Gene: COL3A1 - Sequence: NG_007404.1
Date : January 14, 2015

1st line: Base numbering. Full stops for intronic +/- 5, 10, 15...
2nd line: Base sequence. lower case Introns, upper case Exons
3rd line: Amino acid sequence. Printed on FIRST base of codon
4th line: Amino acid numbering. Numbered on 1st and increments of 10

```
Exon 1 | Start: 1 | End: 196 | Length: 195


    .    .    .    .    .    .           |-109     |-99
cctatttaaggccaaagcaaaggaatctcagtgGGCTGAGTTTTATGACGGGCCCGGTGC

|-89      |-79      |-69      |-59      |-49      |-39
TGAAGGGCAGGGAACAACTTGATGGTGCTACTTTGAACTGCTTTTCTTTTCTCCTTTTTG

|-29      |-19      |-9       |1       |11       |21
CACAAAGAGTCTCATGTCTGATATTTAGACATGATGAGCTTTGTGCAAAAGGGGAGCTGG
                                M  M  S  F  V  Q  K  G  S  W
                                |1

|31      |41       |51       |61       |71          .       .
CTACTTCTCGCTCTGCTTCATCCCACTATTATTTTGGCACAACAGGAAGgtgagtaggta
L  L  L  A  L  L  H  P  T  I  I  L  A  Q  Q  E  A
|11                            |21


    .    .    .    .
ctgatttcaagaaactttatgg



Exon 2 | Start: 197 | End: 399 | Length: 202


    .    .    .    .    .    .     |81      |91       |101
ggaaacttcacgtcatctaacttgtttttcagcCTGTTGAAGGAGGATGTTCCCATCTTG
                                   V  E  G  G  C  S  H  L  G
                                                     |31

    |111      |121      |131      |141      |151      |161
GTCAGTCCTATGCGGATAGAGATGTCTGGAAGCCAGAACCATGCCAAATATGTGTCTGTG
```

```
     Q   S   Y   A   D   R   D   V   W   K   P   E   P   C   Q   I   C   V   C   D
                 |41                                             |51


         |171         |181         |191         |201         |211         |221
     ACTCAGGATCCGTTCTCTGCGATGACATAATATGTGACGATCAAGAATTAGACTGCCCCA
       S   G   S   V   L   C   D   D   I   I   C   D   D   Q   E   L   D   C   P   N
                     |61                                         |71


         |231         |241         |251         |261         |271         |281
     ACCCAGAAATTCCATTTGGAGAATGTTGTGCAGTTTGCCCACAGCCTCCAACTGCTgtga
       P   E   I   P   F   G   E   C   C   A   V   C   P   Q   P   P   T   A
                     |81                                         |91


     .       .       .       .       .       .
     gtttaaagataaactgtacatcttcaata



     Exon 3 | Start: 400 | End: 450 | Length: 50



          .       .       .       .       .       .               |291         |301
     cttgtttaacttgtttctttttccatttattagcCCTACTCGCCCTCCTAATGGTCAAGGA
                                         P   T   R   P   P   N   G   Q   G
                                                                   |101


      |311         |321         |331   .       .       .       .       .       .
     CCTCAAGGCCCCAAGGGAGATCCAgtaagtaaacattcttcagtagaataaaattaa
                         |111



     Exon 4 | Start: 451 | End: 564 | Length: 113



          .       .       .       .       .       .               |341         |351
     cactatttaatttattttttatctctttttttaggGGCCCTCCTGGTATTCCTGGGAGAAAT
                                          G   P   P   G   I   P   G   R   N


     |361         |371         |381         |391         |401         |411
     GGTGACCCTGGTATTCCAGGACAACCAGGGTCCCCTGGTTCTCCTGGCCCCCCTGGAATC
     G   D   P   G   I   P   G   Q   P   G   S   P   G   S   P   G   P   P   G   I
     |121                                 |131
```

```
|421        |431        |441        .    .    .    .    .    .
TGTGAATCATGCCCTACTGGTCCTCAGgtataacaattacggtacttaaaaaattccctc
|141


Exon 5 | Start: 565 | End: 645 | Length: 80


     .    .    .    .    .    .        |451        |461        |471
aatgatcatatctatttgtctccttgccacagaAACTATTCTCCCCAGTATGATTCATAT
                                  N  Y  S  P  Q  Y  D  S  Y
                                                         |151

    |481        |491        |501        |511        |521        .
GATGTCAAGTCTGGAGTAGCAGTAGGAGGACTCGCAGGCTATCCTGGACCAGCTgtacgt
D  V  K  S  G  V  A  V  G  G  L  A  G  Y  P  G  P  A
    |161                                |171

    .    .    .    .    .
acaaatgtttctcagcattttggagct


Exon 6 | Start: 646 | End: 699 | Length: 53


     .    .    .    .    .    .        |531        |541        |551
tattttgttttttcattcaaattcacattccaggGGCCCCCCAGGCCCTCCCGGTCCCCCT
                                   G  P  P  G  P  P  G  P  P
                                                        |181

    |561        |571        |581  .    .    .    .    .    .
GGTACATCTGGTCATCCTGGTTCCCCTgtaagtatagccattggtggtgttttcttcctc
              |191


Exon 7 | Start: 700 | End: 753 | Length: 53


     .    .    .    .    .    .        |591        |601
ctttaaaattatttacatattctactcactaggGGATCTCCAGGATACCAAGGACCCCCT
                                  G  S  P  G  Y  Q  G  P  P
                                                        |201
```

