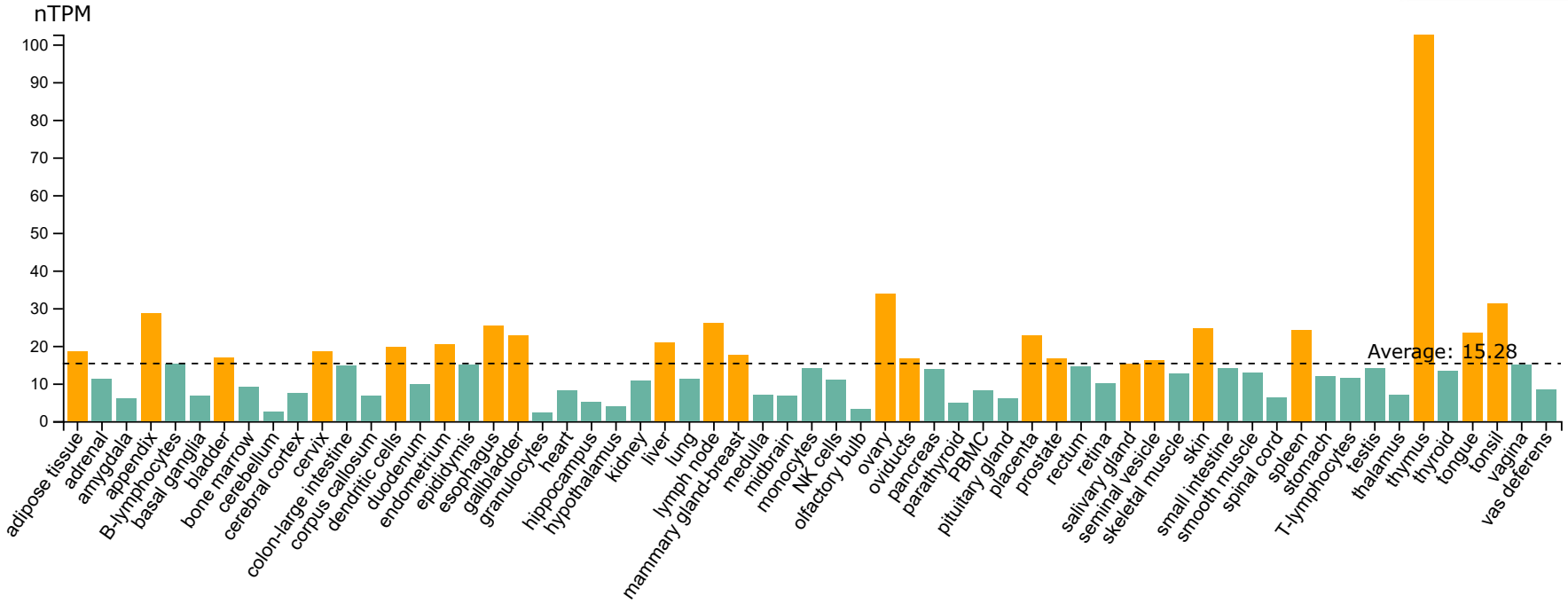
Viability effects : decreased viability; increased viability; inviable; viable details

Anatomical effects : acute myeloid leukemia; adenocarcinoma; adenoma; amygdala; astrocytes; astrocytoma; B-lymphocytes; B-lymphoma; bladder; blood vessels; blood ... details

Physiological effects : aging; anti-bacterial response; anti-viral response; behavior; cell adhesion; cell cycle control; cell death/apoptosis; cell differentiation; cell migration; DNA repair; DNA replication ... details

Expression what is this?

Tissue expression



+ View organ or tissue, cell type, and tumor type entries in detail

Regulation of TP53 expression

Proteins, complexes, or pathways that influence TP53 expression (45 entries)

Show 5 entries Search:

Regulator details	Effect
AhR	Not affected by
ANT2	Upregulated by
ATF-3	Downregulated by

Showing 1 to 5 of 45 entries

First Previous 1 2 3 4 5 Next Last

Transcriptional Regulation what is this?

Add a subscription to TRANSFAC® and this report will display detailed information about:

46 transcription factor(s) which bind and regulate the TP53 gene

895 transcription factor(s) which have been shown by ChIP-Chip or ChIP-Seq experiments to bind within or near the TP53 gene

143 gene(s) which are bound by the TP53 factor

12 positional weight matrices for the TP53 factor

A subscription also provides access to the Match tool for prediction of additional transcription factor binding sites.

