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Insilco analysis of functionally important residues in folate receptors

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Abstract:

Lack of crystal structure data of folate binding proteins has left so many questions unanswered (for example, important residues in active site, binding domain, important amino acid residues involved in interactions between ligand and receptor). With sequence alignment and PROSITE motif identification, we attempted to answer evolutionarily significant residues that are of functional importance for ligand binding and that form catalytic sites. We have analyzed 46 different FRs and FBP sequences of various organisms obtained from Genbank. Multiple sequence alignment identified 44 highly conserved identical amino acid residues with 10 cysteine residues and 12 motifs including ECSPNLGPW (which might help in the structural stability of FR).

Keywords: folate receptors (FR); folate binding proteins (FBP); multiple sequence alignment; consensus sequence; conserved motifs; evolutionary trace (ET)

Background:

Folate is the major source of one carbon moiety during DNA biosynthesis in various organisms. Internalization of the folic acid into cell is mediated by folate receptors (FRs) or folate binding proteins (FBPs) or by reduced folate carriers (RFCs). [1, 2] The FRs are clustered on the cell surface and associated with uncoated membrane invaginations known as caveolae. [3, 4] Folate binds to the externally oriented receptor and is followed by internalization. After binding and internalization, at low pH folate receptor disassociates from folate and is transported back to the cell surface through potocytosis. [2, 5, 6] Based on the tissue expression and affinity of binding towards folic acid and its various analogues into three major types, FR1 (FR-α), FR2 (FR-β), FR3 (FR-γ). [7] FR1 (FR- α) and FR2 (FR- β) are membrane bound GPI anchored and expressed in adult epithelial cells and placental (fetal) tissues respectively [8, 9, 10], FR3 (FR- γ) is a secretory protein as it lacks signal for GPI attachment [11] and is developmentally highly regulated with a restricted spatial (tissue specific) or temporal (time specific) expression pattern. [12] The presence of fourth rare type is also reported as FR4 (FR-\delta). [10] FR1 and FR2 differ not only on tissue expression but also in binding affinities and stereo specificities to various folate analogues. [10] It is been reported that, Folate receptors and Riboflavin binding proteins share more than ~30% sequence similarity. [13] In both cases, sequences exhibited 16 conserved cysteine residues that form eight bridges important for ligand binding. The N-terminal and centre portion of the sequences show very high similarity rather than C-terminal. [14] Here, we attempted to explore the important residues that may play an important ISSN 0973-2063

role in the binding of folic acid and various analogues. This may help us to find mechanism of binding and interactions of the folate receptor subtypes with folic acid and its analogues under divergent physiologic condition. This study will provide information about the differential efficacy of the compounds such as, Methotrexate (MTX) in relation to developing new strategy in relation to cancer therapy.

Multiple sequence alignments are often used to find out conserved sequence regions in a group of sequences. Here, we have used ClustalW multiple sequence alignment tool which produces biologically meaningful alignments of divergent sequences. Through multiple sequence alignment we can also find out motifs which are short conserved sequence among set of sequences. The detection of conserved residues will be useful in identifying the functionally important residue even in the absence of structural information.

Methodology:

Dataset

We retrieved 140 folate related sequences by keyword search at GenBank [15]. We manually curated the dataset to remove redundant sequences. Thus, a refined dataset of 46 non-redundant sequences of different folate receptors and folate binding proteins were created. To study evolutionarily trend among conserved functional residues in these sequences (about 250 residues in length), we grouped them based on sequence source (12 different organisms). (See: supplementary material).

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Hypothesis

Multiple sequence alignment

The 46 sequences are subjected to multiple sequence alignment as a first step to assess sequence conservation of single residue or motifs (residue stretch). Multiple sequence alignment was done using CLUSTAL-W. [16] Different parameters were tested and manual editing was performed wherever required to get significant alignment.

Motif Identification

The conserved motifs identified by multiple sequence alignment are submitted to PROSITE web server to scan against existing signatures and identify motifs unique to folate receptor [17].

Discussion:

Conserved and variable amino acids

Multiple alignments of all FBP sequences are presented in Figure 2. A list of conserved amino acids is presented in figure 1 with the percentage of conservation and the m igure 1 with the percentage of conservation and the major substitutions present at the position. Figure 1 shows that L^{217} , C^{221} , M^{222} , H^{227} , K^{228} , P^{2449} , E^{247} , L^{250} , C^{307} , P^{309} , W^{310} , C^{315} , C^{223} , S^{328} , F^{341} , H^{345} , C^{346} , H^{370} , F^{371} , Q^{373} , C^{376} , E^{379} , C^{380} , S^{381} , P^{382} , N^{383} , L^{384} , G^{385} , P^{386} , W^{387} , E^{409} , R^{437} , P^{442} , L^{443} , C^{444} , E^{464} , D^{465} , C^{466} , W^{470} , C^{473} , T^{478} , C^{479} , W^{486} and W^{490} residues are absolutely conserved in all the sequence of folate receptors. Although 44 residues showed 100% conservation, an additional 6 residues (K^{225} , D^{248} , T^{327} , G^{347} , I^{388} , K^{480} , and G^{489}) showed more than 95% conservation (Figure 1).

| Alignment position (a) | Residues (b) | Percentage (c) | Alignment position (a) | Residues (b) | Percentage (c) | |
|--|--------------|----------------|---------------------------|--------------|--|--|
| 218 | L | 100 | 372 | I V | 94 6 | |
| 219 | N S | 91 9 | 373 | Q | 100 | |
| 220 | | 91 9 | 376 | С | 100 | |
| 221 | С | 100 | 377 | L F | 79 21 | |
| 222 | N | 100 | 379 | E | 100 | |
| (1020) | N | 40 | | 122 | | |
| 223 | K D | 2 58 | 380 | С | 100 | |
| 10000 | K | 96 | | | 100000 | |
| 225 | R | 4 | 381 | S | 100 | |
| 227 | н | 100 | 382 | Р | 100 | |
| 228 | ĸ | 100 | 383 | N | 100 | |
| 244 | Р | 100 | 384 | L | 100 | |
| 245 | G | 81 | 385 | G | 100 | |
| | S | 19 | | | | |
| 247 | E D | 100 96 | 386 | Р | 100 | |
| 248 | G | 4 | 387 | W | 100 | |
| | | | | 1 | 98 | |
| 250 | L | 100 | 388 | F | 2 | |
| 251 | н | 70 | 409 | E | 100 | |
| | Y | 30 | | | (1993) | |
| 310 | w | 100 | 437 | R | 100 | |
| 2 m m | N | 90 | | V I | 35 33 | |
| 313 | R | 6 | 438 | F | 25 | |
| | к | 4 | | Ĺ | 4 | |
| 314 | Α | 85 | 442 | Р | and the second | |
| 100 C | S | 15 | | P | 100 | |
| 315 | С | 100 | 443 | L | 100 | |
| 323 | С | 100 | 444 | С | 100 | |
| 327 | T | 96 | 465 | D | 100 | |
| 328 | s | 100 | 466 | С | 100 | |
| | S | 87 | | | | |
| 336 | P | 13 | 470 | W | 100 | |
| | | | | E | 85 | |
| 339 | Y | 87 | 471 | R | 9 | |
| 559 | F | 13 | | ĸ | 4 | |
| | | 100 | | Q | 2 | |
| 341 | F | 100 | 473 | C R | 100 62 | |
| 0025 | 202 | 11000000 | 192210 | K | 24 | |
| 345 | н | 100 | 474 | H | 10 | |
| N 10 10 10 10 10 10 10 10 10 10 10 10 10 | | | | Q | 4 | |
| 346 | С | 100 | 478 | Ť | 100 | |
| 347 | G | 98 | 479 | С | 100 | |
| 2.47 | S | 2 | | | 1000 (1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - | |
| 348 | M | 77 | 480 | K | 98 | |
| S1033644 | L K | 23 77 | | R | 2 | |
| | R | 15 | 1 | N | 85 | |
| 353 | Ĥ | 4 | 482 | D | 13 | |
| | E | 2 | | s | 2 | |
| | Q | 2 | | | | |
| 370 | н | 100 | 489 | G | 98 | |
| | F | 100 | 490 | S W | 2 100 | |
| 371 | P 2 | 100 | 490 | W | 100 | |

