IV

Related Sequences

Beginning in 1993, this section of the compendium turned its focus toward cellular and viral factors that interact with HIV. Many of these factors are discussed at length by K.-T. Jeang, one of the database editors, in the 1994 release. In this 1995 update we present amino acid sequences of some cellular factors newly reported to interact with HIV proteins or nucleic acids. Be forewarned that some of these claims are controversial. Moreover, it is possible that we have overlooked some cofactor sequences, in which case upon hearing of those we will place them onto the Web site (`http://hiv-web.lanl.gov`). Rajesh Krishnan and Teh Jeang at NIAID/NIH were instrumental in compiling this collection of sequences.

Note that many of these proteins are equivocally named. RIP can mean vpR-interacting protein or Rev-interacting protein (or repeat-induced point mutation process in an unrelated context). TAP is used as a name for several proteins with different functions; here TAP, also known as SF2 (splicing factor 2) associated factor, stands for TAR-associated protein.

PART IV Related Sequences

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EIF5A

```
LOCUS       HSU17969     4862 bp    DNA             PRI       16-DEC-1994
DEFINITION  Human initiation factor eIF-5A gene, complete cds.
ACCESSION   U17969
REFERENCE   1  (sites)
  AUTHORS   Koettnitz,K., Woehl,T., Kappel,B., Lottspeich,F., Hauber,J. and
            Bevec,D.
  TITLE     Identification of a new member of the human initiation factor
            elF-5A gene family
  JOURNAL   Unpublished
REFERENCE   2  (bases 1 to 4862)
  AUTHORS   Werner,F.
  TITLE     Direct Submission
  JOURNAL   Submitted (01-DEC-1994) Werner F., Sandoz Research Institute,
            Mrg-Ir, Brunnerstrasse 59, Vienna, Austria, A-1235
COMMENT     The eIF-5A protein (eukaryotic initiation factor 5A) is an
            essential cofactor for HIV Rev function (Steinkasserer et al.,
            Genomics 25:749,1995; Katahira et al., J.Virol. 69:3125, 1995;
            Ruhl et al., J. Cell Biol. 123:1309,1993).
            NCBI gi: 602244
FEATURES             Location/Qualifiers
     source          1..4862
                     /organism="Homo sapiens"
                     /sex="female"
                     /tissue_type="placenta"
     exon            1..125
                     /number=1
     intron          126..1974
                     /number=1
     exon            1975..2159
                     /number=2
     CDS             join(1995..2159,3372..3476,3704..3835,3932..3994)
                     /note="NCBI gi: 602245"
                     /codon_start=1
                     /function="initiation factor"
                     /evidence=experimental
                     /product="eIF-5A"
                     /db_xref="PID:g602245"
                     /translation="MADDLDFETGDAGASATFPMQCSALRKNGFVVLKGRPCKIVEMS
                     TSKTGKHGHAKVHLVGIDIFTGKKYEDICPSTHNMDVPNIKRNDFQLIGIQDGYLSLL
                     QDSGEVREDLRLPEGDLGKEIEQKYDCGEEILITVLSAMTEEAAVAIKAMAK"
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```
LOCUS       HUMRABCCF    2583 bp    DNA             PRI       24-AUG-1995
DEFINITION  Homo sapiens cellular co-factor (RAB) gene, complete cds.
ACCESSION   L42025
REFERENCE   1  (bases 1 to 2583)
  AUTHORS   Bogerd,H.P., Fridell,R.A., Madore,S. and Cullen,B.R.
  TITLE     Identification of a novel cellular cofactor for the Rev/Rex class
            of retroviral regulatory proteins
  JOURNAL   Cell 82 (3), 485-494 (1995)
  MEDLINE   95360992
REFERENCE   2  (bases 1 to 2583)
  AUTHORS   Cullen,B.R.
  TITLE     Direct Submission
  JOURNAL   Submitted (11-AUG-1995) Bryan R. Cullen, Howard Hughes Medical
            Institute and Department of Genetics, Duke University Medical
            Center, Durham, NC 27710, USA
COMMENT     The RAB protein (Rev/Rex activation domain-binding protein) binds
            to Rev and Rex activation domainds in vivo and in vitro. It appears
            to enhance Rev activity, i.e., export of unspliced and singly-spliced
            HIV messages, when the latter is bound to RNA.
            NCBI gi: 945222
FEATURES             Location/Qualifiers
     source          1..2583
                     /organism="Homo sapiens"
                     /clone="RAB"
                     /cell_line="CEM-SS"
                     /cell_type="T-cell"
                     /sequenced_mol="DNA"
     mRNA            <1..>2583
                     /gene="RAB"
     CDS             244..1932
                     /gene="RAB"
                     /note="Rev/Rex activation domain-binding protein;  NCBI
                     gi: 945223"
                     /codon_start=1
                     /function="cellular co-factor"
                     /db_xref="PID:g945223"
                     /translation="MAASAKRKQEEKHLKMLRDMTGLPHNRKCFDCDQRGPTYVNMTV
                     GSFVCTSCSGSLRGLNPPHRVKSISMTTFTQQEIEFLQKHGNEVCKQIWLGLFDDRSS
                     AIPDFRDPQKVKEFLQEKYEKKRWYVPPEQAKVVASVHASISGSSASSTSSTPEVKPL
                     KSLLGDSAPTLHLNKGTPSQSPVVGRSQGQQQEKKQFDLLSDLGSDIFAAPAPQSTAT
                     ANFANFAHFNSHAAQNSANADFANFDAFGQSSGSSNFGGFPTASHSPFQPQTTGGSAA
                     SVNANFAHFDNFPKSSSADFGTFNTSQSHQTASAVSKVSTNKAGLQTADKYAALANLD
                     NIFSAGQGGDQGSGFGTTGKAPVGSVVSVPSQSSASSDKYAALAELDSVFSSAATSSN
                     AYTSTSNASSNVFGTVPVVASAQTQPASSSVPAPFGATPSTNPFVAAAGPSVASSTNP
                     FQTNARGATAATFGTASMSMPTGFGTPAPYSLPTSFSGSFQQPAFPAQAAFPQQTAFS
                     QQPNGAGFAAFGQTKPVVTPFGQVAAAGVSSNPFMTGAPTGQFPTGSSSTNPFL"
```

