```
PeptideFragment6.c X
    /* Peptide Fragment Size Calculation program */
 1
 2
    /* To calculate the theoretical different peptide fragments */
    /* by the given amino acid sequence and enzyme cleaveage sites */
 3
    /* Program Composer: Alex Tzuu-Wang Chang */
 4
5
 6
    #define Max Protein Sequence Length 500
    char BoNTA LC[449] =
7
     { 'M', 'P', 'F', 'V', 'N', 'K', 'Q', 'F', 'N', 'Y', 'K', 'D', 'P', 'V', 'N',
 8 -
        'G', 'V', 'D', 'I', 'A', 'Y', 'I', 'K', 'I', 'P', 'N', 'A', 'G', 'Q', 'M',
9
        'Q','P','V','K','A','F','K','I','H','N','K','I','W','V','I',
10
        'P', 'E', 'R', 'D', 'T', 'F', 'T', 'N', 'P', 'E', 'E', 'G', 'D', 'L', 'N'
11
        'P', 'P', 'P', 'E', 'A', 'K', 'O', 'V', 'P', 'V', 'S', 'Y', 'Y', 'D', 'S',
12
        'T', 'Y', 'L', 'S', 'T', 'D', 'N', 'E', 'K', 'D', 'N', 'Y', 'L', 'K', 'G',
13
        'V', 'T', 'K', 'L', 'F', 'E', 'R', 'I', 'Y', 'S', 'T', 'D', 'L', 'G', 'R',
14
        'M','L','L','T','S','I','V','R','G','I','P','F','W','G','G',
15
        'S','T','I','D','T','E','L','K','V','I','D','T','N','C','I',
16
        'N', 'V', 'I', 'O', 'P', 'D', 'G', 'S', 'Y', 'R', 'S', 'E', 'E', 'L', 'N',
17
        'L','V','I','I','G','P','S','A','D','I','I','O','F','E','C',
18
        'K', 'S', 'F', 'G', 'H', 'E', 'V', 'L', 'N', 'L', 'T', 'R', 'N', 'G', 'Y',
19
        'G', 'S', 'T', 'Q', 'Y', 'I', 'R', 'F', 'S', 'P', 'D', 'F', 'T', 'F', 'G',
20
        'F', 'E', 'E', 'S', 'L', 'E', 'V', 'D', 'T', 'N', 'P', 'L', 'L', 'G', 'A',
21
        'G','K','F','A','T','D','P','A','V','T','L','A','H','E','L',
22
        'I','H','A','G','H','R','L','Y','G','I','A','I','N','P','N',
23
        'R','V','F','K','V','N','T','N','A','Y','Y','E','M','S','G',
24
        'L','E','V','S','F','E','E','L','R','T','F','G','G','H','D',
25
        'A', 'K', 'F', 'I', 'D', 'S', 'L', 'O', 'E', 'N', 'E', 'F', 'R', 'L', 'Y',
26
        'Y', 'Y', 'N', 'K', 'F', 'K', 'D', 'I', 'A', 'S', 'T', 'L', 'N', 'K', 'A',
27
        'K','S','I','V','G','T','T','A','S','L','Q','Y','M','K','N',
28
        'V', 'F', 'K', 'E', 'K', 'Y', 'L', 'L', 'S', 'E', 'D', 'T', 'S', 'G', 'K',
29
        'F', 'S', 'V', 'D', 'K', 'L', 'K', 'F', 'D', 'K', 'L', 'Y', 'K', 'M', 'L',
30
        'T', 'E', 'I', 'Y', 'T', 'E', 'D', 'N', 'F', 'V', 'K', 'F', 'F', 'K', 'V',
31
        'L','N','R','K','T','Y','L','N','F','D','K','A','V','F','K',
32
        'I','N','I','V','P','K','V','N','Y','T','I','Y','D','G','F',
33
        'N', 'L', 'R', 'N', 'T', 'N', 'L', 'A', 'A', 'N', 'F', 'N', 'G', 'Q', 'N'
34
        'T', 'E', 'I', 'N', 'N', 'M', 'N', 'F', 'T', 'K', 'L', 'K', 'N', 'F', 'T',
35
        'G', 'L', 'F', 'E', 'F', 'Y', 'K', 'L', 'L', 'C', 'V', 'R', 'G', 'I', 'I',
36
        'T', 'S', 'K', 'T', 'K', 'S', 'L', 'D', 'K', 'G', 'Y', 'N', 'K', '\0' };
37
    int Pepsin Sites[106]=
38
     {0,2,7,35,51,58,77,78,87,88,93,94,102,103,106,108,116,126,127,
39 -
       148, 149, 150, 151, 162, 163, 167, 173, 174, 175, 192, 193, 194, 195, 196,
40
       199,200,206,208,212,213,220,221,224,242,255,256,259,260,262,
41
       263, 265, 272, 273, 276, 277, 281, 282, 284, 289, 290, 296, 297, 309, 310,
42
       317,321,323,330,331,335,336,338,340,341,344,353,354,356,357,
43
44
       360,367,368,369,374,389,390,391,392,396,397,400,401,412,413,
       415,416,418,421,422,423,424,425,427,428,441,448);
45
46
    int Chymotrypsin Sites[111]=
47 -
     {0,3,8,10,21,30,36,39,43,51,59,72,73,77,78,87,88,94,95,99,103,
```