3

```
         |611        |621        |631      .     .     .      .      .      .
GGTGAACCTGGGCAAGCTGGTCCTTCAgtaagtaacaattaaatttatatttagtaagtc
                        |211
```

Exon 8 | Start: 754 | End: 807 | Length: 53

```
      .     .     .      .      .      .        |641        |651        |661
aatctattcattttttatttccttattttcaggGGCCCTCCAGGACCTCCTGGTGCTATA
                                    G  P  P  G  P  P  G  A  I
                                                            |221

        |671        |681      .      .      .      .      .      .
GGTCCATCTGGTCCTGCTGGAAAAGATgtaagttttaaaacttaaataagaatacagca
```

Exon 9 | Start: 808 | End: 861 | Length: 53

```
      .     .     .      .      .      .        |691        |701        |711
agcacctacgtattctttatttctctacctaggGGAGAATCAGGTAGACCCGGACGACCT
                                    G  E  S  G  R  P  G  R  P
                                    |231

    |721        |731        |741      .      .      .      .      .      .
GGAGAGCGAGGATTGCCTGGACCTCCAgtgagtcttcagcatctaataaattaattggaa
    |241
```

Exon 10 | Start: 862 | End: 915 | Length: 53

```
      .     .     .      .      .      .        |751        |761        |771
ttcattaatattttttcattcattattttttaggGGTATCAAAGGTCCAGCTGGGATACCT
                                    G  I  K  G  P  A  G  I  P
                                    |251

        |781        |791      .      .      .      .      .      .
GGATTCCCTGGTATGAAAGGACACAGAgtaagtagagtttctaagttgttttacaaggtat
        |261
```

Exon 11 | Start: 916 | End: 969 | Length: 53


```
         .      .      .      .      .      .        |801       |811       |821
taataattttgctggtttttatacatttcctaggGGCTTCGATGGACGAAATGGAGAAAAG
                                     G  F  D  G  R  N  G  E  K
                                               |271


      |831       |841       |851  .      .      .      .      .      .
GGTGAAACAGGTGCTCCTGGATTAAAGgtaaatcacaacaaaaatcatattttcataagt
               |281
```


Exon 12 | Start: 970 | End: 1014 | Length: 44


```
         .      .      .      .      .      .        |861       |871
gtaaaatagtaacatattttatatgtatctaggGGTGAAAATGGTCTTCCAGGCGAAAAT
                                    G  E  N  G  L  P  G  E  N
                                                   |291


  |881       |891       .      .      .      .      .      .
GGAGCTCCTGGACCCATGgtaattatgtttcttatgtataattttcagttt
```


Exon 13 | Start: 1015 | End: 1068 | Length: 53


```
         .      .      .      .      .      .        |901       |911       |921
gagtaaaaccatatttcaattttactctgtaggGGTCCAAGAGGGGCTCCTGGTGAGCGA
                                    G  P  R  G  A  P  G  E  R
                                               |301


       |931       |941       |951  .      .      .      .      .      .
GGACGGCCAGGACTTCCTGGGGCTGCAgtgagtatagctgctaacatcacacaattacaa
       |311
```