Figure 1: Conserved amino acids in members of FBP sequences (a) Amino acid position by alignment (b) Consensus residues given at positions are in bold. Residues over 85% are shaded (c) Percentage of 46 aligned sequences in which the listed residue appears. Percentages are rounded to the nearest number. Residues over 85% are shaded

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Hypothesis

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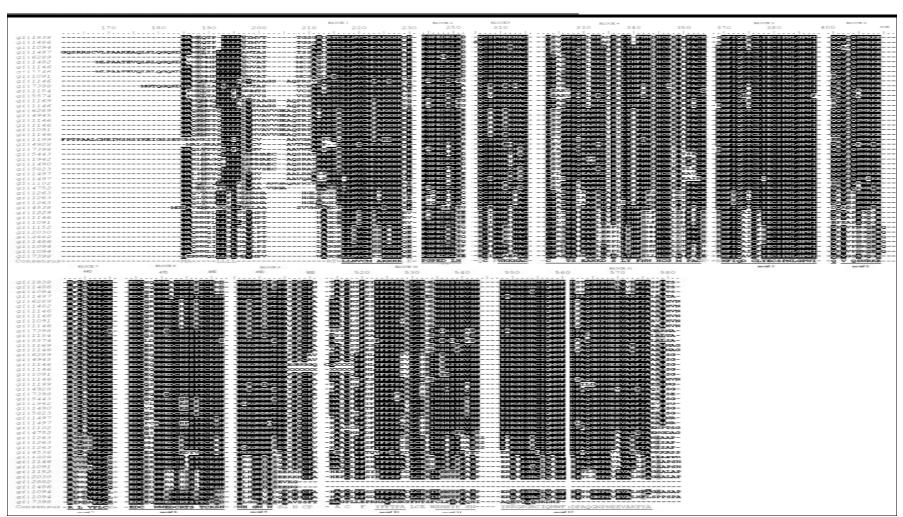


Figure 2: Shown in next four pages. Multiple sequence alignment of 46 members of FBPs. Conserved residues are highlighted in block (an arbitrary cut-off of 50% was used for conservation). Dashes represent gaps, introduced for the best alignment. A consensus sequence is shown at the bottom of each column, with conserved amino acid motifs underlined. For full protein names, see Supplementary material

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Structural or functional domain elements are generally formed by grouping of conserved amino acids. The 44 amino acids are very well conserved, with few similar amino acid residue substitutions not altering the overall property. For example, in cases where the consensus residue is an aromatic amino acid (Trp, Tyr, Phe) an aromatic substitution occurs in 87% of cases and non aromatic amino acids occurs only 13% of cases. For example, at position 339, which has conserved Tyr, has 6 aromatic amino acid substitutions (6 Phe) which are shown in figure 1. In position 561, which has conserved Asp residue is substituted with similar amino acid Glu in 8 sequences. In some cases, aliphatic character was completely conserved, such as position 220 Val is substituted by Ile 3 times.

Earlier, Ratnam., et al, in 1999 reported a model structure for FR-α using the crystal structure of Chicken riboflavin binding protein and have mentioned the ligand binding sites Ala⁴⁹, Val¹⁰⁴, and Glu¹⁶⁶ as important residues. [13] Position 49 specifically has small hydrophobic amino acids Ala/Leu. At position 49, Ala is highly conserved in all FR- α and FR- δ sequences, in case of FR- β it is substituted by similar residue Leu and in case of binding proteins and FR-y it is Ala or Leu. Position 104 contains neutral, nonpolar amino acids with larger side chains-Phe, Val and Ile. Sequences of binding proteins, FR- α , FR- γ and FR- δ have either Val or Ile, where as in FR- β it is substituted by Phe. Position 166 contains neutral, nonpolar amino acid Gly or polar amino acids of various charges (positive or negative) aspartic acid, lysine, Gln, Glu and serine indicating less conservation in this position. Glu at 166 is conserved in 75% of FR-a sequence with remaining sequences having Gly or Lys as a substitution. FR- β has Gly highly conserved except for Equus caballus sequence having Glu. FR-8 has Lys conserved except for Canis familiaris sequence where it is substituted by Lys. No such conservation can be concluded in FBP and FR-y. These substitutions are clearly shown in supplementary material. Present studies clearly indicate about the residues in binding pocket which lead to the specific affinity of subtypes of receptors towards various folate analogues.

We also compared the amino acid sequence of chicken RfBP with those of folate binding proteins and folate receptors. The Ligand binding site residue, Tyr-75 of RfBP is highly conserved in FBPs with few exceptions (His in four sequences and Cys in one sequence). Another ligand binding site, Trp-156 of RfBP is conserved in most of the FBP sequences except for one substitution Phe residue (Data not showed).

