Phosphoserine phosphatase (PSP) is a 25 kDa enzyme responsible for the third and last step of the L-serine biosynthesis pathway. It catalyses the Mg2+-dependent hydrolysis of L-phosphoserine. The reaction mechanism of many phosphatases or phosphotransferases involves the formation of a catalytic intermediate in which the phosphate derived from the substrate is bound to the side chain of either a serine, histidine, cysteine or aspartate residue present in the catalytic site [1,2]. PSP belongs to a recently identified class of phosphotransferases forming a phosphoaspartate intermediate during catalysis. Other enzymes forming a phosphoaspartate intermediate include e.g. P-type ATPases and phosphomannomutases [3].

The goal of the project is to solve the PSP structure and to study its working mechanism.

PSP has been crystallized using the hanging drop vapour diffusion method with a solution containing 0.7 M $CaCl_2$, 0.1 M cacodylate buffer pH 6.3 and 20 % polyethylene glycol 1500. Preliminary data to 1.53 Å of native crystals were previously collected at the BW7B beam line of the DESY synchrotron (Hamburg, Germany). The crystals are orthorhombic, belonging to space group $C222_1$ with unit cell parameters a = 49.03 Å, b = 130.25 Å, c = 157.29 Å [4].

A selenomethionyl derivative has been prepared and we collected a three wavelength MAD dataset at the BM30A beamline at ESRF, Grenoble (France). The crystal diffracted till 2.395 Å and there was visible radiation dammage during data collection. The three wavelenghts we used for the MAD dataset were 0.9792 Å (peak), 0.9794 Å (inflection point) and 0.9763 Å (remote). Data collection and –reduction went very fast and we had no major problems to collect this dataset. This MAD data set was sufficient to solve the crystallographic phase problem using SHARP [5] and using ARP/wARP [6] we were able to automatically trace most of the structure. Further refinement of the structure is now underway.

Furthermore, at BM30A, we collected a PSP crystal soaked with L-serine. We hope that L-serine binds to the active site of PSP and that we can beter understand the reaction mechanism of the human PSP. At this moment we are still analysing the results of that measurement.

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