Exon 14 | Start: 1069 | End: 1113 | Length: 44

```
                .     .     .     .     .     .                 |961        |971
aaaggatatttgatgtaaacttctcttttttaggGGTGCTCGGGGTAATGACGGTGCTCGA
                                                  G  A  R  G  N  D  G  A  R
                                                                |321

   |981        |991        .     .     .     .     .     .
GGCAGTGATGGTCAACCAgtaagtaactttctatctcttatgtgttgtagg
              |331


Exon 15 | Start: 1114 | End: 1167 | Length: 53



                .     .     .     .     .     .         |1001       |1011       |1021
agagctcttgaaattgtatttaatttttttcaggGGCCCTCCTGGTCCTCCTGGAACTGCC
                                                  G  P  P  G  P  P  G  T  A
                                                                            |341

          |1031       |1041        .     .     .     .     .     .
GGATTCCCTGGATCCCCTGGTGCTAAGgtaaacatgtgtttctatagaagggtataaaaa



Exon 16 | Start: 1168 | End: 1266 | Length: 98



                .     .     .     .     .     .         |1051       |1061       |1071
gagaaactgactacacaaggttttaccattaggGGTGAAGTTGGACCTGCAGGGTCTCCT
                                                  G  E  V  G  P  A  G  S  P
                                                                |351

   |1081       |1091       |1101       |1111       |1121       |1131
GGTTCAAATGGTGCCCCTGGACAAAGAGGAGAACCTGGACCTCAGGGACACGCTGGTGCT
G  S  N  G  A  P  G  Q  R  G  E  P  G  P  Q  G  H  A  G  A
   |361                                  |371

   |1141        .     .     .     .     .     .
CAAGGTCCTCCTgtaagtatcatagttgagagggagtaagcatag
   |381


Exon 17 | Start: 1267 | End: 1311 | Length: 44
```

```
         .    .    .    .    .    .        |1151      |1161      |1171
attaatacattatctgtttttttgtatacttaggGGCCCTCCTGGGATTAATGGTAGTCCT
                                     G  P  P  G  I  N  G  S  P
                                                          |391


    |1181      |1191    .    .    .    .    .    .
GGTGGTAAAGGCGAAATGgtaagctgtcccccactcctcagccttatctcat



Exon 18 | Start: 1312 | End: 1410 | Length: 98



         .    .    .    .    .    .        |1201      |1211      |1221
cggctaatatagtgtctttggtttgttcttaggGGTCCCGCTGGCATTCCTGGAGCTCCT
                                    G  P  A  G  I  P  G  A  P
                                    |401


        |1231      |1241      |1251      |1261      |1271      |1281
GGACTGATGGGAGCCCGGGGTCCTCCAGGACCAGCCGGTGCTAATGGTGCTCCTGGACTG
G  L  M  G  A  R  G  P  P  G  P  A  G  A  N  G  A  P  G  L
        |411                                |421


        |1291    .    .    .    .    .    .
CGAGGTGGTGCAgtaagttgccttgttttttctctgttgactgaa
        |431



Exon 19 | Start: 1411 | End: 1464 | Length: 53



         .    .    .    .    .    .        |1301      |1311
tgtgtttcaaccaagactttgttatactttaggGGTGAGCCTGGTAAGAATGGTGCCAAA
                                    G  E  P  G  K  N  G  A  K


|1321      |1331      |1341    .    .    .    .    .    .
GGAGAGCCCGGACCACGTGGTGAACGCgtaagttttactgcaacagatctggttatttct
|441
```

Exon 20 | Start: 1465 | End: 1572 | Length: 107


```
     .     .     .     .     .     .          |1351      |1361      |1371
ttctttattttaccatctttttttttttttcaggGGTGAGGCTGGTATTCCAGGTGTTCCA
                                   G   E   A   G   I   P   G   V   P
                                                               |451

        |1381      |1391      |1401      |1411      |1421      |1431
GGAGCTAAAGGCGAAGATGGCAAGGATGGATCACCTGGAGAACCTGGTGCAAATGGGCTT
G   A   K   G   E   D   G   K   D   G   S   P   G   E   P   G   A   N   G   L
        |461                             |471

        |1441      |1451      .     .     .     .     .     .
CCAGGAGCTGCAGGAGAAAGGgtacgttttccatggggcatctaaaagaaaagc
        |481
```


Exon 21 | Start: 1573 | End: 1626 | Length: 53


```
     .     .     .     .     .     .          |1461      |1471      |1481
ggactgaaatacttgtctttcattattttcaggGGTGCCCCTGGGTTCCGAGGACCTGCT
                                  G   A   P   G   F   R   G   P   A
                                                              |491

          |1491      |1501      .     .     .     .     .     .
GGACCAAATGGCATCCCAGGAGAAAAGgtagataactttagtttctatgttcctaaatgc
                  |501
```


Exon 22 | Start: 1627 | End: 1725 | Length: 98


```
     .     .     .     .     .     .          |1511      |1521      |1531
ttaatttttttaaaatttctttcactacttaggGGTCCTGCTGGAGAGCGTGGTGCTCCA
                                  G   P   A   G   E   R   G   A   P
                                                              |511

     |1541      |1551      |1561      |1571      |1581      |1591
GGCCCTGCAGGGCCCAGAGGAGCTGCTGGAGAACCTGGCAGAGATGGCGTCCCTGGAGGT
G   P   A   G   P   R   G   A   A   G   E   P   G   R   D   G   V   P   G   G
                          |521                             |531
```

```
     |1601          .       .       .       .       .        .
CCAGGAATGAGGgtacagagaaacatttgtttgaatgacacttta
```

Exon 23 | Start: 1726 | End: 1779 | Length: 53

```
     .      .      .      .       .      .        |1611      |1621       |1631
aaatcacctaacaactgacttctttacttcaggGGCATGCCCGGAAGTCCAGGAGGACCA
                                    G   M   P   G   S   P   G   G   P
                                                                    |541

     |1641      |1651      |1661 .       .       .       .       .        .
GGAAGTGATGGGAAACCAGGGCCTCCCgtatgtacatttttaaaatctcattttaaaagg
                 |551
```

