AC CH000000038
XX
DT 2003-01-22 12:05:15.0(created); mkl.
DT 2004-03-02 11:29:35.0(updated); mkl.

XX
NA insulin ---> ERK
XX
TY chain.
XX
CC insulin activates ERK1 and ERK2 in rat muscle cell line.
XX
XN <XN000000004>; Ras --> Raf (activation; binding).
XN <XN000000006>; Raf --> MEK (activation; phosphorylation; binding).
XN <XN000000007>; MEK --> ERK (activation; phosphorylation; binding).
XN <XN000000089>; Shc-1 --> Grb-2 (activation; binding).
XN <XN000000091>; Sos --> Ras (activation; binding; exchange).
XN <XN000001360>; InsR --> IRS-1 (activation; binding; phosphorylation).
XN <XN000001366>; IRS-1 --> Grb-2 (activation; binding).
XN <XN000001391>; InsR --> Shc-1 (activation; binding; phosphorylation).
XN <XN000003634>; Grb-2 --> Sos (activation; binding).
MO <MO000000011>; ERK.
MO <MO000000012>; Grb-2.
MO <MO000000082>; InsR.
MO <MO000000154>; IRS-1.
MO <MO000000018>; MEK.
MO <MO000000009>; Raf.
MO <MO000016736>; Ras.
MO <MO000000008>; Shc-1.
MO <MO000016777>; Sos.
XX
RN [1].
RX <pubmed:12933696>.

RA Sasaoka T., Kikuchi K., Wada T., Sato A., Hori H., Murakami S., Fukui K., Ishihara H., Aota R., Kimura I., Kobayashi M.
RT Dual role of SRC homology domain 2-containing inositol phosphatase 2 in the regulation of platelet-derived growth factor and insulin-like growth factor I signaling in rat vascular smooth muscle cells
RL Endocrinology 144:4204-14 (2003).
XX
RN [2].
RX <pubmed:11884620>.
. . .
XX
RN [40].
RX <pubmed:1385403>.
RA Sun X. J., Miralpeix M., Myers jr M. G., Glasheen E. M., Backer J. M., Kahn C. R., White M. F.
RT Expression and function of IRS-1 in insulin signal transmission.
RL J. Biol. Chem. 267:22662-22672 (1992).
XX
//

AC CH000000710
XX
DT 2004-03-01 09:51:39.0(created); cch.
DT 2011-08-12 12:07:44.0(updated); spi.
CO Copyright (c) Biobase GmbH.
XX
NA p53 pathway
XX
TY pathway.
XX
HC <CH000000701>; p53 nuclear import (chain).
HC <CH000000702>; ATR ---> p53 (chain).
HC <CH000000703>; ATM ---> p53 (chain).
HC <CH000000705>; MKK6 ---> p53 (chain).
HC <CH000000706>; MKP-5 ---/ p53; MKK4 ---> p53 (chain).
HC <CH000000707>; DNA-PK ---> p53 (chain).