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PeptideFragment6.c X
   106, 107, 108, 117, 118, 127, 144, 149, 151, 163, 168, 170, 173, 175, 180,
48
       185,188,192,194,196,200,207,208,213,221,223,225,227,230,232,
49
       233,243,250,251,253,256,260,263,266,273,277,282,284,285,286,
50
       287,290,297,310,312,313,317,321,322,323,331,336,338,341,342,
51
       344,345,349,354,357,358,361,366,367,369,374,384,387,390,392,
52
       397,401,411,413,416,419,422,423,425,426,428,429,442,446,448};
53
54
    int Trypsin Sites[55]=
55 -
    {0,6,11,23,34,37,41,48,66,84,89,93,97,105,113,128,145,166,177,
       187,212,231,241,244,264,272,283,289,291,299,301,314,318,320,
56
       330,335,337,340,343,356,359,363,364,371,375,381,393,415,417,
57
       427, 432, 438, 440, 444, 448);
58
59
60
   main()
61 - {
      static char PeptideFragment[500];
62
      int index, first, last, i, j, k, w, counter;
63
64
      float MW:
     char AA:
65
66
      printf("BoNT/A Light Chain Sequence:\n");
67
      for (index=0; index<449; index++)
68
69
       { printf("%c", BoNTA LC[index]);}
      printf("\n");
70
71
      printf("\n\n\n");
72
      i=0; j=1; k=0; w=0; first=0; last=0;
73
74
      printf("BoNT-A LC Digested by Pepsin\n");
75
      for (i=0; i<106; i++)
76 -
      1
77
         first=Pepsin Sites[i];
78
         for (j=i+1; j<106; j++)
79 -
80
      last=Pepsin Sites[j];
      w=0;
81
    /* printf("first=%d, last=%d", first, last); */
82
      printf("Pepsin: ");
83
84
     MW=0.0; counter=0;
85
      for (k=first; k<=last-1; k++)
86 -
      1
87
         PeptideFragment[w]=BoNTA LC[k];
88
         counter++;
89
         AA=PeptideFragment[w];
         switch (AA)
90
91 -
             case 'A':
92
             MW=MW+89.09;
93
94
             break:
```

```
PeptideFragment6.c X
    MW=MW+181.19;
147
148
               break;
              case 'V':
149
150
                 MW=MW+117.15;
151
               break:
              default:
152
                 printf("Unknown Amino Acid\n");
153
154
155
          printf("%c", PeptideFragment[w++]);
156
157
      MW = (MW - ((counter - 1) *18)) / 1000;
       printf(" <From %d To %d>", first+1, k);
158
       printf(" MW=%4.3f KDa\n", MW);
159
160
     /* printf("\n"); */
161
162
163
      printf("\n\n\n");
       i=0; j=1; k=0; w=0; first=0; last=0;
164
165
      printf("BoNT-A LC Digested by Chymotrypsin\n");
     for (i=0; i<111; i++)
166
167 -
168
          first=Chymotrypsin Sites[i];
169
          for (j=i+1; j<111; j++)
170 -
171
       last=Chymotrypsin Sites[j];
172
       w=0;
     /* printf("first=%d, last=%d ", first, last);
173
174
       printf ("Chymotrypsin: ");
175
      MW=0.0; counter=0;
     for (k=first; k<=last-1; k++)
176
177 -
178
          PeptideFragment[w]=BoNTA LC[k];
179
          counter++;
180
          AA=PeptideFragment[w];
181
          switch (AA)
182 -
              case 'A':
183
               MW=MW+89.09;
184
185
              break:
              case 'R':
186
                 MW=MW+174.20;
187
188
              break;
              case 'D':
189
190
                 MW=MW+133.10:
191
              break:
              case 'N':
192
                 MW=MW+132.12;
193
```

```
PeptideFragment6.c X
    case 'V':
240
                 MW=MW+117.15;
241
242
              break:
243
              default:
                 printf("Unknown Amino Acid\n");
244
245
246
         printf("%c", PeptideFragment[w++]);
247
      MW = (MW - ((counter - 1) * 18)) / 1000;
248
      printf(" <From %d To %d>", first+1, k);
249
       printf(" MW=%4.3f KDa\n", MW);
250
     /* printf("\n"); */
251
252
       }
253
254
      printf("\n\n\n");
255
      i=0; j=1; k=0; w=0; first=0; last=0;
256
      printf("BoNT-A LC Digested by Trypsin\n");
      for (i=0; i<55; i++)
257
258 -
259
          first=Trypsin Sites[i];
          for (j=i+1; j<55; j++)
260
261 -
           {
262
       last=Trypsin Sites[j];
263
      w=0:
264
    /* printf("first=%d, last=%d", first, last);
      printf("Trypsin: ");
265
266
      MW=0.0; counter=0;
       for (k=first; k<=last-1; k++)
267
268 -
       -{
269
          PeptideFragment[w]=BoNTA LC[k];
270
          counter++;
271
         AA=PeptideFragment[w];
272
          switch (AA)
273 -
            -
274
              case 'A':
              MW=MW+89.09;
275
276
              break:
              case 'R':
277
                 MW=MW+174.20;
278
279
              break:
              case 'D':
280
                 MW=MW+133.10;
281
282
              break;
              case 'N':
283
284
                 MW=MW+132.12;
285
              break:
              case 'C':
286
```