hRIP

```
LOCUS       HSRNANLP     2414 bp    RNA             PRI       17-AUG-1995
DEFINITION  H.sapiens mRNA for nucleoporin-like protein.
ACCESSION   X89478
*FIELD* NID
            g950050
KEYWORDS    nucleoporin-like protein.
SOURCE      human.
  ORGANISM  Homo sapiens
            Eukaryotae; mitochondrial eukaryotes; Metazoa; Chordata;
            Vertebrata; Osteichthyes; Sarcopterygii; Mammalia; Eutheria;
            Primates; Catarrhini; Hominidae; Homo.
REFERENCE   1  (bases 1 to 2414)
  AUTHORS   Fritz,C.C., Zapp,M.L. and Green,M.R.
  TITLE     A human nucleoporin-like protein that specifically interacts with
            HIV Rev
  JOURNAL   Nature 376 (6540), 530-533 (1995)
  MEDLINE   95364930
REFERENCE   2  (bases 1 to 2414)
  AUTHORS   Green,M.R.
  TITLE     Direct Submission
  JOURNAL   Submitted (07-JUL-1995) to the EMBL/GenBank/DDBJ databases. M.R.
            Green, Univ. of Massachusetts Medical Center, Program in Molecular
            Medicine, 373 Plantation Street, Worcester, MA 01605, USA
COMMENT     HRIP (human Rev interacting protein) specifically interacts with the
            HIV Rev effector domain. The hRIP is homologous to nucleoporins.
            NCBI gi: 950050
FEATURES             Location/Qualifiers
     source          1..2414
                     /organism="Homo sapiens"
     CDS             67..1755
                     /note="pid:e188464;  NCBI gi: 950051"
                     /codon_start=1
                     /product="nucleoporin-like protein"
                     /db_xref="PID:g950051"
                     /translation="MAASAKRKQEEKHLKMLRDMTGLPRNRKCFDCDQRGPTYVNMTV
                     GSFVCTSCSGSLRGLNPPHRVKSISMTTFTQQEIEFLQKHGNEVCKQIWLGLFDDRSS
                     AIPDFRDPQKVKEFLQEKYEKKRWYVPPEQAKVVASVHASISGSSASSTSSTPEVKPL
                     KSLLGDSAPTLHLNKGTPSQSPVVGRSQGQQQEKKQFDLLSDLGSDIFAAPAPQSTAT
                     ANFANFAHFNSHAAQNSANADFANFDAFGQSSGSSNFGGFPTASHSPFQPQTTGGSAA
                     SVNANFAHFDNFPKSSSADFGTFNTSQSHQTASAVSKVSTNKAGLQTADKYAALANLD
                     NIFSAGQGGDQGSGFGTTGKAPVGSVVSVPSQSSASSDKYAALAELDSVFSSAATSSN
                     AYTSTSNASSNVFGTVPVVASAQTQPASSSVPAPFGRTPSTNPFVAAAGPSVASSTNP
                     FQTNARGATAATFGTASMSMPTGFGTPAPYSLPTSFSGSFQQPAFPAQAAFPQQTAFS
                     QQPNGAGFAAFGQTKPVVTPFGQVAAAGVSSNPFMTGAPTGQFPTGSSSTNPFL"
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```
LOCUS       HUMPPARGB    1811 bp    mRNA            PRI       01-NOV-1995
DEFINITION  H. sapiens peroxisome proliferator activated receptor gamma,
            complete cds.
ACCESSION   L40904
REFERENCE   1  (bases 1 to 1811)
  AUTHORS   Greene,M.E., Blumberg,B., McBride,O.W., Yi,H.F., Kronquist,K.,
            Kwan,K., Hsieh,L., Greene,G. and Nimer,S.D.
  TITLE     Isolation of the human peroxisome proliferator activated receptor
            gamma cDNA: expression in hematopoietic cells and chromosomal
            mapping
  JOURNAL   Gene Expr. 4 (4-5), 281-299 (1995)
  MEDLINE   95307078
REFERENCE   2  (bases 1 to 1811)
  AUTHORS   Qi,J.S., Desai-Yajnik,V., Greene,M.E., Raaka,B.M. and Samuels,H.H.
  TITLE     The ligand-binding domains of the thyroid hormone/retinoid receptor
            gene subfamily function in vivo to mediate heterodimerization, gene
            silencing, and transactivation
  JOURNAL   Mol. Cell. Biol. 15 (3), 1817-1825 (1995)
  MEDLINE   95166267
COMMENT     As reported by Desai-Yajnik and coworkers, J. Virol. 69:5103-5112, 1995,
            this protein binds to thyroid hormone response elements (TREs)
            embedded within NF-Kappa B and Sp1 motifs. The latter interaction, but
            not the former, is Tat-dependent, and therefore interaction with Tat is
            suggested. The 50-aa N-terminal region of T3R alpha, which is said to
            interact with TFIIIB, is critical for the Tat-dependent and independent
            effects.

            Full length receptor cDNA first isolated and sequenced Jan 9 1991.
            Patent applied for.

            NCBI gi: 722619
FEATURES                Location/Qualifiers
     CDS             173..1609
                     /gene="PPARG"
                     /map="3p25"
                     /note="NCBI gi: 722620"
                     /codon_start=1
                     /function="ligand activated transcription factor"
                     /product="peroxisome proliferator activated receptor
                     gamma"
                     /db_xref="PID:g722620"
                     /translation="MTMVDTEIAFWPTNFGISSVDLSVMEDHSHSFDIKPFTTVDFSS
                     ISTPHYEDIPFTRTDPVVADYKYDLKLQEYQSAIKVEPASPPYYSEKTQLYNKPHEEP
                     SNSLMAIECRVCGDKASGFHYGVHACEGCKGFFRRTIRLKLIYDRCDLNCRIHKKSRN
                     KCQYCRFQKCLAVGMSHNAIRFGRIAQAEKEKLLAEISSDIDQLNPESADLRQALAKH
                     LYDSYIKSFPLTKAKARAILTGKTTDKSPFVIYDMNSLMMGEDKIKFKHITPLQEQSK
                     EVAIRIFQGCQFRSVEAVQEITEYAKSIPGFVNLDLNDQVTLLKYGVHEIIYTMLASL
                     MNKDGVLISEGQGFMTREFLKSLRKPFGDFMEPKFEFAVKFNALELDDSDLAIFIAVI
                     ILSGDRPGLLNVKPIEDIQDNLLQALELQLKLNHPESSQLFAKLLQKMTDLRQIVTEH
                     VQLLQVIKKTETDMSLHPLLQEIYKDLY"
     polyA_site      1811
                     /gene="PPARG"
                     /map="3p25"
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HT2A

```
LOCUS       HSU18543     2424 bp    mRNA            PRI       07-APR-1995
DEFINITION  Human zinc-finger protein mRNA, complete cds.
ACCESSION   U18543
REFERENCE   1  (bases 1 to 2424)
  AUTHORS   Fridell,R.A., Harding,L.S., Bogerd, H.P. and Cullen,B.R.
  TITLE     Identification of a novel human zinc finger protein that specifically
            interacts with the activation domain of lentiviral Tat proteins.
  JOURNAL   Virology 209: 347-357 (1995)
REFERENCE   2  (bases 1 to 2424)
  AUTHORS   Fridell,R.A.
  TITLE     Direct Submission
  JOURNAL   Submitted (13-DEC-1994) Robert A. Fridell, Genetics, Howard Hughes
            Medical Institute at Duke Univ. Medical Center, DUMC, Durham, NC
            27710, USA
COMMENT     The Tat activation domain, a functionally-conserved region comprising
            cysteine-rich motifs, interacts with this human zinc finger protein
            designated HT2A. HT2A, a nuclear protein, is also found to interact
            with HIV-2 and EIAV Tat activation domains in vivo, according to [1].
            HT2A is a member of the C3HC4 family of zinc finger proteins.
            NCBI gi: 758422
FEATURES             Location/Qualifiers
     source          1..2424
                     /clone="HT2A"
                     /organism="Homo sapiens"
     CDS             111..2072
                     /note="NCBI gi: 758423"
                     /codon_start=1
                     /product="zinc-finger protein"
                     /db_xref="PID:g758423"
                     /translation="MAAAAASHLNLDALREVLECPICMESITEEQLRPKLLHCGHTIC
                     RQCLEKLLASSINGVRCPFCSKITRITSLTQLTDNLTVLKIIDTAGLSEAVGLLMCRS
                     CGRRLPRQFCRSCGLVLCEPCREADHQPPGHCTLPVKEAAEERRRDFGEKLTRLRELM
                     GELQRRKAALEGVSKDLQARYKAVLQEYGHEERRVQDELARSRKFFTGSLAEVEKSNS
                     QVVEEQSYLLNIAEVQAVSRCDYFLAKIKQADVALLEETADEEEPELTASLPRELTLQ
                     DVELLKVGHVGPLQIGQAVKKPRTVNVEDSWAMEATASAASTSVTFREMDMSPEEVVA
                     SPRASPAKQRGPEAASNIQQCLFLKKMGAKGSTPGMFNLPVSLYVTSQGEVLVADRGN
                     YRIQVFTRKGFLKEIRRSPSGIDSFVLSFLGADLPNLTPLSVAMNCQGLIGVTDSYDN
                     SLKVYTLDGHCVACHRSQLSKPWGITALPSGQFVVTDVEGGKLWCFTVDRGSGVVKYS
                     CLCSAVRPKFVTCDAEGTVYFTQGLGLNLENRQNEHHLEGGFSIGSVGPDGQLGRQIS
                     HFFSENEDFRCIAGMCVDARGDLIVADSSRKEILHFPKGGGYSVLIREGLTCPVGIAL
                     TPKGQLLVLDCWDHCIKIYSYHLRRYSTP"
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LOCUS       HUMSF2P33    1428 bp    mRNA            PRI       24-NOV-1993
DEFINITION  Human SF2p33 mRNA, complete cds.
ACCESSION   M69040
REFERENCE   1  (bases 1 to 1428)
  AUTHORS   Krainer,A.R., Mayeda,A., Kozak,D. and Binns,G.
  TITLE     Functional expression of cloned human splicing factor SF2: homology
            to RNA-binding proteins, U1 70K, and Drosophila splicing regulators
  JOURNAL   Cell 66, 383-394 (1991)
  MEDLINE   91309150
COMMENT     SF2p33 is an essential pre-mRNA splicing factor, which
            can also affect alternative 5' splice site selection in vitro by
            stimulating the use of proximal 5' splice sites.
            (Krainer, A.R., Conway, G.C., and Kozak, D. (1990) Purification and
            Characterization of SF2, a Human Pre-mRNA Splicing Factor. Genes
            Dev. 4, 1158-1171; Krainer, A.R., Conway, G.C., and Kozak, D.
            (1990) The Essential Pre-mRNA Splicing Factor SF2 Influences 5'
            Splice Site Selection by Activating Proximal Sites. Cell 62,
            35-42). This factor is also known as ASF (Ge, H., and
            Manley, J.L. (1990) A protein Factor, ASF, Controls Alternative
            Splicing of SV40 Early Pre-mRNA In Vitro. Cell 62, 25-34). SF2 p33
            consists of two polypeptides of apparent molecular weight 33 kd,
            approximately, although their predicted molecular weight is 27,744
            daltons. The two forms appear to differ by the extent of
            post-translational modification, which includes phosphorylation.
            SF2p33 binds RNA and promotes the annealing of complementary RNAs.
            It is required for assembly of pre-spliceosome complexes. The
            N-termini of the HeLa polypeptides are blocked.