HC <CH000000708>; Caspase-3 ---/ p53 (chain).
HC <CH000000717>; p53 ---> HIF-1alpha degradation (chain).
HC <CH000000838>; p53 degradation (chain).
HC <CH000000923>; p53 transcription complex (chain).
HC <CH000000924>; Cdk2 ---> p53 (chain).
HC <CH000000968>; PI3K ---Mdm2---/ p53 (chain).
HC <CH000000969>; PTEN ---/ AKT-1 (chain).
HC <CH000000970>; ATR ---/ Mdm2 (chain).
HC <CH000000975>; Usp7 ---/ p53 (chain).
HC <CH000000976>; Plk3 ---> p53 (chain).
HC <CH000000982>; Set9 ---> p21WAF1 (chain).
HC <CH000000985>; E1 ---PIRH2---/ p53 (chain).
HC <CH000000986>; p53 ---> cytochrome C (chain).
HC <CH000000989>; CtBP ---/ p53 (chain).
HC <CH000000993>; UCRBP ---/ p300 (chain).
HC <CH000003415>; Mdm2 ---> p/CAF (chain).
HC <CH000004514>; p53 ---Mdm2--> p53 monoubiquitination (chain).
HC <CH000004515>; p53 ---Mdm2, YY1---> degradation (chain).
HC <CH000004576>; p53 ---Ubc13---> p53{ub{K63}} ubiquitination (chain).
XX
XN <XN000000130>; E1 + ubiquitin + ATP --> E1{ub(1)} + AMP + PPi (ubiquitination).
XN <XN000001543>; PIP2 + ATP --p85:p110--> PIP3 + ADP (phosphorylation).
XN <XN000002082>; p53 + 2 ATP --JNK2{p}--> p53{pS20}{pT81} + 2 ADP (phosphorylation).
XN <XN000002808>; p53{ub(n)} --26S proteasome--> protein remnants + n ubiquitin (degradation).
XN <XN000023698>; PIP3 --PTEN--> PIP2 + p (dephosphorylation).
XN <XN000023703>; PIP3 + AKT-1 <==> PIP3:AKT-1 (binding).
XN <XN000023709>; PIP3:AKT-1{pS473} + ATP --PIP3:PDK1{pS241}--> AKT-1{pT308}{pS473} + PIP3 + ADP (phosphorylation; dissociation).
XN <XN000023959>; HIF-1alpha{hydP}{ub(n)} --proteasome--> protein remnants + n ubiquitin (degradation).
XN <XN000023987>; HIF-1alpha{hydP} + p53 + mdm2 <==> HIF-1alpha{hydP}:p53:mdm2 (binding; destabilization).
XN <XN000023991>; HIF-1alpha{hydP}:p53:mdm2 + n ubiquitin --> HIF-1alpha{hydP}{ub(n)} + p53 + mdm2 (ubiquitination).
XN <XN000024044>; Chk1 + 2 ATP --ATR--> Chk1{pS317}{pS345} + 2 ADP (phosphorylation).
XN <XN000024050>; Chk2 + ATP --ATM--> Chk2{pT68} + ADP (phosphorylation).
XN <XN000024252>; p38alpha + ATP --MKK6{p}--> p38alpha{p} + ADP (phosphorylation).

