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The Reaction of PMM/PGM: Structural Insights Into a Simple Processive Enzyme. Andrew M. Schramm, Catherine Regni, Lesa J. Beamer, Dept. of Biochemistry, Univ. of Missouri-Columbia, MO.

The enzyme phosphomannomutase/phosphoglucomutase (PMM/PGM) belongs to the α -D-phosphohexomutase enzyme superfamily and catalyzes the reversible conversion of 1-phospho to 6-phosphosugars. The reaction entails two phosphoryl transfers, with an intervening 180° reorientation of the reaction intermediate (e.g., glucose 1,6-bisphosphate) during catalysis. Reorientation of the intermediate occurs without dissociation from the active site of the enzyme, and is thus a simple example of processivity, as defined by multiple rounds of catalysis without release of substrate.

Structural characterization of two PMM/PGM intermediate complexes with glucose 1,6-bisphosphate provides new insights into the reaction catalyzed by the enzyme, including the reorientation of the intermediate. Kinetic analyses of site-directed mutants reveal active site residues critical for maintaining association with glucose 1,6-bisphosphate during its dynamic reorientation in the active site of PMM/PGM.