Background Signal transduction plays a fundamental role in the understanding of cellular physiology. The bacterial phosphotransferase system (PTS) together with the PEP/pyruvate node in central metabolism represents a signaling unit that acts as a sensory element and measures the activity of the central metabolism. Pseudomonas putida possesses two PTS branches, the C-branch (PTSFru) and a second branch (PTSNtr), which communicate with each other by phosphate exchange. Recent experimental results showed a cross talk between the two branches. However, the functional role of the crosstalk remains open. Results A mathematical model was set up to describe the available data of the state of phosphorylation of PtsN, one of the PTS proteins, for different environmental conditions and different strain variants. Additionally, data from flux balance analysis was used to determine some of the kinetic parameters of the involved reactions. Based on the calculated and estimated parameters, the flux distribution during growth of the wild type strain on fructose could be determined. Conclusion Our calculations show that during growth of the wild type strain on the PTS substrate fructose, the major part of the phosphoryl groups is provided by the second branch of the PTS. This theoretical finding indicates a new...
role of the second branch of the PTS and will serve as a basis for further experimental studies.