XN <XN000024266>; p53 + ATP --Chk2{pT68}--> p53{pS15}{pT18}{pS20} + ADP (phosphorylation).
XN <XN000024269>; p53{pS15}{pT18}{pS20} + acetyl-CoA --p300--> p53{pS15}{pT18}{pS20}{ace} + CoA (acetylation).
XN <XN000024277>; p53{pS15}{pT18}{pS20}{ace} + ATP --CKII-alpha:CKII-alpha2:(CKII-beta)2:Cdc68:SSRP1--> p53{pS15}{pT18}{pS20}{pS392}{ace} + ADP (phosphorylation).
XN <XN000024278>; 4 p53{pS15}{pT18}{pS20}{pS392}{ace} <==> (p53{pS15}{pT18}{pS20}{pS392}{ace})4 (binding; oligomerization).
XN <XN000024279>; p53{pS15}{pT18}{pS20}{ace} + ATP --cyclinA:Cdk2--> p53{pS15}{pT18}{pS20}{pS315}{ace} + ADP (phosphorylation).
XN <XN000024281>; 4 p53{pS15}{pT18}{pS20}{pS315}{ace} <==> (p53{pS15}{pT18}{pS20}{pS315}{ace})4 (binding; oligomerization).
XN <XN000024282>; p53 + importin-alpha <==> p53:importin-alpha (binding).
XN <XN000024283>; p53:importin-alpha --> p53:importin-alpha (translocation).
XN <XN000024286>; p53 + ATP --Chk1{pS317}{pS345}--> p53{pS15}{pS20}{pS37} + ADP (phosphorylation).
XN <XN000024288>; p53 + ATP --plk3--> p53{pS20} + ADP (phosphorylation).
XN <XN000024289>; p53 + ATP --p38alpha{p}--> p53{pS33} + ADP (phosphorylation).
XN <XN000024290>; JNK2 + ATP --MKK4{pS221}{pT225}--> JNK2{p} + ADP (phosphorylation).
XN <XN000024291>; JNK2{p} --MKP-5--> JNK2 + p (dephosphorylation).
XN <XN000024296>; p53{pS15}{pS37} + ATP --CKI-delta--> p53{pS15}{pS18}{pS37} + ADP (phosphorylation).
XN <XN000024297>; p53 + 2 ATP --DNA-PKcs:Ku70:Ku80--> p53{pS15}{pS37} + 2 ADP (phosphorylation).
XN <XN000024298>; PKCdelta --Caspase-3--> PKCdelta-CF (processing).
XN <XN000024299>; DNA-PKcs:Ku70:Ku80 + PKCdelta-CF <==> PKCdelta-CF:DNA-PKcs + Ku80 + Ku70 (binding; exchange).
XN <XN000024300>; DNA-PKcs + Ku70 + Ku80 <==> DNA-PKcs:Ku70:Ku80 (binding; assembly).
XN <XN000024301>; DNA-PKcs:Ku70:Ku80 --Caspase-3--> Ku70 + Ku80 + protein remnants (processing).
XN <XN000024314>; BAF47 + BAF155 + BRG1 + (p53{pS15}{pT18}{pS20}{pS392}{ace})4 <==> BAF47:BAF155:BRG1:(p53{pS15}{pT18}{pS20}{pS392}{ace})4 (binding; assembly).
XN <XN000025174>; (Bak)2:tBid --> (Bak)2:tBid (translocation).
XN <XN000025358>; Ubc5{ub(1)} + p53 + n ubiquitin --COP1--> Ubc5 + p53{ub(n)} (ubiquitination).
XN <XN000026934>; Cytochrome C --(Bak)2:tBid--> Cytochrome C (translocation).
XN <XN000026937>; 2 Bak + tBid <==> (Bak)2:tBid (binding).
XN <XN000028641>; p53 --> CDKN1A (DNA binding; transactivation).
XN <XN000032521>; E1{ub(1)} + Ubc5 --> E1 + Ubc5{ub(1)} (ubiquitination).
XN <XN000033327>; PML + ATP --ATR--> PML{p} + ADP (phosphorylation).
XN <XN000033329>; rpl11 + PML{p} + mdm2 <==> rpl11:PML{p}:mdm2 (binding).
XN <XN000033366>; mdm2{ub(n)} --HAUSP--> mdm2 + n ubiquitin (deubiquitination).
XN <XN000033367>; Ubc5{ub(1)} + mdm2 --> Ubc5 + mdm2{ub(n)} (ubiquitination).
XN <XN000033427>; p53 + ATP --plk1--> p53{p} + ADP (phosphorylation).