            While the p32 (or p33) protein copurifies with SF2, there is no
            evidence to date that it functions as a splicing factor; rather, it
            appears to be identical to a protein named TAP (tat-associated protein;
            Yu et al., J. Virol. 69:3007, 1995). The same protein, named as YL2,
            earlier was thought to modulate Rev (Luo et al., J. Virol. 68:3850,
            1994).

            NCBI gi: 338046
FEATURES               Location/Qualifiers
     source          1..1428
                     /organism="Homo sapiens"
                     /sex="female"
     5'UTR           <1..124
     CDS             125..871
                     /note="NCBI gi: 338047"
                     /codon_start=1
                     /function="pre-mRNA splicing factor"
                     /product="SF2p33"
                     /db_xref="PID:g338047"
                     /translation="MSGGGVIRGPAGNNDCRIYVGNLPPDIRTKDIEDVFYKYGAIRD
                     IDLKNRRGGPPFAFVEFEDPRDAEDAVYGRDGYDYDGYRLRVEFPRSGRGTGRGGGGG
                     GGGGAPRGRYGPPSRRSENRVVVSGLPPSGSWQDLKDHMREAGDVCYADVYRDGTGVV
                     EFVRKEDMTYAVRKLDNTKFRSHEGETAYIRVKVDGPRSPSYGRSRSRSRSRSRSRSR
                     SNSRSRSYSPRRSRGSPRYSPRHSRSRSRT"
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MNSOD

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LOCUS       HSMNSOD       977 bp    RNA             PRI       12-NOV-1990
DEFINITION  Human mRNA for mangano-superoxide dismutase (Mn-SOD).
ACCESSION   X14322
REFERENCE   1  (bases 1 to 977)
  AUTHORS   Wispe,J.R., Clark,J.C., Burhans,M.S., Kropp,K.E., Korfhagen,T.R.
            and Whitsett,J.A.
  TITLE     Synthesis and processing of the precursor for human
            mangano-superoxide dismutase
  JOURNAL   Biochim. Biophys. Acta 994 (1), 30-36 (1989)
  MEDLINE   89076921
COMMENT     Steady-state levels of MN-SOD mRNA are lower in HeLa-tat cell lines
            than in parental lines and enzyme activity is reduced by about 50%.
            The tat effect is not seen with Cu- and Zn-dependent SODs. As a
            consequence, HeLa-tat cells show signs of oxidative stress (Flores
            et al., PNAS 90:7632,1993).
            NCBI gi: 34706
FEATURES             Location/Qualifiers
     source          1..977
                     /organism="Homo sapiens"
                     /tissue_type="liver"
                     /clone_lib="lambda gt11"
                     /clone="lambda 105"
     mRNA            1..977
                     /gene="Mn-SOD"
                     /evidence=experimental
     transit_peptide 96..167
                     /gene="Mn-SOD"
                     /evidence=experimental
     CDS             96..764
                     /gene="Mn-SOD"
                     /note="NCBI gi: 34707"
                     /codon_start=1
                     /product="Manganese superoxide dismutase"
                     /db_xref="PID:g34707"
                     /translation="MLSRAVCGTSRQLAPALGYLGSRQKHSLPDLPYDYGALEPHINA
                     QIMQLHHSKHHAAYVNNLNVTEEKYQEALAKGDVTAQTALQPALKFNGGGHINHSIFW
                     TNLSPNGGGEPKGELLEAIKRDFGSFDKFKEKLTAASVGVQGSGWGWLGFNKERGHLQ
                     IAACPNQDPLQGTTGLIPLLGIDVWEHAYYLQYKNVRPDYLKAIWNVINWENVTERYM
                     ACKK"
     mat_peptide     168..761
                     /gene="Mn-SOD"
                     /evidence=experimental
                     /product="Manganese superoxide dismutase"
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```
LOCUS       HUMHIP116A   3418 bp    mRNA            PRI       25-MAY-1995
DEFINITION  Human ATPase, DNA-binding protein (HIP116) mRNA, 3' end.
ACCESSION   L34673
REFERENCE   1  (bases 1 to 3418)
  AUTHORS   Sheridan,P.L., Schorpp,M., Voz,M.L. and Jones,K.A.
  TITLE     Cloning of an SNF2/SWI2-related protein that binds specifically to
            the SPH motifs of the SV40 enhancer and to the HIV-1 promoter
  JOURNAL   J. Biol. Chem. 270 (9), 4575-4587 (1995)
  MEDLINE   95181452
COMMENT     This protein binds to the TATA/inhibitor region of the HIV-1 promoter.
            It contains a C3hC4 zinc-finger motif interspersed between ATPase motifs.
            The authors speculate that this protein can affect transcription by
            acting as a DNA-binding ATPase.
            NCBI gi: 531195
FEATURES               Location/Qualifiers
     source          1..3418
                     /organism="Homo sapiens"
                     /cell_line="HeLa S3"
                     /sequenced_mol="cDNA to mRNA"
     5'UTR           1..177
     mRNA            1..3418
     CDS             178..3207
                     /gene="HIP116"
                     /note="SNF2/SWI2-related protein; DNA-binding protein;
                     NCBI gi: 531196"
                     /codon_start=1
                     /function="putative transcription factor"
                     /product="ATPase"
                     /db_xref="PID:g531196"
                     /translation="MSWMFKRDPVWKYLQTVQYGVHGNFPRLSYPTFFPRFEFQDVIP
                     PDDFLTSDEEVDSVLFGSLRGHVVGLRYYTGVVNNNEMVALQRDPNNPYDKNAIKVNN
                     VNGNQVGHLKKELAGALAYIMDNKLAQIEGVVPFGANNAFTMPLHMTFWGKEENRKAV
                     SDQLKKHGFKLGPAPKTLGFNLESGWGSGRAGPSYSMPVHAAVQMTTEQLKTEFDKLF
                     EDLKEDDKTHEMEPAEAIETPLLPHQKQALAWMVSRENSKELPPFWEQRNDLYYNTIT
                     NFSEKDRPENVHGGILADDMGLGKTLTAIAVILTNFHDGRPLPIERVKKNLLKKEYNV
                     NDDSMKLGGNNTSEKADGLSKDASRCSEQPSISDIKEKSKFRMSELSTSRPKRRKTAV
                     QYIESSDSEEIETSELPQKMKGKLKNVQSETKGRAKAGSSKVIEDVAFACALTSSVPT
                     TKKKMLKKGACAVEGSKKTDVEERPRTTLIICPLSVLSNWIDQFGQHIKSDVHLNFYV
                     YYGPDRIREPALLSKQDIVLTTYNILTHDYGTKGDSPLHSIRWLRVILDEGHAIRNPN
                     AQQTKAVLDLESERRWVLTGTPIQNSLKDLWSLLSFLKLKPFIDREWWHRTIQRPVTM
                     GDEGGLRRLQSLIKNITLRRTKTSKIKGKPVLELPERKVFIQHITLSDEERKIYQSVK
                     NEGRATIGRYFNEGTVLAHYADVLGLLLRLRQICCHTYLLTNAVSSNGPSGNDTPEEL
                     RKKLIRKMKLILSSGSDEECAICLDSLTVPVITHCAHVFCKPCICQVIQNEQPHAKCP
                     LCRNDIHEDNLLECPPEELARDSEKKSDMEWTSSSKINALMHALTDLRKKNPNIKSLV
                     VSQFTTFLSLIEIPLKASGFVFTRLDGSMAQKKRVESIQCFQNTEAGSPTIMLLSLKA
                     GGVGLNLSAASRVFLMDPAWNPAAEDQCFDRCHRLGQKQEVIITKFIVKDSVEENMLK
                     IQNKKRELAAGAFGTKKPNADEMKQAKINEIRTLIDL"
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HHV6O1

