Peroxiredoxins (PRDXs) regulate the levels of reactive oxygen species (ROS) in cells and tissues and protect them against oxidative attacks. Indeed, ROS may react with lipids, proteins and nucleic acids, leading to cell damage or death. PRDX5 belongs to the class of atypical 2-cys peroxiredoxins. Contrary to the typical 2-cys PRDXs, which upon oxidation form an intermolecular disulfide bond, the atypical 2-cys are supposed to form an intramolecular disulfide bond. Peroxiredoxins are reduced by thiol-containing donor molecules like thioredoxin (TXN). Our goal is to study, from a structural point of view, the interaction between PRDX5 and mitochondrial TXN2.

In order to study these interactions, we have in the past tried to prepare complexes of the two molecules after mutating one of the Cys residues of TXN2. This mutation will allow the formation of intermolecular contacts without allowing the TXN molecule to reduce the PRDX molecule. Unfortunately, we did not succeed to grow suitable crystals of these complexes. In order to overcome this difficulty, we have prepared a fusion protein between PRDX5 and the mutant of TXN2 and several crystal forms of this protein have been obtained. There are four or six copies of the fusion protein in the asymmetric unit. We have now collected data of several crystal forms in reduced or oxidized states. The solution of the crystal structures is attempted by molecular replacement, using as models the known structures of PRDX5 and of TXN2.