XN <XN000033482>; setd7 --> p53 (activation; methylation).
XN <XN000033516>; Ubc5{ub(1)} + p53 + n ubiquitin --PIRH2--> Ubc5 + p53{ub(n)} (ubiquitination).
XN <XN000033554>; Bcl-x + Bak <==> Bcl-x:Bak (binding).
XN <XN000033556>; p53 + Bcl-x <==> p53:Bcl-x (binding).
XN <XN000033562>; CtBP2 + mdm2 <==> CtBP2:mdm2 (binding).
XN <XN000033563>; CtBP2:mdm2 + p53 <==> CtBP2:mdm2:p53 (binding).
XN <XN000033564>; NADH + CtBP2 <==> NADH:CtBP2 (binding).
XN <XN000033604>; YY1 + p53 <==> YY1:p53 (binding).
XN <XN000105817>; p/CAF + TAF(II)31 <==> p/CAF:TAF(II)31 (binding).
XN <XN000105818>; mdm2 + p/CAF:TAF(II)31 <==> mdm2:p/CAF:TAF(II)31 (binding).
XN <XN000105866>; mdm2:p/CAF:TAF(II)31 + n ubiquitin --> mdm2:p/CAF{ub(n)}:TAF(II)31 (ubiquitination).
XN <XN000105870>; mdm2:p/CAF{ub(n)}:TAF(II)31 --26S proteasome--> mdm2 + protein remnants + n ubiquitin (degradation).
XN <XN000149400>; mTOR + mLST8 + rictor + SIN1 + Protor-1 <==> mTOR:mLST8:rictor:SIN1:Protor-1 (binding).
XN <XN000149401>; PIP3:AKT-1 + ATP --mTOR:mLST8:rictor:SIN1:Protor-1--> PIP3:AKT-1{pS473} + ADP (phosphorylation).
XN <XN000252892>; p53 + mdm2{pS166}{pS188} + Ubc5A{ub(1)} <==> p53:mdm2{pS166}{pS188}:Ubc5A{ub(1)} (binding).
XN <XN000252893>; p53:mdm2{pS166}{pS188}:Ubc5A{ub(1)} --> p53{ub(1)K370} + mdm2{pS166}{pS188} + Ubc5A (ubiquitination).
XN <XN000252969>; p53{ub(1)K370} + mdm2{pS166}{pS188} + Ubc5A{ub(1)} <==> p53{ub(1)K370}:mdm2{pS166}{pS188}:Ubc5A{ub(1)} (binding).
XN <XN000252970>; p53{ub(1)K370}:mdm2{pS166}{pS188}:Ubc5A{ub(1)} --> p53{ub(1)K370}{ub(1)K372} + mdm2{pS166}{pS188} + Ubc5A (ubiquitination).
XN <XN000253216>; p53:mdm2{pS166}{pS188}:Ubc5A{ub(1)} --> p53{ub(1)K386} + mdm2{pS166}{pS188} + Ubc5A (ubiquitination).
XN <XN000253217>; p53{ub(1)K386} + 4 mdm2{pS166}{pS188} + n Ubc5A{ub(1)} --> p53{ub{K48}(n)K382}{ub{K48}(4)K386} + 4 mdm2{pS166}{pS188} + n Ubc5A (ubiquitination).
XN <XN000253218>; p53{ub{K48}(n)K382}{ub{K48}(4)K386} --26S proteasome--> protein remnants (degradation).
XN <XN000253219>; mdm2{pS166}{pS188} + YY1 <==> mdm2{pS166}{pS188}:YY1 (binding).
XN <XN000253548>; mdm2{pS166}{pS188}:YY1:p53 + n Ubc5A{ub(1)} --> p53{ub{K48}(n)K} + mdm2{pS166}{pS188} + YY1 + Ubc5A (ubiquitination).
XN <XN000253549>; mdm2{pS166}{pS188}:YY1 + p53 <==> mdm2{pS166}{pS188}:YY1:p53 (binding).
XN <XN000253550>; p53{ub{K48}(n)K} --26S proteasome--> protein remnants (degradation).
XN <XN000253815>; p53{ub(1)K370} --> p53{ub(1)K370} (translocation).
XN <XN000253816>; p53{ub(1)K370}{ub(1)K372} --> p53{ub(1)K370}{ub(1)K372} (translocation).
XN <XN000253893>; mdm2 + 2 ATP --AKT-1{pT308}{pS473}--> mdm2{pS166}{pS188} + 2 ADP (phosphorylation).
XN <XN000253894>; mdm2{pS166}{pS188} --> mdm2{pS166}{pS188} (translocation).
XN <XN000275614>; Ubc13 + Mms2 <==> Ubc13:Mms2 (binding).
XN <XN000275672>; E1{ub(1)} + Ubc13:Mms2 <==> E1{ub(1)}:Ubc13:Mms2 (binding).
XN <XN000275679>; E1{ub(1)}:Ubc13:Mms2 --> Ubc13{ub(1)}:Mms2 + E1 (ubiquitination).