Learn more...

Transcriptional Regulation what is this?

Regulation of TP53 gene expression

Transcription factor binding sites within the TP53 gene (102 entries)

Show 5 entries Search:

DNA Binding Reaction	Effect
ATF-3-isoform1(h) --/ TP53(h)	transrepression
BCL-6(h) --/ TP53(h)	transrepression
GSK3(h) --/ TP53(h)	transrepression

Showing 1 to 5 of 102 entries

RNA Features what is this?

Overview of RNA sequence

Nucleotide Sequence : GATTGGG...AGGGGTG (1..2646; 2646 nt) details

Sequence source : REFSEQ#NM_001126113

FASTA

PROTEIN

Drug Interactions what is this?

Drug(s) targeting TP53 (74 entries)

Show 5 entries Search:

Drug(s)	Status	Interaction Data Source	Reference(s)
(S)-(+)-Tert-Butyl 2-(4-(4-chlorophenyl)-2,3,9-trimethyl-6H-thieno[3,2-f][1,2,4]triazolo[4,3-a][1,4]diazepin-6-yl)acetate	Small molecule	DrugBank	32329693
1,2,5,8-tetrahydroxyanthracene-9,10-dione	small molecule,experimental	DrugBank	29207064 29860266

2-HYDROXY-3,5-DIIODOBENZOIC ACID	small molecule,experimental	ChEMBL	29702446

Showing 1 to 5 of 74 entries First Previous 1 2 3 4 5 Next Last

Pathways & Interactions what is this?

Pathways

Canonical pathways assembled from experiments involving orthologous proteins (4 entries)

Show 5 entries Search:

Name	View Supporting Reactions	View Graphic Representation	Load in PathFinder
Aurora-A cell cycle regulation	View Supporting Reactions	View Graphic Representation	Load in PathFinder
HIF-1alpha pathway	View Supporting Reactions	View Graphic Representation	Load in PathFinder
neurotrophic signaling	View Supporting Reactions		Load in PathFinder
p53 pathway	View Supporting Reactions	View Graphic Representation	Load in PathFinder

Showing 1 to 4 of 4 entries First Previous 1 Next Last

Subcomponents assembled from experiments involving orthologous proteins (28 entries)

Show 5 entries Search:

Name	View Supporting Reactions	View Graphic Representation	Load in PathFinder

ATR ---> p53	View Supporting Reactions		Load in PathFinder
Aurora-A activation, substrates and degradation	View Supporting Reactions		Load in PathFinder
Caspase-3 ---/ p53	View Supporting Reactions		Load in PathFinder
Cdk2 ---> p53	View Supporting Reactions		Load in PathFinder

Showing 1 to 5 of 28 entries First Previous 1 2 3 4 5 Next Last

Subcomponents assembled from experiments involving only Human TP53 (11 entries)

Show 5 entries Search:

Name	View Supporting Reactions	View Graphic Representation	Load in PathFinder
Aurora-A(h) ---/ p53(h)	View Supporting Reactions		Load in PathFinder
CKII-alpha2:CKII-beta:SUPT16H:SSRP1 ---> p53	View Supporting Reactions		Load in PathFinder
HDAC1 ---> p53	View Supporting Reactions		Load in PathFinder
hipk2 ---> p53	View Supporting Reactions		Load in PathFinder
hipk2 ---> p53{pS46}	View Supporting Reactions		Load in PathFinder

Provided by the Reactome database, release 78 (ReactomePathways.gmt).

Show 5 entries Search:

Name	Reactome pathway report link	Reactome pathway browser link
Activation of BH3-only proteins	R-HSA-114452	Open in Reactome Browser
Activation of NOXA and translocation to mitochondria	R-HSA-111448	Open in Reactome Browser
Activation of PUMA and translocation to mitochondria	R-HSA-139915	Open in Reactome Browser
Apoptosis	R-HSA-109581	Open in Reactome Browser
Association of TriC/CCT with target proteins during biosynthesis	R-HSA-390471	Open in Reactome Browser

Showing 1 to 5 of 91 entries First Previous 1 2 3 4 5 Next Last

Pathways from WikiPathways (69 entries)

Provided by the WikiPathways database.