Exon 24 | Start: 1780 | End: 1878 | Length: 98

```
     .      .      .      .       .      .        |1671      |1681
aaacctttattaatgtaattttttcttattaggGGAAGTCAAGGAGAAAGTGGTCGACCA
                                    G   S   Q   G   E   S   G   R   P
                                                                    |561

   |1691      |1701      |1711      |1721      |1731      |1741
GGTCCTCCTGGGCCATCTGGTCCCCGAGGTCAGCCTGGTGTCATGGGCTTCCCCGGTCCT
G   P   P   G   P   S   G   P   R   G   Q   P   G   V   M   G   F   P   G   P
                             |571                              |581

   |1751      |1761.       .       .       .       .        .
AAAGGAAATGATgtgagttccttcattaatttcttcaataaatat
```

Exon 25 | Start: 1879 | End: 1932 | Length: 53

```
     .      .      .      .       .      .        |1771      |1781
ggattagtaaataccgaccacttcttctttaggGGTGCTCCTGGTAAGAATGGAGAACGA
                                    G   A   P   G   K   N   G   E   R
```

```
                                              |591

    |1791      |1801      |1811    .    .    .    .    .    .
GGTGGCCCTGGAGGACCTGGCCCTCAGgtacgtagctttcctcaatttatttctagcctt
                |601
```

Exon 26 | Start: 1933 | End: 1986 | Length: 53

```
    .    .    .    .    .    .          |1821      |1831      |1841
atttctacttccctaactgttcttgtttttaggGGTCCTCCTGGAAAGAATGGTGAAACT
                                      G  P  P  G  K  N  G  E  T
                                                       |611

          |1851      |1861    .    .    .    .    .    .
GGACCTCAGGGACCCCCAGGGCCTACTgtaagttcactcatatataaaattggagatgaaaa
                  |621
```

Exon 27 | Start: 1987 | End: 2040 | Length: 53

```
    .    .    .    .    .    .          |1871      |1881      |1891
ttacaacagagtgtatcattatactttctaggGGGCCTGGTGGTGACAAAGGAGACACA
                                      G  P  G  G  D  K  G  D  T
                                                       |631

      |1901      |1911      |1921    .    .    .    .    .    .
GGACCCCCTGGTCCACAAGGATTACAAgtaagaacttgttatttaaatgtcacggcatat
                  |641
```

Exon 28 | Start: 2041 | End: 2094 | Length: 53

```
    .    .    .    .    .    .            |1931      |1941
taattacctaatacaaatatgattctttctaggGGCTTGCCTGGTACAGGTGGTCCTCCA
                                      G  L  P  G  T  G  G  P  P

|1951      |1961      |1971    .    .    .    .    .    .
GGAGAAAATGGAAAACCTGGGGAACCAgtaagttacgtttcattattcaaaactcagaaa
```

Exon 29 | Start: 2095 | End: 2139 | Length: 44

```
      .      .      .      .      .      .           |1981      |1991      |2001
atgggcctaatcatataatgccaatctcccaggGGTCCAAAGGGTGATGCCGGTGCACCT
                                  G  P  K  G  D  A  G  A  P
                                                          |661
```

```
      |2011      |2021 .      .      .      .      .      .
GGAGCTCCAGGAGGCAAGgtagtatttcaatttattctctaccttcttcag
      |671
```

Exon 30 | Start: 2140 | End: 2238 | Length: 98

```
      .      .      .      .      .      .           |2031      |2041
ctaatatggttatttacatattttttgtcacaggGGTGATGCTGGTGCCCCTGGTGAACGT
                                   G  D  A  G  A  P  G  E  R
                                                           |681
```

```
 |2051      |2061      |2071      |2081      |2091      |2101
GGACCTCCTGGATTGGCAGGGGCCCCAGGACTTAGAGGTGGAGCTGGTCCCCCTGGTCCC
G  P  P  G  L  A  G  A  P  G  L  R  G  G  A  G  P  P  G  P
                         |691                            |701
```

```
 |2111      |2121.      .      .      .      .      .
GAAGGAGGAAAGgtaactccacagcattccattcacctaggttta
```