XN <XN000275685>; p53 + 2 Ubc13{ub(1)}:Mms2 --> p53{ub{K63}(2) + 2 Ubc13:Mms2 (ubiquitination).
MO <MO000043122>; (Bak)2:tBid.
MO <MO000039122>; (p53{pS15}{pT18}{pS20}{pS315}{ace})4.
MO <MO000039119>; (p53{pS15}{pT18}{pS20}{pS392}{ace})4.
MO <MO000000218>; 26S proteasome.
MO <MO000045330>; acetyl-CoA.
MO <MO000000328>; ADP.
MO <MO000017411>; AKT-1.
MO <MO000038693>; AKT-1{pT308}{pS473}.
MO <MO000016761>; AMP.
MO <MO000030934>; ATM.
MO <MO000000327>; ATP.
MO <MO000030924>; ATR.
MO <MO000035445>; BAF155.
MO <MO000035439>; BAF47.
MO <MO000039150>; BAF47:BAF155:BRG1:(p53{pS15}{pT18}{pS20}{pS392}{ace})4.
MO <MO000018293>; Bak.
MO <MO000017151>; Bcl-x.
MO <MO000045296>; Bcl-x:Bak.
MO <MO000035446>; BRG1.
MO <MO000016924>; Caspase-3.
MO <MO000023541>; Chk1.
MO <MO000038953>; Chk1{pS317}{pS345}.
MO <MO000030897>; Chk2.
MO <MO000038956>; Chk2{pT68}.
MO <MO000030921>; CKI-delta.
MO <MO000039125>; CKII-alpha:CKII-alpha2:(CKII-beta)2:Cdc68:SSRP1.
MO <MO000045331>; CoA.
MO <MO000041727>; COP1.
MO <MO000041596>; CtBP2.
MO <MO000045302>; CtBP2:mdm2.
MO <MO000045303>; CtBP2:mdm2:p53.
MO <MO000017850>; cyclinA:Cdk2.

MO <MO000016985>; Cytochrome C.
MO <MO000021911>; DNA-PKcs.
MO <MO000018334>; DNA-PKcs:Ku70:Ku80.
MO <MO000000283>; E1.
MO <MO000000293>; E1{ub(1)}.
MO <MO000188322>; E1{ub(1)}:Ubc13:Mms2.
MO <MO000045016>; HAUSP.
MO <MO000038880>; HIF-1alpha{hydP}.
MO <MO000038912>; HIF-1alpha{hydP}:p53:mdm2.
MO <MO000038882>; HIF-1alpha{hydP}{ub(n)}.
MO <MO000020973>; importin-alpha.
MO <MO000016903>; JNK2.
MO <MO000038350>; JNK2{p}.
MO <MO000021912>; Ku70.
MO <MO000021913>; Ku80.
MO <MO000018839>; mdm2.
MO <MO000083853>; mdm2:p/CAF:TAF(II)31.
MO <MO000083897>; mdm2:p/CAF{ub(n)}:TAF(II)31.
MO <MO000171484>; mdm2{pS166}{pS188}.
MO <MO000171322>; mdm2{pS166}{pS188}:YY1.
MO <MO000171175>; mdm2{pS166}{pS188}:YY1:p53.
MO <MO000045082>; mdm2{ub(n)}.
MO <MO000041401>; MKK4{pS221}{pT225}.
MO <MO000038355>; MKK6{p}.
MO <MO000018050>; MKP-5.
MO <MO000038220>; mLST8.
MO <MO000090260>; Mms2.
MO <MO000017140>; mTOR.
MO <MO000122561>; mTOR:mLST8:rictor:SIN1:Protor-1.
MO <MO000045267>; NADH.
MO <MO000045304>; NADH:CtBP2.
MO <MO000000072>; p.
MO <MO000023551>; p/CAF.