Show 5 entries Search:

Name	Display below	WikiPathways external link
16p11.2 proximal deletion syndrome	View	WikiPathways
22q11.2 copy number variation syndrome	View	WikiPathways
AMP-activated protein kinase (AMPK) signaling	View	WikiPathways
Amyotrophic lateral sclerosis (ALS)	View	WikiPathways
Apoptosis	View	WikiPathways

Showing 1 to 5 of 69 entries First Previous 1 2 3 4 5 Next Last

WikiPathways Display

Protein-protein interactions

+ Proteins bound by TP53 (629 partners)

+ Protein-protein associations (49 partners)

Events acting on TP53

+ Proteins or complexes that affect TP53 in other ways (569 partners)

Events triggered by TP53

+ Proteins or complexes activated by TP53 (4 partners)
+ Proteins or complexes inhibited by TP53 (7 partners)
+ Proteins or complexes phosphorylated (directly or indirectly) by TP53 (6 partners)
+ Proteins or complexes affected by TP53 in other ways (681 partners)

Genes regulated (directly or indirectly) by TP53

Show 5 entries Search:

Gene details	Effect
ABCB1	Downregulated by
ABCC1	Downregulated by
ABL1	Downregulated by
ACTB	Downregulated by
AK1	Upregulated by

Showing 1 to 5 of 191 entries
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Transcription Factor Activity what is this?

Regulation of gene expression by TP53

Transcription factor classification :

p53; 6.3.1.0.1

Overview of protein sequence and structure

Chromosome : 17p13.1

Isoforms : p53-isoform1 , p53-isoform2 , p53-isoform3 , p53-isoform4 , p53-isoform5 , p53-isoform6 , p53-isoform7 , p53-isoform8 , p53-isoform9

+ View associated sequences and their domains

+ View related proteins

Post-translational modifications of TP53 protein

Acetylated {ace}	Phosphorylated {p}	Other
Sumoylated {sumo}	Ubiquitinated {ub}	Abbreviations key

+ Acetylated forms (26 entries)

+ Phosphorylated forms (34 entries)

+ Sumoylated forms (3 entries)

+ Ubiquitinated forms (2 entries)

+ Other forms (8 entries)

Known types of modification : acetylation; internal acetylation; lysine methylation; neddylation; phosphorylation; serine phosphorylation; ubiquitin-related moity linkage; ubiquitination details

View complexes containing TP53 protein

+ View complexes (577 entry)

Annotations what is this?

Display all annotations

Description

- Tumor protein p53 , a transcription factor that acts in cell cycle arrest, apoptosis, senescence, DNA repair, and keratinocyte differentiation, upregulated in breast and several neoplasms; gene mutation is associated with Li-Fraumeni syndrome 16728594 16912213 18056705 1905840 16418264 17586686 18215142

Editor's Notes

- Acetylation at AA 320 and AA 373 occurs in the G2/M, G0 and G1 phase of mitotic cell cycle with a peak in the G0 phase 10706102
- Dram is predicted to be a 6-transmembrane protein with both the N- and C-terminal domain located in the intracellular compartment of the cell. 17397945
- Phosphorylation of Ser15, Ser20 and Ser372 occurs in the G1 phase of mitotic cell cycle 10706102
- Phosphorylation of Ser37 starts in the S phase of mitotic cell cycle and is enhanced in the G2/M transition 10706102
- Phosphorylation of Ser392 is detected in the G2/M transition of mitotic cell cycle 10706102

more

Function

- Activated by etoposide and TSA (trichostatin) treatment 15964798
- Activates genes participating in global genomic repair 11971958
- Activator 11971958 15064739 1614538 2144363 12890671 10383130 1314165 14576823
- At least some mutants are active in S/MAR binding 9581865
- Binds to both E2F-1 and DP-1 thus inhibiting cell cycle promotion by E2F 8557038

more

Mechanism

- HDAC2 can bind to p53 promoter sequence which is inhibited by the downregulation of ddx53 (CAGE) 20534591
- Inactivation of p53 significantly attenuates the senescence response, which indicates that p53 signaling is essential for SENP1 induced senescence. 18616636

more

Expression

- BL-13, HT1376, BL 17/2, BL 17/5, J82 cell lines 12527206
- MCF-7, MCF-7 + BRL 16887883

Disease related

- Amino acid variations are associated with malignant gliomas [see 10949938]
- Amino acid variations are associated with various cancers [see 11003642]
- Autoimmune deficiency syndrome (AIDS) 11099484
- Certain alleles may display low penetrance for predisposition for the development of cancer 10486318
- Decreases CXCL12-induced cancer cell migration and invasion 17108103

more

Identifiers what is this?