Exon 31 | Start: 2239 | End: 2346 | Length: 107

```
      .      .      .      .      .      .           |2131      |2141
ctgatcatttattatttctcacttattttcaggGGTGCTGCTGGTCCTCCTGGGCCACCT
                                  G  A  A  G  P  P  G  P  P
                                                          |711
```

```
  |2151      |2161      |2171      |2181      |2191      |2201
```

```
GGTGCTGCTGGTACTCCTGGTCTGCAAGGAATGCCTGGAGAAAGAGGAGGTCTTGGAAGT
G   A   A   G   T   P   G   L   Q   G   M   P   G   E   R   G   G   L   G   S
              |721                                    |731


    |2211        |2221            .       .       .       .       .       .
CCTGGTCCAAAGGGTGACAAGgtgttgacttgttttctcttaattgttcaataa
              |741



Exon 32 | Start: 2347 | End: 2400 | Length: 53



        .       .       .       .       .       .       |2231        |2241        |2251
tgaatctgatgacattggcttttatttgacaggGGTGAACCAGGCGGTCCAGGTGCTGAT
                                      G   E   P   G   G   P   G   A   D
                                                                          |751


    |2261        |2271        |2281    .       .       .       .       .       .
GGTGTCCCAGGGAAAGATGGCCCAAGGgtgagtattcccagtgaggagaagcaggcctta
                              |761



Exon 33 | Start: 2401 | End: 2454 | Length: 53



        .       .       .       .       .       .               |2291        |2301
tcaaaattaaaaaaatattttttatttcctctaggGGTCCTACTGGTCCTATTGGTCCTCCT
                                        G   P   T   G   P   I   G   P   P


|2311        |2321        |2331        .       .       .       .       .       .
GGCCCAGCTGGCCAGCCTGGAGATAAGgtaacccttaatactacctggatataaaaagaa
|771



Exon 34 | Start: 2455 | End: 2508 | Length: 53



        .       .       .       .       .       .               |2341        |2351        |2361
gcaagacagtgacatggcttctctttttccaggGGTGAAGGTGGTGCCCCCGGACTTCCA
                                      G   E   G   G   A   P   G   L   P
                                                              |781
```

12

```
        |2371      |2381      |2391.    .    .    .    .    .
GGTATAGCTGGACCTCGTGGTAGCCCTgtaagtgttaaagacattctcaacatactttt
        |791
```

Exon 35 | Start: 2509 | End: 2562 | Length: 53

```
    .    .    .    .    .    .              |2401      |2411
actgtgactaaggaggatattttttctcttcaggGGTGAGAGAGGTGAAACTGGCCCTCCA
                                     G   E   R   G   E   T   G   P   P
                                          |801

    |2421      |2431      |2441    .    .    .    .    .    .
GGACCTGCTGGTTTCCCTGGTGCTCCTgtaagtgtgaatatttatacatacatgtcccat
            |811
```

Exon 36 | Start: 2563 | End: 2670 | Length: 107

```
    .    .    .    .    .    .              |2451      |2461      |2471
agctgagagattgctgttgttgttgcatgtaggGGACAGAATGGTGAACCTGGTGGTAAA
                                     G   Q   N   G   E   P   G   G   K
                                               |821

        |2481      |2491      |2501      |2511      |2521      |2531
GGAGAAAGAGGGGCTCCGGGTGAGAAAGGTGAAGGAGGCCCTCCTGGAGTTGCAGGACCC
G   E   R   G   A   P   G   E   K   G   E   G   G   P   P   G   V   A   G   P
                |831                              |841

        |2541      |2551    .    .    .    .    .    .
CCTGGAGGTTCTGGACCTGCTgtaagttccttcctctttctctgtctatctatc
                |851
```

Exon 37 | Start: 2671 | End: 2724 | Length: 53

```
    .    .    .    .    .    .              |2561      |2571
attcttacataatttccttccatttcatataggGGTCCTCCTGGTCCCCAAGGTGTCAAA
                                     G   P   P   G   P   Q   G   V   K
```

```
|2581      |2591      |2601      .    .    .    .    .    .
GGTGAACGTGGCAGTCCTGGTGGACCTgtaagtattgatcctcttaactattattgaaaa
|861
```

Exon 38 | Start: 2725 | End: 2778 | Length: 53

```
    .    .    .    .    .    .      |2611      |2621      |2631
ttgaaattcaaaaatatattaccatttcacaggGGTGCTGCTGGCTTCCCTGGTGCTCGT
                                   G   A   A   G   F   P   G   A   R
                                   |871
```

```
      |2641      |2651      |2661.   .    .    .    .    .
GGTCTTCCTGGTCCTCCTGGTAGTAATgtaagtaattgttaaagtcttttctcatcatac
        |881
```

Exon 39 | Start: 2779 | End: 2940 | Length: 161

```
    .    .    .    .    .    .      |2671      |2681
taaatattcaaatttcaaacaattatttgtaggGGTAACCCAGGACCCCCAGGTCCCAGC
                                   G   N   P   G   P   P   G   P   S
                                   |891
```

```
  |2691      |2701      |2711      |2721      |2731      |2741
GGTTCTCCAGGCAAGGATGGGCCCCCAGGTCCTGCGGGTAACACTGGTGCTCCTGGCAGC
G   S   P   G   K   D   G   P   P   G   P   A   G   N   T   G   A   P   G   S
            |901                             |911
```

```
  |2751      |2761      |2771      |2781      |2791      |2801
CCTGGAGTGTCTGGACCAAAAGGTGATGCTGGCCAACCAGGAGAGAAGGGATCGCCTGGT
P   G   V   S   G   P   K   G   D   A   G   Q   P   G   E   K   G   S   P   G
            |921                             |931
```

```
  |2811      |2821    .    .    .    .    .    .
GCCCAGGGCCCACCAgtaagtaacttcattttttttaaattgattctac
            |941
```