Conserved protein motifs

A number of conserved amino acid motifs are shown at the bottom of Figure 1. Using PROSITE database we found out that 4 motifs are unique to folate binding proteins and the rest are observed in other protein sequences as well. The motif [LM]-L-[NS]-[VI]-C-M-

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x(2)-[KR]-[HRY]-H-K (positions 217-228), C-x(3)-[TV]-S-x-[EAH]-[ALD]-[HT]-x-[DEA]-x-[SP]-x-[LS]-[YF]-x-F-[NST]-x(2)-H-C-[GS]-x-[ML]-x(3)-[CR] (positions 323-353), H-F-[IV]-Q-[DAN]-x-C-[LF]-[YHC]-E-C-S-P-N-L-G-P-W-[IF] (positions 370-388), E-D-C-x(2)-[WR]-W-x-[DA]-C-x(2)-[SY]-x-T-C-[KR]-x-[NDS] (positions 464-482) are uniquely present in folate receptors and folate binding proteins only. The other motifs such as, P-[GS]-[PQ]-E-[DG]-x-L-[HY] (positions 244-251), P-Wx(2)-[NRK]-[AS]-C (positions 309-315), [QRD]-x-[VAE]-x-[QSP]-x-[WGR]-x-E (positions 400-409), R-[FVI]-x(3)-P-L-C (positions 437-444), W-x(2)-[GS]-Wx-[WC] (positions 486-492), [YNHVF]-[FA]-P-[TGS]-[PGS]-[AKDTEV] (positions 523-528), [WC]-[STNDL]-[HNRVF]-[STD]-[YFN]-[KNE] positions 535-540, [YEA]-[SRGQ]-[RK]-[GNT]-[SQ]-G-[RQK]-[CLG]-[ILK]-[QD]--[MKH]-[WP]-F-[DE]-[PSAL]-[ATIVEF]-[QLEH]-[GSD]-N-P-N-[EV]-[EADV]-V-[AV]-[RKL]-[FLYH]-[YF]-[AL] (positions 548-576) (where x is any amino acid). This motif E-C-S-P-N-L-G-P-W (position 379-387) is 100% conserved in all the folate receptor sequences.

Conserved cysteines residues

Cysteine residues form disulfide bridges that help to keep the molecule intact and to maintain the confirmation of elements of the active site. Monaco, in 1997, comparing amino acid sequences of chicken RfBP, bovine milk folate-binding protein and human folate-binding protein, identified 16 conserved cysteine residues that formed intra molecular disulfide bonds. [14] All analyzed 46 sequences in these substitution 16 cysteine residues. Out of 16, 10 cysteines are 100% aligned in our alignment positions 221, 315, 323, 346, 376, 380, 444, 466, 473, and 479. Remaining 6 cysteine residues are not fully conserved in our alignment (positions 307, 353, 499, 517, 531, and 555).

Conclusion:

In our study 46 different FBP sequences were subjected to multiple sequence alignment to identify sequence homology and evolutionarily conserved residues, which found to be functionally important. Multiple sequence alignment has indicated that all 46 sequences have 44 highly conserved amino acids including 10 cysteines and 12 sequence motifs. The motifs obtained from multiple sequence alignment were compared with PROSITE database and we identified 4 motifs unique to folate binding protein sequences which further strengthened our belief that they are functionally important residues and highly conserved during evolution.

Two unique conserved motifs [LM]-L- [NS]-[VI]-C-Mx(2)-[KR]-[HRY]-H-K and C-x(3)-[TV]-S-x-[EAH]-[ALD]-[HT]-x-[DEA]-x-[SP]-x-[LS]-[YF]-x-F-[NST]x(2)-H-C-[GS]-x-[ML]-x(3)-[CR] are predominantly helices and coils in most of the sequences. The other motif E-D-C-x(2)-[WR]-W-x-[DA]-C-x(2)-[SY]-x-T-C-[KR]-x-[NDS] form coil-helix-coil in most cases (FR-a,

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 γ , and δ) or only coil or helix-coil in case of beta. This conserved motif ECSPNLGPW is forming a coil between a strand and a helix. Most of these conserved motifs form coils are mostly not part of any secondary structures in all 46 sequences emphasizing its probable functional importance as loop regions frequently form binding sites, active sites. The predominance of helices along with coils may be due to its transmembrane location.

Ratnam et al in 1999 have reported functionally important residues in FR-a as Ala49, Val104, and Glu166 and in FR-B as Leu49, Phe104 and Gly166. [13] Our data has shown that functionally important residues in FR-a and FR- β are highly conserved in all organisms. In FR- α Ala in 49, Val/Ile in 104 similar amino acid substitution, Glu in 166, in case of FR-B Leu in 49, Phe in 104 and Gly in 166. Our analytical data also supported the findings of similar functionally important residues in δ as Ala49 and Val104. Similar amino acid substitution Leu/Ile was observed in three cases and Lys166 with one exception of Serine. This change of amino acid from Glu to Lys (166) in alpha and delta respectively may be the reason for their differences in function even though the other two residues Ala49 and Val104 are the same. This explains the probable difference in affinities of various receptors to folate and its analogues although it needs to be validated experimentally.