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LOCUS       HHV6DR       3927 bp    DNA             VRL       22-DEC-1994
DEFINITION  Human Herpesvirus Type 6 DNA.
ACCESSION   X73675
REFERENCE   1  (bases 1 to 3927)
  AUTHORS   Thompson,J., Choudhury,S., Kashanchi,F., Doniger,J., Berneman,Z.,
            Frenkel,N. and Rosenthal,L.J.
  TITLE     A transforming fragment within the direct repeat region of human
            herpesvirus type 6 that transactivates HIV-1
  JOURNAL   Oncogene 9 (4), 1167-1175 (1994)
  MEDLINE   94181269
REFERENCE   2  (bases 1 to 3927)
  AUTHORS   Thompson,J.T.
  TITLE     Direct Submission
  JOURNAL   Submitted (28-JUN-1993) to the EMBL/GenBank/DDBJ databases. J.T.
            Thompson, Georgetown University Medical Center, Dept of
            Microbiology, 3900 Reservoir Rd NW, Washington DC 20007, USA
COMMENT     Orf 1 of HHV-6 product, 357 aa,  transactivates HIV-1 LTR by 10- to
            15-fold. Minimal promoter elements are involved. See Kashanchi et al.,
            Virology 201:95,1994. Only the translation of Orf 1 of this 3927 cds
            is shown below.
            NCBI gi: 469952
FEATURES             Location/Qualifiers
     source          1..3927
                     /organism="Human herpesvirus type 6"
                     /variety="U1102"
                     /clone="pNF1022"
                     /map="DRL & UNIQUE junction"
     CDS             903..1976
                     /note="ORF1;  NCBI gi: 469953"
                     /codon_start=1
                     /db_xref="PID:g469953"
                     /translation="MRHLPFHGMPLRVQMFCAFFIRSETTDKNKATPTITFMVSCCFV
                     WVKRLFYRVGRIHHVQSLTYARPITALDSCLYVCCGYGEKLQPVGFVKSYVTNSQLDT
                     LRVLLVGKDGAVYVHHMRAARLCRLASSTTEFTRRGLQRDAVTYEEDLELPDQRMCGT
                     NARHLFDVIAAAADEHNLLTVGGLCQTHAGVSCNLLETVGDPWTAVPAARMTLTVPQV
                     QYRLWPEARRDLRRHLYAGHPLGPWLVCGVLSRERETQKPSPPIRTTVGNVPTPGPRE
                     VEIAWVVLTLAGPLLAFWPDTGKICRLANSFSTLWKMGPRAMRGHWTYSAPGRHLPGD
                     AWPLCEHVRPQVGKLPRKRAYLD"
```

```
LOCUS       HSU23731     1245 bp    mRNA            PRI       19-JUL-1995
DEFINITION  Human TAR DNA-binding protein-43 mRNA, complete cds.
ACCESSION   U23731
REFERENCE   1  (bases 1 to 1245)
  AUTHORS   Ou,S.H., Wu,F., Harrich,D., Garcia-Martinez,L.F. and Gaynor,R.B.
  TITLE     Cloning and characterization of a novel cellular protein, TDP-43,
            that binds to human immunodeficiency virus type 1 TAR DNA sequence
            motifs
  JOURNAL   J. Virol. 69 (6), 3584-3596 (1995)
  MEDLINE   95264449
REFERENCE   2  (bases 1 to 1245)
  AUTHORS   Ou,S.-H.I.
  TITLE     Direct Submission
  JOURNAL   Submitted (27-MAR-1995) S.-H.I. Ou, Internal Medicine, University
            of Texas Southwestern, 5323 Harry Hines Blvd., Dallas, TX 75209,
            USA
COMMENT     TDP-43 is a Tar DNA-binding protein of weight 43 kDa. It is said to bind
            to pyrimidine-rich motifs in the DNA and not to Tar RNA. It represses in
            vitro transcription in the presence and absence of Tat by apparently
            altering transcription complexes.
            NCBI gi: 901997
FEATURES             Location/Qualifiers
     source          1..1245
                     /organism="Homo sapiens"
                     /cell_line="HeLa cells"
     CDS             1..1245
                     /note="TDP-43 binds to HIV-1 LTR TAR DNA region and can
                     repress HIV-1 transcription; TDP-43;  NCBI gi: 901998"
                     /codon_start=1
                     /product="TAR DNA-binding protein-43"
                     /db_xref="PID:g901998"
                     /translation="MSEYIRVTEDENDEPIEIPSEDDGTVLLSTVTAQFPGACGLRYR
                     NPVSQCMRGVRLVEGILHAPDAGWGNLVYVVNYPKDNKRKMDETDASSAVKVKRAVQK
                     TSDLIVLGLPWKTTEQDLKEYFSTFGEVLMVQVKKDLKTGHSKGFGFVRFTEYETQVK
                     VMSQRHMIDGRWCDCKLPNSKQSQDEPLRSRKVFVGRCTEDMTEDELREFFSQYGDVM
                     DVFIPKPFRAFAFVTFADDQIAQSLCGEDLIIKGISVHISNAEPKHNSNRQLERSGRF
                     GGNPGGFGNQGGFGNSRGGGAGLGNNQGSNMGGGMNFGAFSINPAMMAAAQAALQSSW
                     GMMGMLASQQNQSGPSGNNQNQGNMQREPNQAFGSGNNSYSGSNSGAAIGWGSASNAG
                     SGSGFNGGFGSSMDSKSSGWGM"
```

PKR