Exon 40 | Start: 2941 | End: 3048 | Length: 107

14

```
            .     .     .     .     .     .                  |2831       |2841
aagatgagctaagtcttcattatctgtattaggGGAGCTCCAGGCCCACTTGGGATTGCT
                                  G  A  P  G  P  L  G  I  A


|2851       |2861       |2871       |2881       |2891       |2901
GGGATCACTGGAGCACGGGGTCTTGCAGGACCACCAGGCATGCCAGGTCCTAGGGGAAGC
G  I  T  G  A  R  G  L  A  G  P  P  G  M  P  G  P  R  G  S
|951                                 |961

|2911       |2921       |2931.   .     .     .     .     .
CCTGGCCCTCAGGGTGTCAAGgtgagtatagtcattttccactacactcttcct
|971


Exon 41 | Start: 3049 | End: 3156 | Length: 107



            .     .     .     .     .     .                  |2941       |2951
aaacaaaatgttttttcattcctttgtatacaggGGTGAAAGTGGGAAACCAGGAGCTAAC
                                   G  E  S  G  K  P  G  A  N
                                                          |981

   |2961       |2971       |2981       |2991       |3001       |3011
GGTCTCAGTGGAGAACGTGGTCCCCCTGGACCCCAGGGTCTTCCTGGTCTGGCTGGTACA
G  L  S  G  E  R  G  P  P  G  P  Q  G  L  P  G  L  A  G  T
            |991                                 |1001

   |3021       |3031       .     .     .     .     .     .
GCTGGTGAACCTGGAAGAGATgtgagtagcagttttttattcaaccagccaggta
            |1011



Exon 42 | Start: 3157 | End: 3210 | Length: 53



            .     .     .     .     .     .                  |3041       |3051       |3061
aaattttatttcctttctcattttttaatcaggGGAAACCCTGGATCAGATGGTCTTCCA
                                  G  N  P  G  S  D  G  L  P
                                                          |1021

      |3071       |3081       |3091  .     .     .     .     .     .
```

15

```
GGCCGAGATGGATCTCCTGGTGGCAAGgtataataaacacatgtgcaattgatttgtgtt
                          |1031
```

Exon 43 | Start: 3211 | End: 3318 | Length: 107

```
    .    .    .    .    .    .              |3101      |3111
tgtttattttgtacctatgaatttgttcacaggGGTGATCGTGGTGAAAATGGCTCTCCT
                                   G  D  R  G  E  N  G  S  P


|3121     |3131     |3141     |3151     |3161     |3171
GGTGCCCCTGGCGCTCCTGGTCATCCAGGCCCACCTGGTCCTGTCGGTCCAGCTGGAAAG
G  A  P  G  A  P  G  H  P  G  P  P  G  P  V  G  P  A  G  K
|1041                          |1051

|3181     |3191     |3201.    .    .    .    .    .
AGTGGTGACAGAGGAGAAAGTgtgagttcccaaaagcagcatctgtcttgtttg
|1061
```

Exon 44 | Start: 3319 | End: 3372 | Length: 53

```
    .    .    .    .    .    .              |3211      |3221
tatgtcttctcaattgaatgttttcatcttaggGGCCCTGCTGGCCCTGCTGGTGCTCCC
                                  G  P  A  G  P  A  G  A  P
                                                     |1071

   |3231     |3241     |3251    .    .    .    .    .    .
GGTCCTGCTGGTTCCCGAGGTGCTCCTgtaagttttgtcattttttggtttttattttgtt
            |1081
```

Exon 45 | Start: 3373 | End: 3480 | Length: 107

```
    .    .    .    .    .    .              |3261      |3271      |3281
atatgacttcaattcaaaatatgtttctaaaggGGTCCTCAAGGCCCACGTGGTGACAAA
                                  G  P  Q  G  P  R  G  D  K
                                                      |1091
```

```
        |3291      |3301      |3311      |3321      |3331      |3341
GGTGAAACAGGTGAACGTGGAGCTGCTGGCATCAAAGGACATCGAGGATTCCCTGGTAAT
G   E   T   G   E   R   G   A   A   G   I   K   G   H   R   G   F   P   G   N
                |1101                                    |1111

        |3351      |3361   .      .      .      .      .      .
CCAGGTGCCCCAGGTTCTCCAgtaagtgcattcatttttgttggaaaatcccttc
                |1121
```

Exon 46 | Start: 3481 | End: 3534 | Length: 53

```
    .      .      .      .      .      .           |3371      |3381
ttcactcctatgtacacttcctttctttccaggGGCCCTGCTGGTCAGCAGGGTGCAATC
                                   G   P   A   G   Q   Q   G   A   I

|3391      |3401      |3411      .      .      .      .      .      .
GGCAGTCCAGGACCTGCAGGCCCCCAGAgtaagtagcacagaaagatattacaggtccaca
|1131
```