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Hypothesis

Supplementary material

| epil380986 Fold protein [Mus musculus] L F G gil48084850 PREDICTED: similar to Folate receptor beta precursor [Ratius norvegicus] L F G gil4919667 PREDICTED: similar to folate receptor 2 (tral) [Equus caballus] L F G gil4808450 PREDICTED: similar to folate receptor 2 (tral) [Equus caballus] L F G gil14639248 PREDICTED: similar to folate receptor 2 isoform 6 [Pan troglodytes] L F G gil14639248 PREDICTED: similar to Folate receptor 2 [Macaca mulatia] L F G gil14093246 PREDICTED: similar to Folate receptor 2 [Macaca mulatia] L F G gil14093256 PREDICTED: similar to Folate receptor 2 [Macaca mulatia] L F G gil14039246 PREDICTED: similar to Folate receptor 2 [Macaca mulatia] L F G gil14059226 Folate treeqtor 2 [Macaca mulatia] L F G gil14059226 Folate receptor 2 [Macaca mulatia] L F G gil14059246 Folate receptor 1 isoform 3 [Pan troglodytes] L I G gil14059246 Folate | Acc no | Description | Position 49 | Position 104 | Position 166 |
|--|--------------|---|----------------|-----------------|-----------------|
| pil0420338PREDICTED: similar to Folate receptor 2 trial) [Equis cabilus]I.FGgil24971667Folate receptor 2 precursor variant [Homo sapiens]I.FGgil24827007Folate receptor 2 precursor variant [Homo sapiens]I.FGgil14639250PREDICTED: folate receptor 2 isoform 6 [Pan troglodytes]I.FGgil14639248PREDICTED: similar to lotate receptor 2 isoform 7 [Pan troglodytes]I.FGgil14639246PREDICTED: similar to folate receptor 2 isoform 3 [Pan troglodytes]I.FGgil14503256PREDICTED: similar to folate receptor 2 isoform 3 [Pan troglodytes]I.FGgil14503256Folate receptor 2 [Macaca mulata]I.FGgil14503256Folate receptor 2 [Bos surus]I.FGgil14503257Folate receptor 2 [Bos surus]I.I.Ggil14639257Folate receptor anna precursor (FR-gamma) Homo sapiensI.I.Ggil14639267Folate receptor 1 isoform 1 [Pan troglodytes]A.VEgil14639246PREDICTED: folate receptor 1 isoform 2 [Pan troglodytes]A.VEgil1493258PREDICTED: similar to folate receptor 1 precursor isoform 2 [Macaca mulata]A.VEgil1493268PREDICTED: similar to folate receptor 1 precursor isoform 2 [Macaca mulata]A.VEgil1403278PREDICTED: similar to folate receptor 1 precursor isoform 2 [Macaca mulata]A.VEgil1403278PREDICTED: similar | | | | | |
| gil149719667 PREDICTED: similar to folate receptor 2 (fetial) [Equusic aballus] L F E gil14639250 PREDICTED: similar to Folate receptor 2 isoform 6 [Pan troglodytes] L F G gil14639250 PREDICTED: similar to Folate receptor 2 isoform 7 [Pan troglodytes] L F G gil14639250 PREDICTED: Similar to Folate receptor 2 isoform 3 [Pan troglodytes] L F G gil14639250 PREDICTED: Similar to Folate receptor 2 isoform 3 [Pan troglodytes] L F G gil14639256 PREDICTED: similar to folate receptor 2 isoform 3 [Pan troglodytes] L F G gil14639256 PREDICTED: similar to folate receptor 4 isoform 3 [Pan troglodytes] L F G gil14639256 Folate treceptor 2 [Bos tarurs] L I G G gil14639266 Folate receptor 1 precursor variant [Homo sapiens] A V E G gil14639264 PREDICTED: folate receptor 1 isoform 3 [Pan troglodytes] A V E G gil14639264 PREDICTED: folate receptor 1 isoform 3 [Pan troglodytes] A V E G gil14639276 PREDICTED: fola | gi 148684580 | | L | F | |
| pi(2896637 Folate receptor 2 precursor variant [Homo sapiens] L F G gi[14827007 Folate receptor 2 precursor 2 [soform 6 [Pan troglodytes] L F G gi[114639248 PREDICTED: folate receptor 2 [soform 7 [Pan troglodytes] L F G gi[114639248 PREDICTED: folate receptor 2 [Macas anulata] L F G gi[114639248 PREDICTED: similar to Folate receptor 2 [soform 3 [Pan troglodytes] L F G gi[114639256 Folate receptor 2 [Bos starus] L F G gi[114639268 Folate receptor 2 [Bos starus] L I G gi[114639273 Folate receptor aniant [Homo sapiens] A V E gi[114639276 Folate receptor a inscriptor mark [Homo sapiens] A V E gi[114639276 PREDICTED: folate receptor I isoform [Pan troglodytes] A V E gi[114639276 PREDICTED: folate receptor I isoform 1 [Pan troglodytes] A V E gi[114639240 PREDICTED: folate receptor I isoform 2 [Pan targlodytes] A V E gi[114639248 PREDICTED: folate receptor I (adult) | gi 109462538 | PREDICTED: similar to Folate receptor beta precursor [Rattus norvegicus] | L | F | |
| pil48277007 Foldate receptor 2 precursor [Homo sapiens] L F G gil14639248 PREDICTED: foldate receptor 2 isoform 6 [Pan troglodytes] L F G gil10017807 PREDICTED: foldate receptor 2 isoform 7 [Pan troglodytes] L F G gil7388197 PREDICTED: similar to Foldate receptor 2 isoform 3 [Pan troglodytes] L F G gil7388197 PREDICTED: similar to Foldate receptor 2 isoform 3 [Pan troglodytes] L F G gil73707 Foldate binding protein [Sus scrofa] L F G gil14639226 PREDICTED: similar to foldate receptor 1 regamma) Homo sapiens L I G gil74945691 FOLR I [Homo sapiens] A V E gil74945691 K E gil14639246 PREDICTED: foldate receptor 1 sform 8 [Pan troglodytes] A V E gil74945691 V E gil7494592 gil14639240 PREDICTED: foldate receptor 1 sform 8 [Pan troglodytes] A V E gil7494592 R E gil7494592 R E gil7398199 REDICTED: similar to foldate receptor 1 sform 8 [Pan troglodytes] A | gi 149719667 | PREDICTED: similar to folate receptor 2 (fetal) [Equus caballus] | L | F | |
| pil14639250 PREDICTED: Sindiar to folate receptor 2 isoform 7 [Pan troglodytes] L F G gil14639276 PREDICTED: similar to Folate receptor 2 isoform 7 [Pan troglodytes] L F G gil14639276 PREDICTED: similar to Folate receptor 2 isoform 3 [Pan troglodytes] L F G gil14639276 PREDICTED: similar to Folate receptor 2 isoform 3 [Pan troglodytes] L F G gil14539276 Folate receptor 2 [Bos tarurs] L F G gil14639276 Folate receptor 1 grocurs (FR-gamma) Homo sapiens L I G gil14639276 PREDICTED: folate receptor FRGAMMA3 [Pan troglodytes] A V E gil44646991 FOLR1 [Homo sapiens] A V E gil14639240 PREDICTED: folate receptor 1 isoform 1 [Pan troglodytes] A V E gil14639235 PREDICTED: similar to folate receptor 1 precursor isoform 2 [Macaca mulatta] A V E gil14639240 PREDICTED: similar to folate receptor 1 isoform 2 [Pan troglodytes] A I E gil14907823 PREDICTED: similar to folate receptor 1 precursor isoform 2 [Macaca mulatta] A V | gi 62896637 | Folate receptor 2 precursor variant [Homo sapiens] | L | F | |