```
LOCUS       HUMPEIF2A    2392 bp    mRNA            PRI       24-MAY-1994
DEFINITION  Human P1/eIF-2a protein kinase mRNA, complete cds.
ACCESSION   M85294
REFERENCE   1  (bases 1 to 2392)
  AUTHORS   Thomis,D.C., Doohan,J.P. and Samuel,C.E.
  TITLE     Mechanism of interferon action: cDNA structure, expression, and
            regulation of the interferon-induced, RNA-dependent P1/eIF-2 alpha
            protein kinase from human cells
  JOURNAL   Virology 188 (1), 33-46 (1992)
  MEDLINE   92230231
REFERENCE   2  (sites)
  AUTHORS   McCormack,S.J., Thomis,D.C. and Samuel,C.E.
  TITLE     Mechanism of interferon action: identification of a RNA binding
            domain within the N-terminal region of the human RNA-dependent
            P1/eIF-2 alpha protein kinase
  JOURNAL   Virology 188 (1), 47-56 (1992)
  MEDLINE   92230247
REFERENCE   3  (bases 1 to 2392)
  AUTHORS   Samuel,C.E.
  TITLE     Direct Submission
  JOURNAL   Submitted (04-JUN-1992) Charles E. Samuel, Department of Biology,
            University of California, Santa Barbara, CA 93106, USA
COMMENT     This double-stranded RNA-dependent enzyme is called PKR, DAI, or dsI
            kinase. When induced by interferon and activated by RNA, phosphoryl-
            ation of the alpha subunit of eIF-2 by this P1/eIF-2a protein kinase
            leads to inhibition of protein synthesis initiation. PKR binds TAR
            (Maitra et al., Virol. 204:823,1994; Silvastra et al., J. Biol. Chem.
            270:16619, 1995; Clemens et al., Biochemie 76:770, 1994) and Tat
            (McMillan et al., Virol. 213:413,1995).
            NCBI gi: 189781
FEATURES             Location/Qualifiers
     source          1..2392
                     /organism="Homo sapiens"
     CDS             31..1686
                     /gene="P1/eIF-2a protein kinase"
                     /note="NCBI gi: 189782"
                     /codon_start=1
                     /product="P1/eIF-2a protein kinase"
                     /db_xref="PID:g189782"
                     /translation="MAGDLSAGFFMEELNTYRQKQGVVLKYQELPNSGPPHDRRFTFQ
                     VIIDGREFPEGEGRSKKEAKNAAAKLAVEILNKEKKAVSPLLLTTTNSSEGLSMGNYI
                     GLINRIAQKKRLTVNYEQCASGVHGPEGFHYKCKMGQKEYSIGTGSTKQEAKQLAAKL
                     AYLQILSEETSVKSDYLSSGSFATTCESQSNSLVTSTLASESSSEGDFSADTSEINSN
                     SDSLNSSSLLMNGLRNNQRKAKRSLAPRFDLPDMKETKYTVDKRFGMDFKEIELIGSG
                     GFGQVFKAKHRIDGKTYVIKRVKYNNEKAEREVKALAKLDHVNIVHYNGCWDGFDYDP
                     ETSDDSLESSDYDPENSKNSSRSKTKCLFIQMEFCDKGTLEQWIEKRRGEKLDKVLAL
                     ELFEQITKGVDYIHSKKLIHRDLKPSNIFLVDTKQVKIGDFGLVTSLKNDGKRTRSKG
                     TLRYMSPEQISSQDYGKEVDLYALGLILAELLHVCDTAFETSKFFTDLRDGIISDIFD
                     KKEKTLLQKLLSKKPEDRPNTSEILRTLTVWKKSPEKNERHTC"
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LOCUS       HUM49KDA     2201 bp    mRNA            PRI       30-NOV-1995
DEFINITION  Human 49 kDa protein mRNA, complete cds.
ACCESSION   L22009
REFERENCE   1  (bases 1 to 2201)
  AUTHORS   Honore,B., Rasmussen,H.H., Vorum,H., Dejgaard,K., Liu,X.,
            Gromov,P., Madsen,P., Gesser,B., Tommerup,N. and Celis,J.E.
  TITLE     Heterogeneous nuclear ribonuclearproteins H, H', and F are members
            of a ubiquitously expressed subfamily of related but distinct
            proteins encoded by genes mapping to different chromosomes
  JOURNAL   J. Biol. Chem. 270 (48), 28780-28789 (1995)
COMMENT     Reported to be an RRE-binding protein by Xu et al., J. Biomed. Sci.
            in press, 1996 (Wong-Staal, UCSD, La Jolla, Ca.).
            NCBI gi: 347313
FEATURES             Location/Qualifiers
     source          1..2201
                     /organism="Homo sapiens"
                     /cell_line="MRC-5 V2"
                     /cell_type="Fibroblast"
                     /sequenced_mol="cDNA to mRNA"
                     /tissue_lib="lambda ZAP II"
     CDS             73..1422
                     /note="49 kDa protein;  NCBI gi: 347314"
                     /codon_start=1
                     /db_xref="PID:g347314"
                     /translation="MMLGTEGGEGFVVKVRGLPWSCSADEVQRFFSDCKIQNGAQGIR
                     FIYTREGRPSGEAFVELESEDEVKLALKKDRETMGHRYVEVFKSNNVEMDWVLKHTGP
                     NSPDTANDGFVRLRGLPFGCSKEEIVQFFSGLEIVPNGITLPVDFQGRSTGEAFVQFA
                     SQEIAEKALKKHKERIGHRYIEIFKSSRAEVRTHYDPPRKLMAMQRPGPYDRPGAGRG
                     YNSIGRGAGFERMRRGAYGGGYGGYDDYNGYNDGYGFGSDRFGRDLNYCFSGMSDHRY
                     GDGGSTFQSTTGHCVHMRGLPYRATENDIYNFFSPLNPVRVHIEIGPDGRVTGEADVE
                     FATHEDAVAAMSKDKANMQHRYVELFLNSTAGASGGAYEHRYVELFLNSTAGASGGAY
                     GSQMMGGMGLSNQSSYGGPASQQLSGGYGGGYGGQSSMSGYDQVLQENSSDFQSNIA"
```

Trp185