Exon 47 | Start: 3535 | End: 3642 | Length: 107

```
    .      .      .      .      .      .           |3421      |3431      |3441
tctggcattgtgatgtcatgatactttcttaggGGACCTGTTGGACCCAGTGGACCTCCT
                                   G   P   V   G   P   S   G   P   P
                                                          |1141

        |3451      |3461      |3471      |3481      |3491      |3501
GGCAAAGATGGAACCAGTGGACATCCAGGTCCCATTGGACCACCAGGGCCTCGAGGTAAC
G   K   D   G   T   S   G   H   P   G   P   I   G   P   P   G   P   R   G   N
    |1151                                    |1161

        |3511      |3521   .      .      .      .      .      .
AGAGGTGAAAGAGGATCTGAGgtaagacatcacttatacgtatgtgtatttaat
        |1171
```

Exon 48 | Start: 3643 | End: 3940 | Length: 297

```
        .     .     .     .     .     .              |3531        |3541        |3551
tacctcaatgatccatgtttttactcattctaggGGCTCCCCAGGCCACCCAGGGCAACCA
                                     G  S  P  G  H  P  G  Q  P
                                                          |1181


        |3561        |3571        |3581        |3591        |3601        |3611
GGCCCTCCTGGACCTCCTGGTGCCCCTGGTCCTTGCTGTGGTGGTGTTGGAGCCGCTGCC
G  P  P  G  P  P  G  A  P  G  P  C  C  G  G  V  G  A  A  A
                 |1191                                 |1201


        |3621        |3631        |3641        |3651        |3661        |3671
ATTGCTGGGATTGGAGGTGAAAAAGCTGGCGGTTTTGCCCCGTATTATGGAGATGAACCA
I  A  G  I  G  G  E  K  A  G  G  F  A  P  Y  Y  G  D  E  P
                 |1211                                 |1221


        |3681        |3691        |3701        |3711        |3721        |3731
ATGGATTTCAAAATCAACACCGATGAGATTATGACTTCACTCAAGTCTGTTAATGGACAA
M  D  F  K  I  N  T  D  E  I  M  T  S  L  K  S  V  N  G  Q
                 |1231                                 |1241


        |3741        |3751        |3761        |3771        |3781        |3791
ATAGAAAGCCTCATTAGTCCTGATGGTTCTCGTAAAAACCCCGCTAGAAACTGCAGAGAC
I  E  S  L  I  S  P  D  G  S  R  K  N  P  A  R  N  C  R  D
                 |1251                                 |1261


        |3801        |3811        |3821  .     .     .     .     .
CTGAAATTCTGCCATCCTGAACTCAAGAGTGgtatgtttggtagtctttcatcttcatgg
L  K  F  C  H  P  E  L  K  S  G
                 |1271


.
caat




Exon 49 | Start: 3941 | End: 4128 | Length: 187




        .     .     .     .     .     .              |3831        |3841
accaattcccattctttttttgtgactattcaggGAGAATACTGGGTTGACCCTAACCAAG
                                     E  Y  W  V  D  P  N  Q  G
                                                          |1281


|3851        |3861        |3871        |3881        |3891        |3901
```

18

```
GATGCAAATTGGATGCTATCAAGGTATTCTGTAATATGGAAACTGGGGAAACATGCATAA
  C  K  L  D  A  I  K  V  F  C  N  M  E  T  G  E  T  C  I  S
               |1291                            |1301

|3911     |3921     |3931     |3941     |3951     |3961
GTGCCAATCCTTTGAATGTTCCACGGAAACACTGGTGGACAGATTCTAGTGCTGAGAAGA
  A  N  P  L  N  V  P  R  K  H  W  W  T  D  S  S  A  E  K  K
               |1311                            |1321

|3971     |3981     |3991     |4001     |4011.    .    .
AACACGTTTGGTTTGGAGAGTCCATGGATGGTGGTTTTCAGgtaggaaaggatatacctt
  H  V  W  F  G  E  S  M  D  G  G  F  Q
                                  |1331

.    .    .
tttttaaataagtc
```

Exon 50 | Start: 4129 | End: 4371 | Length: 242

```
      .    .    .    .    .    .            |4021     |4031
gtttgatctgtttttatttgttccctattacagtTTTAGCTACGGCAATCCTGAACTTCCT
                                   F  S  Y  G  N  P  E  L  P
                                                  |1341

  |4041     |4051     |4061     |4071     |4081     |4091
GAAGATGTCCTTGATGTGCAGCTGGCATTCCTTCGACTTCTCTCCAGCCGAGCTTCCCAG
 E  D  V  L  D  V  Q  L  A  F  L  R  L  L  S  S  R  A  S  Q
          |1351                            |1361

  |4101     |4111     |4121     |4131     |4141     |4151
AACATCACATATCACTGCAAAAAATAGCATTGCATACATGGATCAGGCCAGTGGAAATGTA
 N  I  T  Y  H  C  K  N  S  I  A  Y  M  D  Q  A  S  G  N  V
          |1371                            |1381

  |4161     |4171     |4181     |4191     |4201     |4211
AAGAAGGCCCTGAAGCTGATGGGGTCAAATGAAGGTGAATTCAAGGCTGAAGGAAATAGC
 K  K  A  L  K  L  M  G  S  N  E  G  E  F  K  A  E  G  N  S
          |1391                            |1401

  |4221     |4231     |4241     |4251   .    .    .    .
AAATTCACCTACACAGTTCTGGAGGATGGTTGCACGgtaggaaacatttttctcaatata
 K  F  T  Y  T  V  L  E  D  G  C  T
```