| pi11439248 PREDICTED: similar to Folate receptor 2 isoform 7 [Pan troglodytes] L F G gi109107807 PREDICTED: folate receptor 2 [los anualta] L F G gi73988197 PREDICTED: similar to Folate receptor 2 isoform 3 [Pan troglodytes] L F G gi73788197 PREDICTED: similar to Folate receptor 2 isoform 3 [Pan troglodytes] L F G gi15476686 Folate receptor 2 [Bos taruns] L I G gi11647636226 PREDICTED: similar to folate receptor FRGAMMA 3 [Pan troglodytes] L I G gi1164739246 Folate receptor a mma precursor (Regamma) Homo sapiens L I G gi114639246 PGDICTED: similar to folate receptor 1 isoform 1 [Pan troglodytes] A V E gi114639246 PREDICTED: folate receptor 1 isoform 3 [Pan troglodytes] A V E gi114639247 PREDICTED: similar to folate receptor 1 precursor isoform 2 [Macaca mulata] A V E gi114639246 PREDICTED: similar to folate receptor 1 gabing [Pan troglodytes] A I E gi114639245 PREDICTED: similar to folate receptor alpha [Pan troglodytes] A <td< td=""><td>gi 148277007</td><td>Folate receptor 2 precursor [Homo sapiens]</td><td>L</td><td>F</td><td>G</td></td<> | gi 148277007 | Folate receptor 2 precursor [Homo sapiens] | L | F | G |
| pill0107807 PREDICTED: foltate receptor 2 isoform 3 [Pan troglodytes] L F G gill14639236 PREDICTED: similar to Foltate receptor beta precursor [Canis familiaris] L I G gill15988179 PREDICTED: similar to Foltate receptor beta precursor [Canis familiaris] L F G gill1639226 Foltate toinding protein [Sus scrofa] L I G gill1639276 Poltate receptor apma precursor (FR-gamma) Homo sapiens L I G gill4639269 PREDICTED: foltate receptor I forcursor variant [Homo sapiens] A V E gill4639240 PREDICTED: foltate receptor 1 isoform 1 [Pan troglodytes] A V E gill409107803 PREDICTED: similar to foltate receptor 1 precursor isoform 2 [Macaa mulata] A V E gill409107803 PREDICTED: similar to foltate receptor 1 isoform 2 [Pan troglodytes] A V E gill409107803 PREDICTED: similar to foltate receptor 1 alpha [Bos taurus] A I E gill409107804 PREDICTED: similar to foltate receptor 1 (adult) [Canis familiaris] A I E gill4028178 PREDICTED: similar to foltate receptor 1 (adult) [Cani | gi 114639250 | PREDICTED: folate receptor 2 isoform 6 [Pan troglodytes] | L | F | |
| iji 14639236PREDICTED: similar to Folate receptor 2 isoform 3 [Pan troglodytes]LFGgif3988197PREDICTED: similar to Folate receptor 2 [Bos tarus]LFGgif3742703Folate receptor 2 [Bos tarus]LIGgif146439226Folate receptor 2 [Bos tarus]LIGgif1467327Folate receptor 2 [Bos tarus]LIGgif14639226PREDICTED: similar to folate receptor FRGAMMA 3 [Pan troglodytes]LIGgif44659216PREDICTED: folate receptor 1 recrurs variant [Homo sapiens]AVEgif14639246PREDICTED: folate receptor 1 isoform 1 [Pan troglodytes]AVEgif14639247PREDICTED: folate receptor 1 isoform 2 [Pan troglodytes]AVEgif14639248PREDICTED: folate receptor 1 isoform 2 [Pan troglodytes]AVEgif14639239PREDICTED: similar to folate receptor 1 [Pan troglodytes]AVEgif14639246PREDICTED: similar to folate receptor 1 [Abus]AIEgif14639237PREDICTED: similar to folate receptor 1 (adut) [Canis familiaris]AIEgif14639238PREDICTED: similar to folate receptor 1 (adut) [Canis familiaris]AIEgif1942478Folate receptor 1 (adut), isoform CRA_b [Ratus norvegicus]AIKgif14971960PREDICTED: similar to folate receptor alpha [Equus caballus]AIKgif14972958PREDICTED: similar to folate receptor alpha [Equus caballus]A< | gi 114639248 | PREDICTED: similar to Folate receptor 2 isoform 7 [Pan troglodytes] | L | F | G |
| pi[7]3988197PREDICTED: similar to Folate receptor beta precursor [Canis familiaris]LIGgi[11690686Folate receptor 2 [Bos tarurs]LFGgi[1169723Folate receptor 2 [Bos tarurs]LIGgi[1169723Folate receptor 1 [Sus serota]LIGgi[1169724Folate receptor 1 precursor variant [Homo sapiens]AVEgi[11639246PREDICTED: folate receptor 1 isoform 1 [Pan troglodytes]AVEgi[116439240PREDICTED: folate receptor 1 isoform 1 [Pan troglodytes]AVEgi[116439234PREDICTED: folate receptor 1 isoform 2 [Pan troglodytes]AVEgi[116439234PREDICTED: similar to folate receptor 1 precursorsoform 2 [Macaca mulata]AVEgi[116907523PREDICTED: similar to folate receptor 1 [sus scrofa]AIEgi[14908707Folate receptor 1 (adult) [Canis familiaris]AIEgi[14908707Folate receptor 1 (adult) [Ratus norvegicus]AIKgi[14908707Folate receptor 1 (adult) [Ratus norvegicus]AIKgi[149719669PREDICTED: similar to folate receptor alpha precursof Nus musculus]AIKgi[149719669PREDICTED: similar to folate receptor alpha [Equus caballus]AIKgi[149723518Secretef ofalate Biding protein [Aus norvegicus]AIKgi[12037764PREDICTED: similar to secreted folate binding protein [MonodelphisAVN | gi 109107807 | PREDICTED: folate receptor 2 [Macaca mulatta] | L | F | G |
| git114396686Folate receptor 2 [Bos taurus]LFGgit5742703Folate binding protein [Sus scrofa]LIGgit11467232Folate receptor gamma precursor (FR-gamma) Homo sapiensLIGgit14639226PREDICTED: similar to folate receptor FRGAMMA 3 [Pan troglodytes]LIGgit14639246PREDICTED: folate receptor 1 precursor variant [Homo sapiens]AVEgit14639247PREDICTED: folate receptor 1 isoform 1 [Pan troglodytes]AVEgit14639248PREDICTED: folate receptor 1 isoform 3 [Pan troglodytes]AVEgit14639249PREDICTED: similar to folate receptor 1 precursor isoform 2 [Macaca mulatta]AVEgit191907523PREDICTED: similar to folate receptor alpha [Bos taurus]AIEgit1928859Membrane-bound folate binding protein [Sus scrofa]AIEgit19428459PREDICTED: similar to folate receptor alpha [Bos taurus]AIEgit19428478Folate receptor alpha precursor [Mus musculus]AIEgit19428478Folate receptor alpha precursor [Mus musculus]AIKgit149079696PREDICTED: similar to folate receptor alpha [Equus caballus]AIKgit149079697Folate receptor alpha [Cricetulus griscus]AIKgit149079698PREDICTED: similar to scoreda [Equus caballus]AIKgit149079698PREDICTED: similar to scored folate binding protein [MonodelphisA <td< td=""><td>gi 114639236</td><td>PREDICTED: similar to Folate receptor 2 isoform 3 [Pan troglodytes]</td><td>L</td><td>F</td><td>G</td></td<> | gi 114639236 | PREDICTED: similar to Folate receptor 2 isoform 3 [Pan troglodytes] | L | F | G |