Accessions mapped to this record

BIOBASE gene accession : GN000007362, G001075, MO000023007

BIOBASE protein accession : PR000014179, f00290, MO000019548, MO000023324, MO000023371, MO000023558, MO000030827, MO000030831, MO000030857, MO000030925, MO000030926, MO000030996, MO000031005, MO000031042, MO000031044, MO000031049, MO000031050, MO000031051, MO000031164, MO000031166, MO000031214, MO000033990, MO000042343, MO000042422, MO000044353, MO000044919, MO000045240, MO000045408, MO000056459, MO000081134, MO000081137, MO000081688, MO000082994, MO000094050, MO000095116, MO000095129, MO000100537, MO000100627, MO000100629, MO000101448, MO000101450, MO000101980, MO000103433, MO000103438,

MO000314839, MO000320533, MO000320783, MO000321411, MO000325295, MO000335797, MO000480230, MO000480335, MO000480553, MO000480983, MO000481017, MO000481712, MO000481818, MO000481995, MO000482319, MO000482487, MO000483152, MO000483249, MO000483743, MO000485841, SB000033, T00671, T17302, T17772, T28428, T31792, T31793, T31794, T31964

Gene

Affymetrix	11738335_x_at, 11748319_x_at, 11748599_a_at, 11750514_x_at, 11751536_a_at, 11751537_x_at, 11761142_at, 11761143_x_at, 11761465_at, 16840732, 1939_at, 1974_s_at, 201746_at, 211300_s_at, 224185_at, 31618_at, 3743907, 3743908, 3743909, 3743912, 3743913, 3743914, 3743915, 3743916, 3743917, 3743918, 3743919, 3743920, 3743921, 3743922, 3743923, 3743924, 3743925, 3743926, 3743927, 3743928, 3743929, 3743933, 3743935, 3743936, 3743938, 3743939, 3743940, 78459_at, 8012257, 8012270, g1389765_3p_at, g189478_3p_a_at, g8400737_3p_at, g8400737_3p_x_at, M22898_at, TC17001094.hg, TC17002468.hg, U58658_at,
Agilent	A_23_P26810
Ensembl	ENSG00000141510, ENST00000269305, ENST00000359597, ENST00000413465, ENST00000420246, ENST00000445888, ENST00000455263, ENST00000503591, ENST00000504290, ENST00000504937, ENST00000505014, ENST00000508793, ENST00000509690, ENST00000510385, ENST00000514944, ENST00000571370, ENST00000574684, ENST00000576024, ENST00000604348, ENST00000610292, ENST00000610538, ENST00000610623, ENST00000618944, ENST00000619186, ENST00000619485, ENST00000620739, ENST00000622645, ENST00000635293
EntrezGene	7157
Genbank	110164961, 110164963, 110164966, 110338982, 11066969, 118640553, 118640555, 118640557, 120407067, 13097806, 14993571, 14993573, 1753088, 187830776, 187830822, 187830854, 187830893, 187830900, 187830908, 189460, 189474, 189478, 23491728, 3041866, 30523241, 339813, 339815, 35209, 35213, 35215, 371502118, 37223060, 38049096, 38194462, 42821409, 4507636, 454520872, 454521556, 454543596, 454544285, 454544714, 454545206, 454545706, 4731630, 4732145, 48094186, 506432, 506434, 506436, 506438, 506440, 506442, 506444, 506446, 506448, 506450, 506452, 54696111, 56157802, 62897612, 70611297,