19

```
                  |1411


    .         .
ggtcataaa



Exon 51 | Start: 4372 | End: 5490 | Length: 1118



    .       .       .       .       .       .      |4261      |4271      |4281
catgatcatgtacattttgtcctttttttacagaAAACACACTGGGGAATGGAGCAAAACA
                                   K   H   T   G   E   W   S   K   T
                                                  |1421


        |4291      |4301      |4311      |4321      |4331      |4341
GTCTTTGAATATCGAACACGCAAGGCTGTGAGACTACCTATTGTAGATATTGCACCCTAT
V   F   E   Y   R   T   R   K   A   V   R   L   P   I   V   D   I   A   P   Y
        |1431                              |1441


        |4351      |4361      |4371      |4381      |4391      |4401
GACATTGGTGGTCCTGATCAAGAATTTGGTGTGGACGTTGGCCCTGTTTGCTTTTTATAA
D   I   G   G   P   D   Q   E   F   G   V   D   V   G   P   V   C   F   L   *
        |1451                              |1461


|+1       |+11       |+21       |+31       |+41       |+51
ACCAAACTCTATCTGAAATCCCAACAAAAAAAAATTTAACTCCATATGTGTTCCTCTTGTT



|+61       |+71       |+81       |+91       |+101      |+111
CTAATCTTGTCAACCAGTGCAAGTGACCGACAAAATTCCAGTTATTTATTTCCAAAATGT


|+121      |+131      |+141      |+151      |+161      |+171
TTGGAAACAGTATAATTTGACAAAGAAAAATGATACTTCTCTTTTTTTGCTGTTCCACCA


|+181      |+191      |+201      |+211      |+221      |+231
AATACAATTCAAATGCTTTTTGTTTTATTTTTTTACCAATTCCAATTTCAAAATGTCTCA


|+241      |+251      |+261      |+271      |+281      |+291
ATGGTGCTATAATAAATAAACTTCAACACTCTTTATGATAACAACACTGTGTTATATTCT


|+301      |+311      |+321      |+331      |+341      |+351
TTGAATCCTAGCCCATCTGCAGAGCAATGACTGTGCTCACCAGTAAAAGATAACCTTTCT
```

```
|+361      |+371      |+381      |+391      |+401      |+411
TTCTGAAATAGTCAAATACGAAATTAGAAAAGCCCTCCCTATTTTAACTACCTCAACTGG

|+421      |+431      |+441      |+451      |+461      |+471
TCAGAAACACAGATTGTATTCTATGAGTCCCAGAAGATGAAAAAAATTTTATACGTTGAT

|+481      |+491      |+501      |+511      |+521      |+531
AAAACTTATAAATTTCATTGATTAATCTCCTGGAAGATTGGTTTAAAAAGAAAAGTGTAA

|+541      |+551      |+561      |+571      |+581      |+591
TGCAAGAATTTAAAGAAATATTTTTAAAGCCACAATTATTTTAATATTGGATATCAACTG

|+601      |+611      |+621      |+631      |+641      |+651
CTTGTAAAGGTGCTCCTCTTTTTTCTTGTCATTGCTGGTCAAGATTACTAATATTTGGGA

|+661      |+671      |+681      |+691      |+701      |+711
AGGCTTTAAAGACGCATGTTATGGTGCTAATGTACTTTCACTTTTAAACTCTAGATCAGA

|+721      |+731      |+741      |+751      |+761      |+771
ATTGTTGACTTGCATTCAGAACATAAATGCACAAAATCTGTACATGTCTCCCATCAGAAA

|+781      |+791      |+801      |+811      |+821      |+831
GATTCATTGGCATGCCACAGGGGATTCTCCTCCTTCATCCTGTAAAGGTCAACAATAAAA

|+841      |+851      |+861      |+871      |+881      |+891
ACCAAATTATGGGGCTGCTTTTGTCACACTAGCATAGAGAATGTGTTGAAATTTAACTTT

|+901      |+911      |+921      |+931      |+941      |+951
GTAAGCTTGTATGTGGTTGTTGATCTTTTTTTTCCTTACAGACACCCATAATAAAATATC

|+961      |+971 .     .      .      .      .      .
ATATTAAAATTCtcctgtttttttgtcactttttcaaagatttaaaa
```