| gi[55742703Folate binding protein [Sus scrofa]LIGgi[1169723Folate receptor gamma precursor (FR-gamma) Homo sapiensLIGgi[26289786Folate receptor I precursor variant [Homo sapiens]AVEgi[26289786Folate receptor I precursor variant [Homo sapiens]AVEgi[114639246PREDICTED: folate receptor I isoform 1 [Pan troglodytes]AVEgi[114639240PREDICTED: folate receptor 1 isoform 2 [Pan troglodytes]AVEgi[114639238PREDICTED: Similar to folate receptor 1 precursor isoform 2 [Macaca mulatta]AVEgi[11907055PREDICTED: similar to folate receptor 1 precursor isoform 2 [Macaca mulatta]AVEgi[11907055PREDICTED: similar to folate receptor 1 precursor isoform 2 [Macaca mulatta]AVEgi[14928373PREDICTED: similar to folate receptor 1 gene uses are scalar.AIEgi[1492859Membrane-bound folate binding protein [Sus scrofa]AIEgi[1492877Folate receptor alpha [Expus uses/uls]AIEgi[14924178Folate receptor 1 (adult) [Rattus norvegicus]AIKgi[1497059PREDICTED: similar to folate receptor alpha [Equus caballus]AIKgi[14970295Folate receptor alpha [Equus caballus]AIKgi[14970296PREDICTED: similar to folate receptor alpha [Equus caballus]AIKgi[14970295PREDICTED: similar to folate receptor alp | gi 73988197 | PREDICTED: similar to Folate receptor beta precursor [Canis familiaris] | L | Ι | G |
| gitS742703Folate binding protein [Sus scrofa]LIGgit1169723Folate receptor gamma precursor (FR-gamma) Homo sapiensLIGgit2898786Folate receptor 1 precursor variant [Homo sapiens]AVEgit2898786Folate receptor 1 precursor variant [Homo sapiens]AVEgit14639240PREDICTED: folate receptor 1 isoform 1 [Pan troglodytes]AVEgit14639240PREDICTED: folate receptor 1 isoform 8 [Pan troglodytes]AVEgit14639238PREDICTED: similar to folate receptor 1 precursor isoform 2 [Macaca mulatta]AVEgit149639239PREDICTED: similar to folate receptor 1 precursor isoform 2 [Macaca mulatta]AVEgit14939240PREDICTED: similar to folate receptor 1 precursor isoform 2 [Macaca mulatta]AVEgit14938273PREDICTED: similar to folate receptor 1 precursor isoform 2 [Macaca mulatta]AVEgit14928879Membrane-bound folate binding protein [Sus scrofa]AIEgit4928879Folate receptor alpha [Four scrofa]AIEgit4924178Folate receptor alpha [Four scrofa]DIKgit14906297Folate receptor alpha [Four scalable]AIKgit14970298PREDICTED: similar to folate receptor alpha [Four scalable]AIKgit147523188Secreted folate binding protein [MonodelphisAVNgit126327964PREDICTED: similar to folate receptor alpha [Four scalable] | gi 115496686 | Folate receptor 2 [Bos taurus] | L | F | G |
| gill 14639226Folate receptor gamma precursor (FR-gamma) Homo sapiensLIGgill 14639226PREDICTED: similar to folate receptor FRGAMMA 3 [Pan troglodytes]LIGgild 2898786Folate receptor 1 precursor variant [Homo sapiens]AVEgild 2898786PREDICTED: folate receptor 1 isoform 1 [Pan troglodytes]AVEgill 14639240PREDICTED: folate receptor 1 isoform 2 [Pan troglodytes]AVEgill 20107805PREDICTED: folate receptor 1 isoform 2 [Pan troglodytes]AVEgill 20107805PREDICTED: similar to folate receptor 1 soform 2 [Pan troglodytes]AVEgill 2023723PREDICTED: similar to folate receptor alpha [Bos taurus]AIEgill 2421878Membrane-bound folate binding protein [Sus scrofa]AIEgill 242178Folate receptor 1 (adult) (Canis familiaris]AIEgill 242178Folate receptor 1 (adult) (Ratus norvegicus]DIKgill 2402178PREDICTED: similar to folate receptor alpha [Equus caballus]AIKgill 2402178PREDICTED: similar to folate receptor alpha [Equus caballus]AIKgill 2402178PREDICTED: similar to folate receptor alpha [Equus caballus]AIKgill 203202Folate receptor alpha [Equus caballus]AIKgill 2032034Folate receptor alpha precursor (FR-alpha) (Milk folate-binding protein) BovineAVNgill 20327958PREDICT | | | L | Ι | G |
| gill 14639226PREDICTÉD: similar to folate receptor FRGAMMA 3 [Pan troglodytes]LIGgil62898786Folate receptor 1 precursor variant [Homo sapiens]AVEgil146369240PREDICTED: folate receptor 1 isoform 1 [Pan troglodytes]AVEgil14639240PREDICTED: folate receptor 1 isoform 3 [Pan troglodytes]AVEgil14639240PREDICTED: similar to folate receptor 1 precursor isoform 2 [Macaca mulatta]AVEgil14639238PREDICTED: similar to folate receptor 1 precursor isoform 2 [Macaca mulatta]AVEgil14639238PREDICTED: similar to folate receptor 1 precursor isoform 2 [Macaca mulatta]AVEgil14907523PREDICTED: similar to folate receptor alpha [Bos taurus]AIEgil14938189PREDICTED: similar to folate receptor 1 (adult) [Canis familiaris]AIEgil1494178Folate receptor 1 (adult) [Rattus norvegicus]DIKgil149068707Folate receptor 1 (adult), Ecities insus]AIKgil14902950PREDICTED: similar to folate receptor alpha [Equus caballus]AIKgil149702950PREDICTED: similar to folate receptor alpha [Equus caballus]AIKgil140327964PREDICTED: similar to scereted folate binding protein [MonodelphisAIKgil126327964PREDICTED: similar to scereted folate binding protein [MonodelphisAVNgil126327964PREDICTED: similar to folate receptor 4 (delta) [Pan roglodytes] <td></td> <td></td> <td>L</td> <td>Ι</td> <td></td> | | | L | Ι | |
