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Proteomics

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Exercises 10

1. **Cumulative binomial probability**

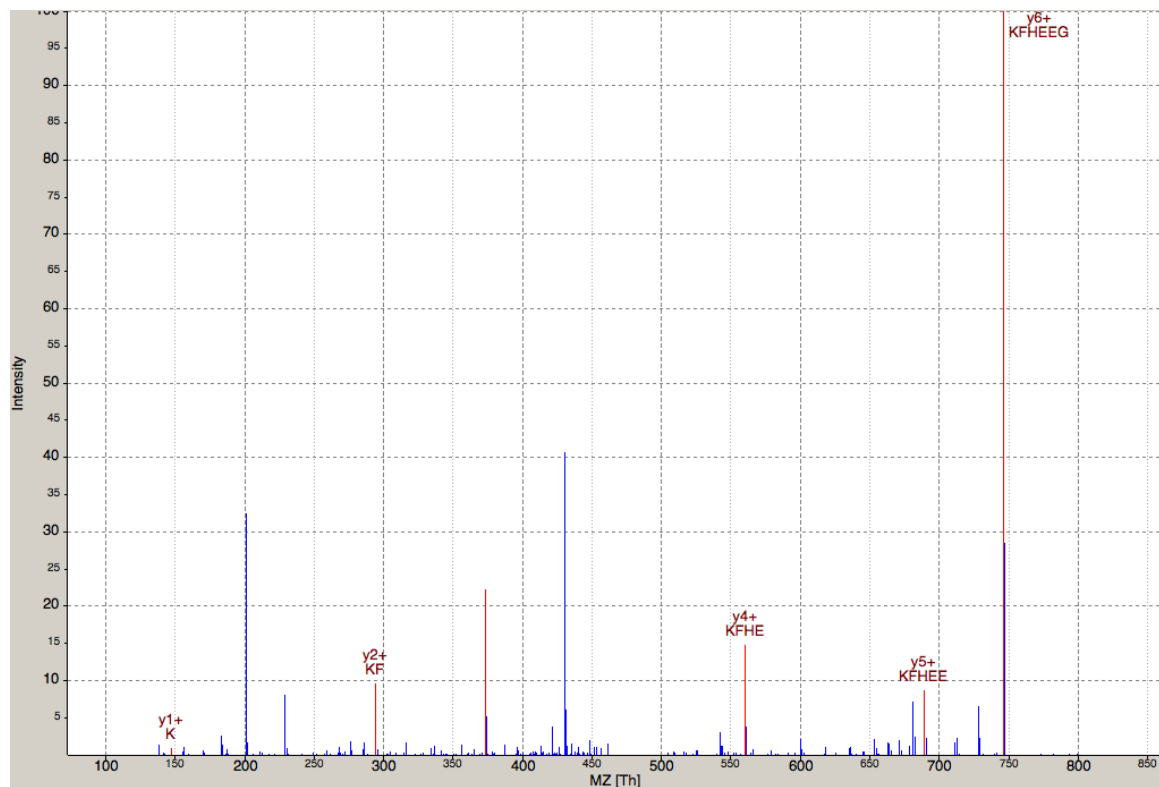   The cumulative binomial probability P can also be used to score non-phosphopeptides.

Figure 1: 5 of 7 y-ions of the peptide DLGEEHFK have been matched to the spectrum above.

   Calculate P for three different peak depths (top 1,2 and 10) and report it (window size 100 Da each, starting at 0). Ascore considers b- and y- ions, for simplicity's sake in your calculations only consider y -ions. What is P_1, P_2 and P_{10} ?

2. **Phosphosite scoring (Multiple Choice Question (Single Answer))**

   Consider your search engine scored PSMs of phosphopeptides. You now apply the AScore algorithm to obtain better site localizations. What is expected to happen to

the false discovery rate (as determined by target/decoy approach) and false localization rate (the rate of false phospho site assignments).

- FDR gets worse, FLR gets better
- FDR stays the same and FLR gets better
- FDR stays the same and FLR gets worse
- FDR and FLR get worse
- FDR and FLR get better

3. **Phosphosite scoring**

   (a) Consider the peptide PEPTIDSER with either T or S phosphorylated.
   List the site determining ions (prefix and suffix sequences).

   (b) Consider the peptide PEPTIDSETR with phosphorilation assignments: PEPpTIDSEpTR or PEPpTIDpSETR
   List the site determining ions.

4. **Phospho stoichiometry**

   Consider you measured a phosphorylated peptide with SILAC ratio 1/5 (heavy/light) and its unphosphorilated version with ratio 3/1. You were also able to quantify the protein ratio and determined that the protein is twice as abundant in the light sample.

   What is the phosphosite occupancy in light and heavy sample?

5. **Posttranslational modifications**

   What are main functions of phosphoprotein p53?

   Name a at least six types of posttranslational modifications of p53.

   Give an example that demonstrates the interplay of different types of modifications of p53.