Petri Nets Representation and Analysis of the Synthesis of Dolichol-Linked Precursor of N-Glycans

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Synthesis of dolichol-linked precursor of N-glycans is a complex biological system with numerous interdependent processes. We used Petri nets mathematical formalism to construct the synthesis of dolichol-linked precursor of N-glycans. Our analysis show that Dol-P is a critical point, but reduced levels of this substrate can be compensated by the oxidative pathway involving dolichol [9], from Dol pool by phosphorylation (EC 2.7.1.108) or PP-Dol pool by dephosphorylation (EC 3.6.1.4). Reactions of dolichol pathway can be controlled at least at three places by availability of substrates Man-GDP [6], Man (β) – P – Dol [5] and Glc(β) – P – Dol. Reduced levels of proteins with consensus Asn-X-Ser or Asn-X-Thr sites, through lack of essential amino acids, can also be a bottleneck in the synthesis.

Key words: petri net, glycosylation.