| git(2898786Folate receptor 1 precursor variant [Homo sapiens]AVEgit(34956991FOLR1 [Homo sapiens]ISoform 1 [Pan troglodytes]AVEgit(114639246PREDICTED: folate receptor 1 isoform 1 [Pan troglodytes]AVEgit(114639240PREDICTED: folate receptor 1 isoform 1 [Pan troglodytes]AVEgit(109107805PREDICTED: similar to folate receptor 1 precursor isoform 2 [Macaca mulatta]AVEgit(114639238PREDICTED: similar to folate receptor 1 incollodytes]AIEgit(28859Membrane-bound folate binding protein [Sus scrofa]AIEgit(28859Membrane-bound folate binding protein [Sus scrofa]AIEgit(244178Folate receptor 1 (adult) [Canis familiaris]AIEgit(2408707Folate receptor 1 (adult), isoform CRA b [Rattus norvegicus]AIKgit(24070958PREDICTED: similar to folate receptor alpha [Equus caballus]AIKgit(14702958PREDICTED: similar to folate receptor alpha [Equus caballus]AIKgit(12827964PREDICTED: similar to secreted folate binding protein [MonodelphisAVNgit(126327962PREDICTED: similar to secreted folate binding protein [MonodelphisAVNgit(126327964PREDICTED: similar to secreted folate binding protein [MonodelphisAVKgit(14639852PREDICTED: similar to secreted folate binding protein [MonodelphisAVK <tr< td=""><td></td><td></td><td>L</td><td>Ι</td><td></td></tr<> | | | L | Ι | |
| git]4456991FOLR1 [Homo sapiens]AVEgit]14639240PREDICTED: folate receptor 1 isoform 1 [Pan troglodytes]AVEgit]14639240PREDICTED: folate receptor 1 isoform 2 [Pan troglodytes]AVEgit]14639238PREDICTED: folate receptor 1 precursor isoform 2 [Macaca mulata]AVEgit]14639238PREDICTED: similar to folate receptor 1 precursor isoform 2 [Macaca mulata]AVEgit]1907523PREDICTED: similar to folate receptor 1 [adult) [Canis familiaris]AIEgit]288859Membrane-bound folate binding protein [Sus scrofa]AIEgit]44338Folate receptor 1 (adult) [Canis familiaris]AIEgit]443178Folate receptor 1 (adult), fosform CRA_b [Rattus norvegicus]AIKgit]447019669PREDICTED: similar to folate receptor alpha [Equus caballus]AIKgit]4702893PREDICTED: similar to folate receptor alpha [Equus caballus]AIKgit]149702959PREDICTED: similar to scereted folate binding protein [MonodelphisAIKgit]26327964PREDICTED: similar to scereted folate binding protein [MonodelphisAVNgit]26327962PREDICTED: similar to scereted folate binding protein [MonodelphisAVNgit]26327964PREDICTED: similar to scereted folate binding protein [MonodelphisAVNgit]26327964PREDICTED: similar to scereted folate binding protein [MonodelphisAVN< | | | А | V | |
| gil14639246PREDICTED: folate receptor 1 isoform 1 [Pan troglodytes]AVEgil14639240PREDICTED: folate receptor 1 isoform 8 [Pan troglodytes]AVEgil14639240PREDICTED: similar to folate receptor 1 precursor isoform 2 [Macaca mulatta]AVEgil14639238PREDICTED: similar to folate receptor 1 precursor isoform 2 [Macaca mulatta]AVGgil14928859Membrane-bound folate binding protein [Sus scrofa]AIEgil349288199PREDICTED: similar to folate receptor 1 (adult) [Canis familiaris]AIEgil344338Folate receptor 1 (adult) [Ratus norvegicus]DIKgil14921478Folate receptor 1 (adult) [Katus norvegicus]AIEgil14970850Folate receptor 1 (adult) isoform CRA_b [Ratus norvegicus]AIKgil149702958PREDICTED: similar to folate receptor alpha [Equus caballus]AIKgil126327964PREDICTED: similar to secreted folate binding protein [MonodelphisAVNgil126327952PREDICTED: similar to secreted folate binding protein [MonodelphisAVNgil126327964PREDICTED: similar to secreted folate binding protein [MonodelphisAVKgil126327952PREDICTED: similar to folate receptor 4 (delta) isoform 1 [Monos apiens]AIKgil126327954PREDICTED: similar to folate receptor 4 (delta) [Pan troglodytes]AVNgil126327952PREDICTED: similar to folate receptor 4 (delta) [Pan troglodyte | | | | | |
| gi[114639240PREDICTED: folate receptor 1 isoform 8 [Pan troglodytes]AVEgi[10107805PREDICTED: similar to folate receptor 1 precursor isoform 2 [Macaca mulatta]AVEgi[114037233PREDICTED: similar to folate receptor 1 isoform 2 [Pan troglodytes]AVGgi[11907523PREDICTED: similar to folate receptor 1 (adut) [Canis familiaris]AIEgi[34388Folate receptor 1 (adut) [Canis familiaris]AIEgi[34338Folate receptor 1 (adut) [Canis familiaris]AIEgi[14924178Folate receptor 1 (adut), [Rattus norvegicus]DIKgi[149707958PREDICTED: similar to folate receptor alpha [Equus caballus]AIKgi[149702958PREDICTED: similar to folate receptor alpha [Equus caballus]AIKgi[14702958PREDICTED: similar to folate receptor alpha [Equus caballus]AIKgi[126327964PREDICTED: similar to secreted folate binding protein [MonodelphisAVNdomestica]gi[126327958PREDICTED: similar to secreted folate binding protein [MonodelphisAVNgi[126327964PREDICTED: similar to folate receptor 4 (delta) isoform 1 [Homo sapiens]AIKgi[126327958PREDICTED: similar to secreted folate binding protein [MonodelphisAVNdomestica]gi[126327959PREDICTED: similar to folate receptor 4 (delta) isoform 1 [Monodelphis]AVKgi[126327958PREDICTED: similar to folate rec | | | | | |
| gi[109107805PREDICTED: similar to folate receptor 1 precursor isoform 2 [Macaca mulatta]AVEgi[114639238PREDICTED: isolate receptor 1 isoform 2 [Pan troglodytes]AVGgi[119907523PREDICTED: similar to folate receptor 1 [Adult] [Bos tarus]AIEgi[39288199PREDICTED: similar to folate receptor 1 (adult) [Canis familiaris]AIEgi[342387Folate receptor alpha precursor [Mus musculus]AIEgi[344387Folate receptor 1 (adult) [Rattus norvegicus]DIKgi[149068707Folate receptor alpha [Cricetulus griseus]AIKgi[14970258PREDICTED: similar to folate receptor alpha [Equus caballus]AIKgi[14970258PREDICTED: similar to folate receptor alpha [Equus caballus]AIKgi[126327964PREDICTED: similar to solate receptor alpha [Equus caballus]AIKgi[126327958PREDICTED: similar to secreted folate binding protein [MonodelphisAVNdomestica]gi[126327962PREDICTED: similar to secreted folate binding protein [MonodelphisAVNgi[126327962PREDICTED: similar to folate receptor 4 (delta) isoform 1 [Hono sapiens]AIKgi[126327964PREDICTED: similar to folate receptor 4 (delta) isoform 1 [MonodelphisAVNgi[126327958PREDICTED: similar to secreted folate binding protein [MonodelphisAVKgi[126327964PREDICTED: similar to folate receptor 4 (delta) isofo | | | | | |