MO <MO000083852>; p/CAF:TAF(II)31.
MO <MO000019984>; p300.
MO <MO000016958>; p38alpha.
MO <MO000038368>; p38alpha{p}.
MO <MO000000277>; p53.
MO <MO000045297>; p53:Bcl-x.
MO <MO000039123>; p53:importin-alpha.
MO <MO000171018>; p53:mdm2{pS166}{pS188}:Ubc5A{ub(1)}.
MO <MO000039135>; p53{pS15}{pS18}{pS37}.
MO <MO000039126>; p53{pS15}{pS20}{pS37}.
MO <MO000039134>; p53{pS15}{pS37}.
MO <MO000039112>; p53{pS15}{pT18}{pS20}.
MO <MO000039114>; p53{pS15}{pT18}{pS20}{ace}.
MO <MO000039121>; p53{pS15}{pT18}{pS20}{pS315}{ace}.
MO <MO000039118>; p53{pS15}{pT18}{pS20}{pS392}{ace}.
MO <MO000039127>; p53{pS20}.
MO <MO000039129>; p53{pS20}{pT81}.
MO <MO000039128>; p53{pS33}.
MO <MO000045160>; p53{p}.
MO <MO000171019>; p53{ub(1)K370}.
MO <MO000171066>; p53{ub(1)K370}:mdm2{pS166}{pS188}:Ubc5A{ub(1)}.
MO <MO000171067>; p53{ub(1)K370}{ub(1)K372}.
MO <MO000171172>; p53{ub(1)K386}.
MO <MO000018953>; p53{ub(n)}.
MO <MO000171174>; p53{ub{K48}(n)K382}{ub{K48}(4)K386}.
MO <MO000171321>; p53{ub{K48}(n)K}.
MO <MO000188329>; p53{ub{K63}(2).
MO <MO000000030>; p85:p110.
MO <MO000000331>; PIP2.
MO <MO000017272>; PIP3.
MO <MO000038688>; PIP3:AKT-1.
MO <MO000038690>; PIP3:AKT-1{pS473}.
MO <MO000038695>; PIP3:PDK1{pS241}.

MO <MO000043774>; PIRH2.
MO <MO000017065>; PKCdelta.
MO <MO000039136>; PKCdelta-CF.
MO <MO000039137>; PKCdelta-CF:DNA-PKcs.
MO <MO000011271>; plk1.
MO <MO000031100>; plk3.
MO <MO000045015>; PML.
MO <MO000045039>; PML{p}.
MO <MO000000329>; PPi.
MO <MO000017622>; proteasome.
MO <MO000019479>; protein remnants.
MO <MO000122443>; Protor-1.
MO <MO000017541>; PTEN.
MO <MO000090103>; rictor.
MO <MO000045031>; rpl11.
MO <MO000045040>; rpl11:PML{p}:mdm2.
MO <MO000044864>; setd7.
MO <MO000122428>; SIN1.
MO <MO000086100>; TAF(II)31.
MO <MO000020591>; tBid.
MO <MO000022136>; Ubc13.
MO <MO000188282>; Ubc13:Mms2.
MO <MO000188323>; Ubc13{ub(1)}:Mms2.
MO <MO000020022>; Ubc5.
MO <MO000044258>; Ubc5A.
MO <MO000160227>; Ubc5A{ub(1)}.
MO <MO000044669>; Ubc5{ub(1)}.
MO <MO000000216>; ubiquitin.
MO <MO000037308>; YY1.
MO <MO000045358>; YY1:p53.
XX
RN [1].
RX <pubmed:19940261>.

RA van Wijk S. J., Timmers H. T.
RT The family of ubiquitin-conjugating enzymes (E2s): deciding between life and death of proteins
RL FASEB J. 24:981-993 (2010).
XX
. . .
RN [93].
RX <pubmed:8012956>.
RA Michieli P., Chedid M., Lin D., Pierce J. H., Mercer W. E., Givol D.
RT Induction of WAF1/CIP1 by a p53-independent pathway
RL Cancer Res. 54:3391-3395 (1994).
XX
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