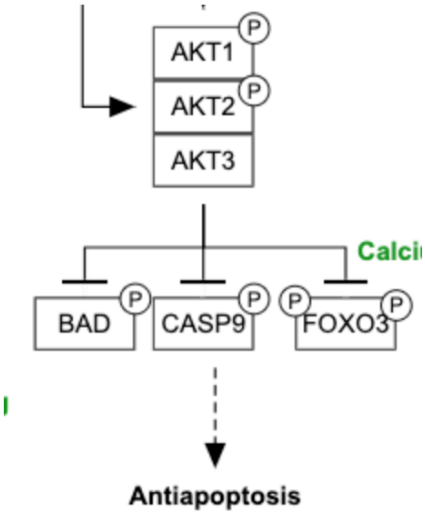
Modeling Phosphorylation Site Information in WikiPathways

These instructions describe how to use public databases to find relevant phosphorylation site information in the context of a pathway, for the purpose of annotating pathway nodes with the information as a structured comment. This annotation enables data mapping in tools like Cytoscape.

The format of the structured comment is as follows, using the example below:

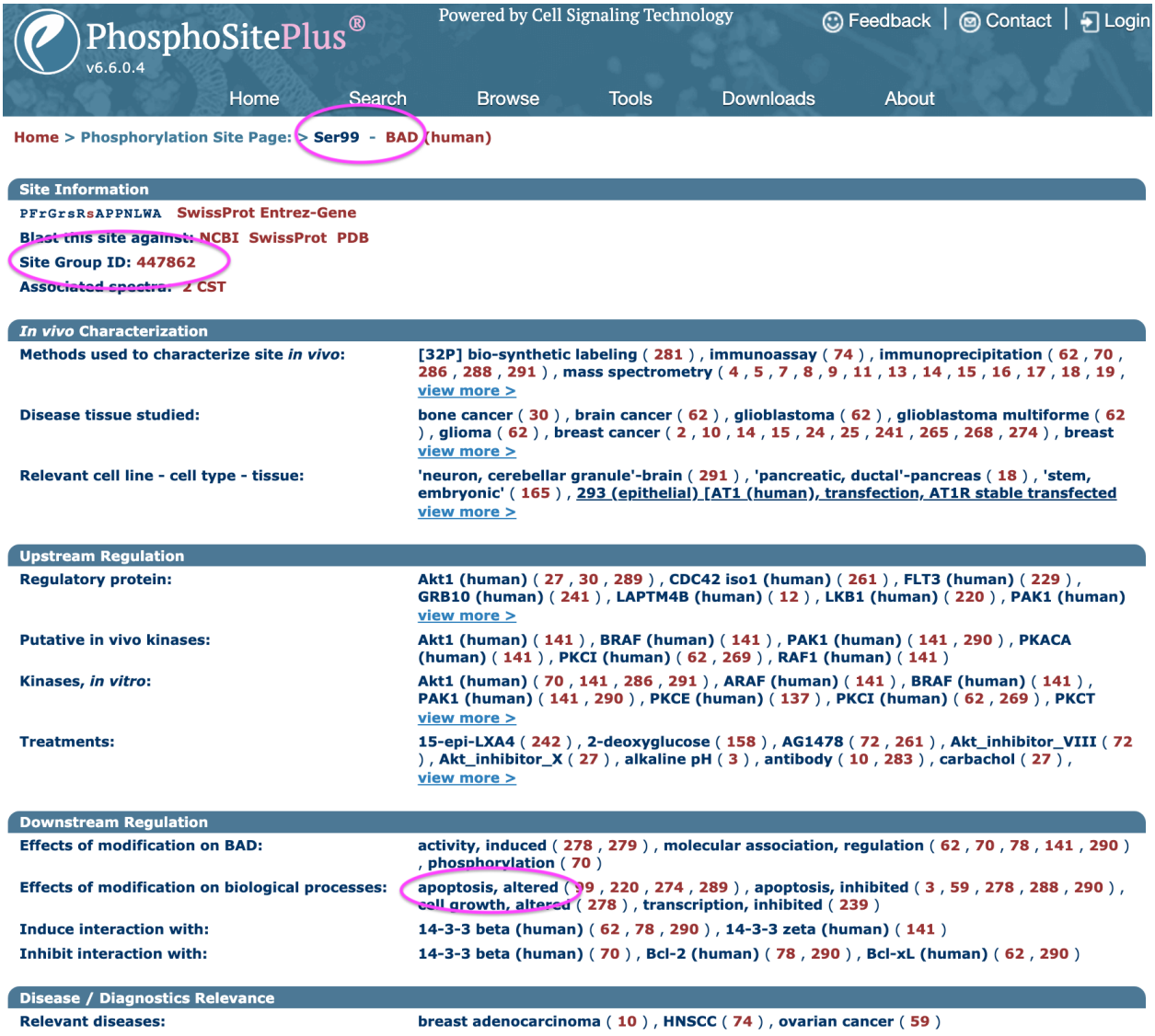
parentid=Q92934; parentsymbol=BAD; site=PFrGrsRsAPPNLWA; position=ser99; sitegrpid=447862; ptm=p; direction=d

The instructions use an example phosphorylation event from a larger pathway; the phosphorylation of the BAD protein by AKT1/2/3, which causes inactivation of BAD, ultimately leading to an anti-apoptotic effect.



1. Navigate to PhosphoSitePlus and search **Protein Name** “BAD”. In the list of results, select the result for BAD, with gene name BAD.
2. In the **Protein Information** tab, record:
    - **parentid**: Q92934 (UniProt ID)
    - **parentsymbol:** BAD (Gene Symbol)
3. In the **Upstream** tab, look for Akt1/2/3 listed under **Kinase, *in vitro*** or **Putative in vivo kinase**. In this case, S99-p is listed as one such site.
4. For each site, open the site-specific page and record the following information:
    - **position**: Ser99
    - **sitegrpid**: 447862 (**Site Group ID)**

    Also confirm that the **Effects of modification on biological processes** makes sense in the context of the pathway.



5. Back on the main page for the protein, go to the **Site Table** tab and find the relevant site (S99 in this case). Record the **site sequence**, i.e. PFrGrsRsAPPNLWA.
6. The **direction** parameter describes the effect that the phosphorylation has on the parent protein (BAD). This can be somewhat tricky to decipher from PhosphoSitePlus, so for this we use the direction indicated in the pathway model. In this case, there is an inhibition interaction between AKT1/2/3 and BAD, indicating the direction is a down-regulation. We will record this as “d” for **direction**.
7. Construct the custom comment using the recorded information:

   parentid=Q92934; parentsymbol=BAD; site=PFrGrsRsAPPNLWA; position=ser99; sitegrpid=447862; ptm=p; direction=d

   Note: If the information available from PhosphoSitePlus is not conclusive or clear, simply skip that site.