| gil114639238PREDICTED: folate receptor 1 isoform 2 [Pan troglodytes]AVGgil119907523PREDICTED: similar to folate receptor alpha [Bos taurus]AIEgil492885Membrane-bound folate binding protein [Sus scrofa]AIEgil73988199PREDICTED: similar to folate receptor 1 (adult) [Canis familiaris]AIEgil442183Folate receptor alpha precursor [Mus musculus]AIEgil942178Folate receptor 1 (adult), [Soform CRA_b [Ratus norvegicus]AIKgil49088707Folate receptor 1 (adult), isoform CRA_b [Ratus norvegicus]AIKgil149719669PREDICTED: similar to folate receptor alpha [Equus caballus]AIKgil149723188Secreted folate binding protein [Mus caballus]AIKgil126327964PREDICTED: similar to secreted folate binding protein [MonodelphisAVNdomestica]gil126327965PREDICTED: similar to secreted folate binding protein [MonodelphisAVNgil126327962PREDICTED: similar to secreted folate binding protein [MonodelphisAVNgil126327965PREDICTED: similar to folate receptor 4 (delta) isoform 1 [Homo sapiens]AIKgil126327964PREDICTED: similar to folate receptor 4 (delta) [Pan troglodytes]AVNgil126327965PREDICTED: similar to secreted folate binding protein [MonodelphisAVKgil126327966Similar to folate receptor 4 (delta) isoform 1 [Homo sapiens]< | • | | | | |
| gi 119907523PREDICTED: similar to folate receptor alpha [Bos taurus]AIEgi 428859Membrane-bound folate binding protein [Sus scrofa]AIQgi 73988199PREDICTED: similar to folate receptor I (adult) [Canis familiaris]AIEgi 43438Folate receptor alpha precursor [Mus musculus]AIEgi 19424178Folate receptor 1 (adult), isoform CRA_b [Rattus norvegicus]DIKgi 149068707Folate receptor 1 (adult), isoform CRA_b [Rattus norvegicus]AIKgi 149710669PREDICTED: similar to folate receptor alpha [Cricetulus griseus]AIKgi 149702958PREDICTED: similar to folate receptor alpha [Equus caballus]AIKgi 14752188Secreted folate binding protein [Sus scrofa]AIKgi 126327964PREDICTED: similar to secreted folate binding protein [MonodelphisAVNdomestica]giIKgigi 126327962PREDICTED: similar to secreted folate binding protein [MonodelphisAVNdomestica]giIKKgigi 126327962PREDICTED: similar to folate receptor 4 (delta) isoform 1 [Homo sapiens]AIKgi 126327964PREDICTED: similar to folate receptor 4 (delta) isoform 1 [MonodelphisAVNgi 126327962PREDICTED: similar to folate receptor 4 (delta) isoform 1 [MonodelphisAVKgi 145382285Folate receptor 1 (adult) [Gallus gallus]A </td <td></td> <td></td> <td></td> <td></td> <td></td> | | | | | |
| gil4928859Membrane-bound folate binding protein [Šus scrofa]AIQgil7398199PREDICTED: similar to folate receptor 1 (adult) [Canis familiaris]AIEgil544338Folate receptor alpha precursor [Mus musculus]AIEgil142178Folate receptor 1 (adult) [Ratus norvegicus]DIKgil149068707Folate receptor 1 (adult), isoform CRA_b [Rattus norvegicus]AIKgil149702958PREDICTED: similar to folate receptor alpha [Equus caballus]AIKgil149702958PREDICTED: similar to folate receptor alpha [Equus caballus]AIKgil147523188Secreted folate binding protein [Sus scrofa]AVKgil126327964PREDICTED: similar to secreted folate binding protein [MonodelphisAVNdomestica]gil126327962PREDICTED: similar to secreted folate binding protein [MonodelphisAVNgil126327962PREDICTED: similar to secreted folate binding protein [MonodelphisAVNgil126327964Similar to folate receptor 4 (delta) isoform 1 [Homo sapiens]AIKgil126327962PREDICTED: similar to folate receptor 4 (delta) [Pan troglodytes]AVKgil126327964Similar to folate receptor 4 (delta) isoform 1 [MonodelphisAVKgil126327962PREDICTED: similar to folate receptor 4 (delta) [Pan troglodytes]AVKgil126327964Similar to folate receptor 4 (delta) [Soform 1 [Macaca mulata]AV | | | | | |
| gi[73988199PREDICTED: similar to folate receptor 1 (adult) [Canis familiaris]AIEgi[344338Folate receptor alpha precursor [Mus musculus]AIEgi[1494378Folate receptor 1 (adult) [Rattus norvegicus]DIKgi[149068707Folate receptor 1 (adult), isoform CRA_ b [Rattus norvegicus]AIKgi[189068707Folate receptor alpha [Cricetulus griscus]AIKgi[149719669PREDICTED: similar to folate receptor alpha [Equus caballus]AIKgi[149702958PREDICTED: similar to folate receptor alpha [Equus caballus]AIKgi[126327964PREDICTED: similar to secreted folate binding protein [MonodelphisAVNgi[126327958PREDICTED: similar to secreted folate binding protein [MonodelphisAVNdomestica]gi[126327962PREDICTED: similar to secreted folate binding protein [MonodelphisAVNgi[126327962PREDICTED: similar to secreted folate binding protein [MonodelphisAVNgi[126327964Similar to folate receptor 4 (delta) isoform 1 [Homo sapiens]AVNgi[126327965Folate receptor 1 (adult) [Gallus gallus]AIKgi[114639852PREDICTED: similar to folate receptor 4 (delta) isoform 1 [Homo sapiens]AVKgi[114639852PREDICTED: similar to folate receptor 4 (delta) isoform 1 [Macaca mulatta]AVKgi[114639852PREDICTED: similar to folate receptor 4 (delta) isoform 1 [Macaca mul | | | | | |
| gi[344338Folate receptor alpha precursor [Mus musculus]AIEgi[19424178Folate receptor 1 (adult) [Rattus norvegicus]DIKgi[149068707Folate receptor 1 (adult), isoform CRA_b [Rattus norvegicus]AIKgi[3823002Folate receptor alpha [Cricetulus griscus]AIKgi[149719669PREDICTED: similar to folate receptor alpha [Equus caballus]AIKgi[149702958PREDICTED: similar to folate receptor alpha [Equus caballus]AIKgi[12823062Folate receptor alpha precursor (FR-alpha) (Milk folate-binding protein) BovineAVKgi[126327964PREDICTED: similar to secreted folate binding protein [MonodelphisAVNdomestica] | | | | | F |
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| | gi 73987778 | PREDICTED: similar to folate receptor 4 (delta) isoform 1 [Kattus horvegetus] | A | I | S |

List of sequences used for multiple sequence alignment and three binding site residue and their convergence among all the folate receptor sequences