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HGMD	TP53
HumanProteinAtlas	ENSG00000141510
Illumina	0005670112, ILMN_1779356
OMIM	191170
PDB	1A1U, 1AIE, 1C26, 1DT7, 1HS5, 1MA3, 1OLG, 1OLH, 1PES, 1PET, 1SAE, 1SAF, 1SAK, 1SAL, 1TSR, 1TUP, 1UOL, 1YC5, 1YCQ, 1YCR, 1YCS, 2AC0, 2ADY, 2AHI, 2ATA, 2BIM, 2BIN, 2BIO, 2BIP, 2BIQ, 2FEJ, 2GS0, 2H1L, 2H2D, 2H2F, 2H4F, 2H4H, 2H4J, 2H59, 2J0Z, 2J10, 2J11, 2J1W, 2J1X, 2J1Y, 2J1Z, 2J20, 2J21, 2L14, 2OCJ, 2PCX, 2VUK, 2WGX, 2X0U, 2X0V, 2X0W, 2XWR, 2YBG, 2YDR, 2Z5S, 2Z5T, 3D05, 3D06, 3D07, 3D08, 3D09, 3D0A, 3DAC, 3IGK, 3IGL, 3KMD, 3KZ8, 3PDH, 3Q01, 3Q05, 3Q06, 3SAK, 3TS8, 3ZME, 4AGL, 4AGM, 4AGN, 4AGP, 4AGQ, 4BUZ, 4BV2, 4HFZ, 4HJE, 4IBQ, 4IBS, 4IBT, 4IBU, 4IBV, 4IBW, 4IBY, 4IBZ, 4IJT, 4KVP, 4LO9, 4LOE, 4LOF, 4MZI, 4MZR,

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Pfam	PF09361
RefSeq	NM_000546.6, NM_001126112.3, NM_001126113.3, NM_001126114.3, NM_001126115.2, NM_001126116.2, NM_001126117.2, NM_001126118.2, NM_001276695.3, NM_001276696.3, NM_001276697.3, NM_001276698.3, NM_001276699.3, NM_001276760.3, NM_001276761.3, NP_000537.3, NP_001119584.1, NP_001119585.1, NP_001119586.1, NP_001119587.1, NP_001119588.1, NP_001119589.1, NP_001119590.1, NP_001263624.1, NP_001263625.1, NP_001263626.1, NP_001263627.1, NP_001263628.1, NP_001263689.1, NP_001263690.1
UniGene	Hs&437460
WikiPathways	WP1403, WP1530, WP1545, WP1601, WP1742, WP176, WP1772, WP179, WP1971, WP2249, WP2261, WP2363, WP2374, WP2431, WP2446, WP2447, WP2516, WP254, WP2815, WP2828, WP3286, WP3303, WP3594, WP3611, WP3614, WP3646, WP3651, WP366, WP3672, WP382, WP3959, WP3981, WP3982, WP399, WP3998, WP4016, WP4155, WP4191, WP4206, WP4216, WP4239, WP4255, WP4262, WP4263, WP4284, WP4313, WP4320, WP4399, WP45, WP4630, WP4657, WP4658, WP4674, WP4685, WP4746, WP4747, WP4754, WP4925, WP4949, WP5043, WP5044, WP5046, WP5049, WP5050, WP5055, WP5098, WP673, WP707, WP710

mRNA

Pfam	PF08190, PF08636, PF09715, PF10533, PF11356, PF11530, PF12306, PF12357

Protein

Genbank	110164962, 110164964, 110164967, 110338983, 11066970, 118640554, 118640556, 118640558, 120407068, 13097807, 14993572, 14993574, 1753089, 187830777, 187830823, 187830855, 187830894, 187830901, 187830909, 189476, 189479, 23491729, 3041867, 30523242, 339814, 339816, 35210,

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PDB	1olg, 1olh, 1pes, 1pet, 1sae, 1saf, 1sag, 1sah, 1sai, 1sak, 1sal, 1tup
Pfam	PF09246
UniProt	P04637

References (2571 entries)

Show 5 entries Search:

Sl.No	PMID	Citation

		(2021) Show abstract
3	33578018	Bordoni, V, Tartaglia, E, Sacchi, A, Fimia, GM, Cimini, E, Casetti, R, Notari, S, Grassi, G, Marchioni, L, Bibas, M, Capobianchi, MR, Locatelli, F, Maeurer, M, Zumla, A, Antinori, A, Nicastri, E, Ippolito, G, Agrati, C, The unbalanced p53/SIRT1 axis may impact lymphocyte homeostasis in COVID-19 patients. Int J Infect Dis 105 49-53 (2021) Show abstract
4	33187149	Proximal Protein Interaction Landscape of RAS Paralogs. 12 (2020) Show abstract
5	32961817	D'Amico, F, Doldo, E, Pisano, C, Scioli, MG, Centofanti, F, Proietti, G, Falconi, M, Sangiuolo, F, Ferlosio, A, Ruvolo, G, Orlandi, A, Specific miRNA and Gene Deregulation Characterize the Increased Angiogenic Remodeling of Thoracic Aneurysmatic Aortopathy in Marfan Syndrome. Int J Mol Sci 21 (18) - (2020) Show abstract

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