```
LOCUS       HSU38847     5173 bp    mRNA            PRI       14-FEB-1996
DEFINITION  Human TAR RNA loop binding protein (TRP-185) mRNA, complete cds.
ACCESSION   U38847
REFERENCE   1  (bases 1 to 5173)
  AUTHORS   Wu-Baer,F., Lane,W.S. and Gaynor,R.B.
  TITLE     The cellular factor TRP-185 regulates RNA polymerase II binding to
            HIV-1 TAR RNA
  JOURNAL   EMBO J. 14, 5995-6009 (1995)
REFERENCE   2  (bases 1 to 5173)
  AUTHORS   Wu-Baer,F. and Gaynor,R.B.
  TITLE     Direct Submission
  JOURNAL   Submitted (17-OCT-1995) Foon Wu-Baer, Internal Medicine, UT
            Southwestern Medical Center, 5323 Harry Hines Blvd., Dallas, TX
            75235-8594, USA
COMMENT     Trp185 binds to TAR RNA and thereby modulates the binding of RNA
            polymerase II [1].
            NCBI gi: 1184691
FEATURES             Location/Qualifiers
     source          1..5173
                     /organism="Homo sapiens"
     CDS             1..4866
                     /gene="TRP-185"
                     /note="Method: conceptual translation supplied by author.;
                     TRP-185;  NCBI gi: 1184692"
                     /codon_start=1
                     /product="TAR RNA loop binding protein"
                     /db_xref="PID:g1184692"
                     /translation="MEWVLAEALLSQSRDPRALLGALCQGEASAERVETLRFLLQRLE
                     DEEARGSGGAGALPEAAREVAAGYLVPLLRSLRGRPAGGPDPSLQPRHRRRVLRAAGA
                     ALRSCVRLAGRPQLAAALAEEALRDLLAGWRAPGAEAAVEVLAAVGPCLRPREDGPLL
                     ERVAGTAVALALGGGGDGDEAGPAEDAAALVAGRLLPVLVQCGGAALRAVWGGLAAPG
                     ASLGSGRVEEKLLVLSALAEKLLPEPGGDRARGAREAGPDARRCWRFWRTVQAGLGQA
                     DALTRKRARYLLQRAVEVSAELGADCTCGPQEGNGPSLFWWSERKKDELLKFWENYIL
                     IMETLEGNQIHVIKPVLPKLNNLFEYAVSEENGCWLFHPSWHMCIYKRMFESENKILS
                     KEGVIHFLELYETKILPFSPEFSEFIIGPLMDALSESSLYSRSPGQPIGSCSPLGLKL
                     QKFLVTYISLLPEEIKSSFLLKFIRKMTSRHWCAVPILFLSKALANVPRHKALGIDGL
                     LALRDVIHCTMITHQILLRGAAQCYLLQTAMNLLDVEKVSLSDVSTFLMSLRQEESLG
                     RGTSLWTELCDWLRVNESYFKPSPTCSSIGLHKTSLNAYVKSIVQEYVKSSAWETGEN
                     CFMPDWFEAKLVSLMVLLAVDVEGMKTQYSGKQRTENVLRIFLDPLLDVLMKFSTNAY
                     MPLLKTDRCLQLLLKLLNTCRLKGSSAQDDEVSTVLQNFFMSTTESISEFILRRLTMN
                     ELNSVSDLDRCHLYLMVLTELINLHLKVGWKRGNPIWRVISLLKNASIQHLQEMDSGQ
                     EPTVGSQIQRVVSMAALAMVCEAIDQKPELQLDSLHAGPLESFLSSLQLNQTLQKPHA
                     EEQSSYAHPLECSSVLEESSSSQGWGKIVAQYIHDQWVCLSFLLKKYHTLIPTTGSEI
                     LEPFLPAVQMPIRTLQSALEALTVLSSDQVLPVFHCLKVLVPKLLTSSESLCIESFDM
                     AWKIISSLSNTQLIFWANLKAFVQFVFDNKVLTIAAKIKGQAYFKIKEIMYKIIEMSA
                     IKTGVFNTLISYCCQSWIVSASNVSQGSLSSAKNYSELILEACIFGTVFRRDQRLVQD
                     VQTFIENLGHDCAANIVMENTKREDHYVRICAVKFLCLLDGSNMSHKLFIEDLAIKLL
                     DKDELVSKSKKRYYVNSLQHRVKNRVWQTLLVLFPRLDQNFLNGIIDRIFQAGFTNNQ
                     ASIKYFIEWIIILILHKFPQFLPKFWDCFSYGEENLKTSICTFLAVLSHLDIITQNIP
                     EKKLILKQALIVVLQWCFNHNFSVRLYALVALKKLWTVCKVLSVEEFDALTPVIESSL
                     HQVESMHGAGNAKKNWQRIQEHFFFATFHPLKDYCLETIFYILPRLSGLIEDEWITID
                     KFTRFTDVPLAAGFQWYLSQTQLSKLKPGDWSQQDIGTNLVEADNQAEWTDVQKKIIP
                     WNSRVSDLDLELLFQDRAARLGKSISRLIVVASLIDKPTNLGGLCRTCEVFGASVLVV
                     GSLQCISDKQFQHLSVSAEQWLPLVEVKPPQLIDYLQQKKTEGYTIIGVEQTAKSLDL
                     TQYCFPEKSLLLLGNEREGIPANLIQQLDVCVEIPQQGIIRSLNVHVSGALLIWEYTR
                     QQLLSHGDTKP"
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```
LOCUS       HUMTCSM      1160 bp    mRNA            PRI       15-JUN-1989
DEFINITION  Human T cell-specific protein (RANTES) mRNA, complete cds.
ACCESSION   M21121
REFERENCE   1  (bases 1 to 1160)
  AUTHORS   Schall,T.J., Jongstra,J., Dyer,B.J., Jorgensen,J., Clayberger,C.,
            Davis,M.M. and Krensky,A.M.
  TITLE     A human T cell-specific molecule is a member of a new gene family
  JOURNAL   J. Immunol. 141, 1018-1025 (1988)
  MEDLINE   88285659
COMMENT     A chemokine that is found to be a suppressive factor for HIV (Cocchi
            and coworkers, Science 270:1811,1995). See also MIP1A and MIP1B.

            Draft entry and computer-readable sequence for [1] kindly provided
            by A.M.Krensky, 24-OCT-1988.

            NCBI gi: 339420
FEATURES               Location/Qualifiers
     source          1..1160
                     /organism="Homo sapiens"
     CDS             27..302
                     /note="T cell-specific protein precursor;  NCBI gi:
                     339421"
                     /codon_start=1
                     /db_xref="PID:g339421"
                     /translation="MKVSAARLAVILIATALCAPASASPYSSDTTPCCFAYIARPLPR
                     AHIKEYFYTSGKCSNPAVVFVTRKNRQVCANPEKKWVREYINSLEMS"
     sig_peptide     27..95
                     /note="T cell-specific protein signal peptide"
                     /codon_start=1
     mat_peptide     96..299
                     /note="T cell-specific protein"
                     /codon_start=1
     repeat_region   450..950
                     /note="Alu-related repeats"
```

MIP1A

```
LOCUS       HUMMIP1A      775 bp    mRNA            PRI       28-OCT-1992
DEFINITION  Human macrophage inflammatory protein (G0S19-1) mRNA, complete cds.
ACCESSION   M23452
REFERENCE   1  (bases 1 to 775)
  AUTHORS   Blum,S., Forsdyke,R.E. and Forsdyke,D.R.
  TITLE     Three human homologs of a murine gene encoding an inhibitor of stem
            cell proliferation
  JOURNAL   DNA Cell Biol. 9, 589-602 (1990)
  MEDLINE   91103879
COMMENT     A chemokine that is found to be an HIV suppressive factor (Cocchi et
            al., Science 270:1811,1995). See also RANTES and MIP1B (sequence not
            available for the latter).

            Draft entry and computer-readable sequence for
            [1] kindly submitted
            by D.R.Forsdyke, 30-JUN-1989.
            The G0S19 genes are members of the 'small inducible' family of
            genes.  The G0S19-1 product is homologous to the alpha subunit of
            the murine cytokine MIP1.

            NCBI gi: 188558
FEATURES               Location/Qualifiers
     source          1..775
                     /organism="Homo sapiens"
                     /cell_type="peripheral lymphocyte"
                     /sequenced_mol="cDNA to mRNA"
     sig_peptide     84..143
                     /note="G0S19-1 peptide signal peptide"
                     /codon_start=1
     CDS             84..362
                     /note="G0S19-1 peptide precursor;  NCBI gi: 188559"
                     /codon_start=1
                     /db_xref="PID:g188559"
                     /translation="MQVSTAALAVLLCTMALCNQFSASLAADTPTACCFSYTSRQIPQ
                     NFIADYFETSSQCSKPGVIFLTKRSRQVCADPSEEWVQKYVSDLELSA"
     mat_peptide     144..359
                     /note="G0S19-1 peptide"
                     /codon_start=1
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```
LOCUS       HSUDGM       1224 bp    RNA             PRI       12-SEP-1993
DEFINITION  Human mRNA for uracil-DNA glycosylase.
ACCESSION   X52486
REFERENCE   1  (bases 1 to 1224)
  AUTHORS   Caradonna,S.J.
  TITLE     Direct Submission
  JOURNAL   Submitted (06-MAR-1990) to the EMBL/GenBank/DDBJ databases.
            Caradonna S.J., University of Med. and Dent. of New Jersey, Dept of
            Biochemistry, 675 Hoes Lane, Piscataway New Jersey 08854, U S A
REFERENCE   2  (bases 1 to 1224)
  AUTHORS   Muller,S.J. and Caradonna,S.
  TITLE     Isolation and characterization of a human cDNA encoding uracil-DNA
            glycosylase
  JOURNAL   Biochim. Biophys. Acta 1088 (2), 197-207 (1991)
  MEDLINE   91159471
COMMENT     The uracil DNA glycosylase is an HIV vpR-binding protein (Bonhamdan
            et al., J. Virol 70:697,1996).
            Data kindly reviewed (07-NOV-1990) by Muller S.J.

