TIME-RESOLVED THERMODYNAMICS OF CO BINDING TO NEUROGLOBIN

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To understand the mechanism of neuroglobin (Ngb) interactions with diatomic ligands, the time-resolved thermodynamic parameters and CO binding kinetics were characterized using photoacoustic calorimetry and time-resolved absorption spectroscopy. Results indicate a direct migration pathway connecting the heme binding site and the protein surrounding in Ngb. In addition, Val68 residue that is located within the distal heme pocket is crucial for regulation of ligand migration, whereas a smaller impact was observed for distal His64. Interestingly, mutation of Cys120 residue which is located ~19 Å from the heme iron also impacts the ligand migration, suggesting long-range ligand triggered structural changes. Replacement of Cys46 and Cys55 residue that form an internal disulfide bond in the CD-loop of hNgb leads to an increase in the volume change associated with ligand photo-dissociation, likely due to a decrease in the CD-loop dynamics and/or alteration of the heme-sliding mechanism.