            NCBI gi: 37586
FEATURES               Location/Qualifiers
     source          1..1224
                     /organism="Homo sapiens"
                     /cell_type="T-cell"
                     /cell_line="Jurkat"
                     /clone_lib="lambda gt11"
                     /chromosome="5"
     CDS             80..1060
                     /note="uracil-DNA glycosylase;  NCBI gi: 37587"
                     /codon_start=1
                     /db_xref="PID:g37587"
                     /translation="MEPLPSFELLSPLREVTLYDALCTAPGPNPGVPAQQARSVSSFH
                     CVSLSELFLPLSWEAPRFFLALPSLPQLPLHPKPSGPASPPPSRQVTAESRCKLLSWL
                     IPVHRQFGLSFESLCLTVNTLDRFLTTTPVLQTASSCLGSPPCSSLANRWRCTRRAWK
                     QLLALCCGAFSRQQLCNLECIRAAQAALHPGCATISFFLTFQHLLSAARPPKLWKRKP
                     WRRGVAELSLADYAFTSYSPSLLAICCLALADRMLRLAARGLATGRPPGGGAGGLYGQ
                     VAAAGGHKQYFLDSHAARSDLREVQPAPELEIKQILRFLLVPGPAAGPLP"
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p56lck

```
LOCUS       HSU23852     2129 bp    mRNA            PRI       29-NOV-1995
DEFINITION  Human T-lymphocyte specific protein tyrosine kinase p56lck (lck)
            abberant mRNA, complete cds.
ACCESSION   U23852
REFERENCE   1  (bases 1 to 2129)
  AUTHORS   Vogel,L.B. and Fujita,D.J.
  TITLE     The SH3 domain of p56lck is involved in binding to
            phosphatidylinositol 3'-kinase from T lymphocytes
  JOURNAL   Mol. Cell. Biol. 13 (12), 7408-7417 (1993)
  MEDLINE   94067101
REFERENCE   2  (bases 1 to 2129)
  AUTHORS   Vogel,L.B. and Fujita,D.J.
  TITLE     p70 phosphorylation and binding to p56lck is an early event in
            interleukin-2-induced onset of cell cycle progression in
            T-lymphocytes
  JOURNAL   J. Biol. Chem. 270 (6), 2506-2511 (1995)
  MEDLINE   95155308
REFERENCE   3  (bases 1 to 2129)
  AUTHORS   Vogel,L.B., Arthur,R. and Fujita,D.F.
  TITLE     An abberant lck mRNA in two human T-cell lines
  JOURNAL   Biochim. Biophys. Acta 1264, 168-172 (1995)
REFERENCE   4  (bases 1 to 2129)
  AUTHORS   Vogel,L.B., Arthur,R. and Fujita,D.F.
  TITLE     Direct Submission
  JOURNAL   Submitted (31-MAR-1995) Lee B. Vogel, Developmental Biology, CNRS
            Station Biologique, Place Georges-Teissier, Roscoff 29680, France
COMMENT     P56lck binds to both the 27 kDa and the 25 kDa isoforms of HIV-1
            nef. Nef appears to interfere with the activation of p56lck. (Greenway
            et al., J. Virol. 69:1842,1995). Note that this sequence is aberrant.
            NCBI gi: 775207
FEATURES             Location/Qualifiers
     source          1..2129
                     /organism="Homo sapiens"
                     /cell_line="Molt-4"
                     /cell_type="T-lymphocyte"
                     /chromosome="1"
                     /map="1p35-p32"
     CDS             60..1151
                     /gene="lck"
                     /note="truncated form of T-lymphocyte-specific protein
                     tyrosine kinase p56lck; this abberant message encoding
                     primarily the SH2 and SH3 domains of p56lck was observed
                     by nothern hybridization and PCR amplification in poly-A
                     selected RNA from two human leukemic T-cell lines.  NCBI
                     gi: 775208"
                     /codon_start=1
                     /product="p56lck"
                     /db_xref="PID:g775208"
                     /translation="MGCGCSSHPEDDWMENIDVCENCHYPIVPLDGKGTLLIRNGSEV
                     RDPLVTYEGSNPPASPLQDNLVIALHSYEPSHDGDLGFEKGEQLRILEQSGEWWKAQS
                     LTTGQEGFIPFNFVAKANSLEPEPWFFKNLSRKDAERQLLAPGNTHGSFLIRESESTA
                     GSFSLSVRDFDQNQGEVVKHYKIRNLDNGGFYISPRITFPGLHELVRHYTNASDGLCT
                     RLSRPCQTQKPQKPWWEDEWEVPRETLKLVERLGAGQFGEVWMGYYNGHTKVAVKSLK
                     QGSMSPDAFLAEANLMKQLQHQRLVRLYAVVTQEPIYIITEYMENGSLVDFLKTPSGI
                     KLTINKLLDMAAQVRRLGRGAGQGNRPVT"
```

```
LOCUS       HSP53G      20303 bp    DNA             PRI       23-APR-1992
DEFINITION  Human p53 gene for transformation related protein p53 (also called
            transformation-associated protein p53, cellular tumor antigen p53,
            and non-viral tumour antigen p53).
ACCESSION   X54156
REFERENCE   1  (bases 1 to 20303)
  AUTHORS   Chumakov,P.M.
  TITLE     Direct Submission
  JOURNAL   Submitted (02-AUG-1990) to the EMBL/GenBank/DDBJ databases.
            Chumakov P.M., Engelhardt Inst. of Molecular Biology, Academy of
            Science of the USSR, Vavilov St. 32, 117984 Moscow, USSR
REFERENCE   2  (bases 1 to 20303)
  AUTHORS   Chumakov,P.M., Almazov,V.P. and Jenkins,J.R.
  JOURNAL   Unpublished
REFERENCE   3  (bases 1 to 20303)
  AUTHORS   Futreal,P.A., Barrett,J.C. and Wiseman,R.W.
  TITLE     An Alu polymorphism intragenic to the TP53 gene
  JOURNAL   Nucleic Acids Res. 19 (24), 6977 (1991)
  MEDLINE   92107726
COMMENT     P53 is found to bind HIV-1 nef (Greenway et al., J. Virol. 69:
            1842, 1995).

            See also entries K03199, M14690, M14695, X01405, X02469, M22881-4,
            M22887-8, M22894-8.
            See also Mol. Cell. Biol. 6:1379-1385(1986);
            and Mol. Cell. Biol. 7:961-963(1987).

            NCBI gi: 35213
FEATURES             Location/Qualifiers
     source          1..20303
                     /organism="Homo sapiens"
                     /strain="caucasian"
                     /chromosome="17p13"
     mRNA            join(843..949,11689..11790,11906..11927,12021..12299,
                     13055..13238,13320..13432,14000..14109,14452..14588,
                     14681..14754,17572..17678,18599..19876)
                     /gene="p53"
     prim_transcript 843..19876
                     /gene="p53"
     exon            843..949
                     /number=1
     intron          950..11688
                     /number=1
     exon            11689..11790
                     /number=2
     CDS             join(11717..11790,11906..11927,12021..12299,13055..13238,
                     13320..13432,14000..14109,14452..14588,14681..14754,
                     17572..17678,18599..18680)
                     /gene="p53"
                     /note="NCBI gi: 35214"
                     /codon_start=1
                     /product="protein p53"
                     /db_xref="PID:g35214"
                     /translation="MEEPQSDPSVEPPLSQETFSDLWKLLPENNVLSPLPSQAMDDLM
                     LSPDDIEQWFTEDPGPDEAPRMPEAAPRVAPAPAAPTPAAPAPAPSWPLSSSVPSQKT
                     YQGSYGFRLGFLHSGTAKSVTCTYSPALNKMFCQLAKTCPVQLWVDSTPPPGTRVRAM
                     AIYKQSQHMTEVVRRCPHHERCSDSDGLAPPQHLIRVEGNLRVEYLDDRNTFRHSVVV
                     PYEPPEVGSDCTTIHYNYMCNSSCMGGMNRRPILTIITLEDSSGNLLGRNSFEVRVCA
                     CPGRDRRTEEENLRKKGEPHHELPPGSTKRALPNNTSSSPQPKKKPLDGEYFTLQIRG
                     RERFEMFRELNEALELKDAQAGKEPGGSRAHSSHLKSKKGQSTSRHKKLMFKTEGPDS
                     D"
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erk1

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LOCUS       HSERK1       1866 bp    RNA             PRI       06-SEP-1993
DEFINITION  Human ERK1 mRNA for protein serine/threonine kinase.
ACCESSION   X60188
REFERENCE   1  (bases 1 to 1866)
  AUTHORS   Pelech,S.L.
  TITLE     Direct Submission
  JOURNAL   Submitted (23-JUN-1991) to the EMBL/GenBank/DDBJ databases. S.L.
            Pelech, Biomedical Res Centre, 2222 Health Science Hall, Univ of
            British Columbia, Vancouver B C V6T 1Z3, CANADA
REFERENCE   2  (bases 1 to 1866)
  AUTHORS   Charest,D.L., Mordret,G., Harder,K.W., Jirik,F. and Pelech,S.L.
  TITLE     Molecular cloning, expression, and characterization of the human
            mitogen-activated protein kinase p44erk1
  JOURNAL   Mol. Cell. Biol. 13 (8), 4679-4690 (1993)
  MEDLINE   93330262
COMMENT     ERK1, or p44 mapK, a protein involved in intracellular signalling,
            binds to HIV-1 27 kDa nef but not to 25 kDa nef (Greenway et al.,
            J. Virol. 69:1842,1995).
            NCBI gi: 31220
FEATURES             Location/Qualifiers
     source          1..1866
                     /organism="Homo sapiens"
                     /tissue_type="liver tumor"
                     /cell_type="hepatoblastoma"
                     /cell_line="HepG2"
                     /clone_lib="HepG2"
                     /clone="p26a-Beta-3"
                     /chromosome="16"
     mRNA            1..1866
                     /gene="ERK1"
                     /evidence=experimental
     CDS             73..1212
                     /gene="ERK1"
                     /note="NCBI gi: 31221"
                     /codon_start=1
                     /product="protein serine/threonine kinase"
                     /db_xref="PID:g31221"
                     /translation="MAAAAAQGGGGGEPRRTEGVGPGVPGEVEMVKGQPFDVGPRYTQ
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                     NVLHRDLKPSNLLSNTTCDLKICDFGLARIADPEHDHTGFLTEYVATRWYRAPEIMLN
                     SKGYTKSIDIWSVGCILAEMLSNRPIFPGKHYLDQLNHILGILGSPSQEDLNCIINMK
                     ARNYLQSLPSKTKVAWAKLFPKSDSKALDLLDRMLTFNPNKRITVEEALAHPYLEQYY
                     DPTDEPVAEEPFTFAMELDDLPKERLKELIFQETARFQPGVLEAP"
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LOCUS       HUMHCKA      2015 bp    mRNA            PRI       08-NOV-1994
DEFINITION  Human hemopoietic cell protein-tyrosine kinase (HCK) gene, complete
            cds, clone lambda-a2/1a.
ACCESSION   M16591
REFERENCE   1  (bases 1 to 2015)
  AUTHORS   Quintrell,N., Lebo,R., Varmus,H., Bishop,J.M., Pettenati,M.J., Le
            Beau,M.M., Diaz,M.O. and Rowley,J.D.
  TITLE     Identification of a human gene (HCK) that encodes a
            protein-tyrosine kinase and is expressed in hemopoietic cells
  JOURNAL   Mol. Cell. Biol. 7 (6), 2267-2275 (1987)
  MEDLINE   87257942
COMMENT     Hck is a member of the Src family kinases that binds to HIV-1 nef
            PxxP motifs (SH3 mediated interaction). Hck from U937 cells preci-
            pitated by nef (Saksela et al., EMBO J.14: 484, 1995 and EMBO J.
            14: 5006, 1995).
            NCBI gi: 183911
FEATURES             Location/Qualifiers
     source          1..2015
                     /organism="Homo sapiens"
     mRNA            <1..2015
                     /note="HCK mRNA"
     CDS             169..1686
                     /gene="HCK"
                     /map="20q11-q12"
                     /note="protein-tyrosine kinase;  NCBI gi: 306832"
                     /codon_start=1
                     /db_xref="GDB:G00-119-303"
                     /db_xref="PID:g306832"
                     /translation="MGSMKSKFLQVGGNTFSKTETSASPHCPVYVPDPTSTIKPGPNS
                     HNSNTPGIREAGSEDIIVVALYDYEAIHHEDLSFQKGDQMVVLEESGEWWKARSLATR
                     KEGYIPSNYVARVDSLETEEWFFKGISRKDAERQLLAPGNMLGSFMIRDSETTKGSYS
                     LSVRDYDPRQGDTVKHYKIRTLDNGGFYISPRSTFSTLQELVDHYKKGNDGLCQKLSV
                     PCMSSKPQKPWEKDAWEIPRESLKLEKKLGAGQFGEVWMATYNKHTKVAVKTMKPGSM
                     SVEAFLAEANVMKTLQHDKLVKLHAVVTKEPIYIITEFMAKGSLLDFLKSDEGSKQPL
                     PKLIDFSAQIAEGMAFIEQRNYIHRDLRAANILVSASLVCKIADFGLARVIEDNEYTA
                     REGAKFPIKWTAPEAINFGSFTIKSDVWSFGILLMEIVTYGRIPYPGMSNPEVIRALE
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lyn

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LOCUS       HUMLYN       2298 bp    mRNA            PRI       07-JAN-1995
DEFINITION  Human lyn mRNA encoding a tyrosine kinase.
ACCESSION   M16038
SOURCE      Human cDNA to mRNA.
REFERENCE   1  (bases 1 to 2298)
  AUTHORS   Yamanashi,Y., Fukushige,S., Semba,K., Sukegawa,J., Miyajima,N.,
            Matsubara,K., Yamamoto,T. and Toyoshima,K.
  TITLE     The yes-related cellular gene lyn encodes a possible tyrosine
            kinase similar to p56lck
  JOURNAL   Mol. Cell. Biol. 7 (1), 237-243 (1987)
  MEDLINE   87172710
COMMENT     Lyn is a member of the Src family kinases that binds to nef through
            PxxP motifs (SH3-mediated interaction) (Saksela et al., EMBO J. 14:
            484, 1995).
            NCBI gi: 187268
FEATURES             Location/Qualifiers
     source          1..2298
                     /organism="Homo sapiens"
     CDS             298..1836
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                     /map="8q13-qter"
                     /note="lyn tyrosine kinase;  NCBI gi: 307144"
                     /codon_start=1
                     /db_xref="GDB:G00-120-159"
                     /db_xref="PID:g307144"
                     /translation="MGCIKSKGKDSLSDDGVDLKTQPVRNTERTIYVRDPTSNKQQRP
                     VPESQLLPGQRFQTKDPEEQGDIVVALYPYDGIHPDDLSFKKGEKMKVLEEHGEWWKA
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                     LKGSFSLSVRDFDPVHGDVIKHYKIRSLDNGGYYISPRITFPCISDMIKHYQKQADGL
                     CRRLEKACISPKPQKPWDKDAWEIPRESIKLVKRLGAGQFGEVWMGYYNNSTKVAVKT
                     LKPGTMSVQAFLEEANLMKTLQHDKLVRLYAVVTREEPIYIITEYMAKGSLLDFLKSD
                     EGGKVLLPKLIDFSAQIAEGMAYIERKNYIHRDLRAANVLVSESLMCKIADFGLARVI
                     EDNEYTAREGAKFPIKWTAPEAINFGCFTIKSDVWSFGILLYEIVTYGKIPYPGRTNA
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                     QQQP"
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