Seminars in Genetics and Molecular Cell Biology

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The phosphotransferase system:
sugar transport, metabolic regulation and virulence

The phosphoenolpyruvate (PEP):sugar phosphotransferase system (PTS) constitutes an efficient bacterial transport and phosphorylation system for numerous carbohydrates and carbohydrate derivatives. It is usually composed of five proteins or domains, one of which is embedded in the membrane, whereas the four others form a phosphorylation cascade in the cytoplasm or attached to the cytosolic side of the membrane by using PEP as phosphoryl donor. Phosphorylation of the PTS proteins occurs at histidyl and cysteyl residues. In firmicutes, HPr, one of the soluble PTS components, becomes also phosphorylated at a seryl residue by an ATP-dependent protein kinase, which serves exclusively regulatory functions. Indeed, in addition to their catalytic role i sugar transport and phosphorylation, PTS components in firmicutes and proteobacteria exert also numerous regulatory functions in carbon catabolite repression, inducer exclusion, chemotaxis and many other cellular processes. In order to carry out their regulatory functions PTS components usually undergo changes in their phosphorylation state, which responds to the presence of a PTS carbon source, but also depends on the energetic state of the cells (PEP to pyruvate ratio, concentrations of ATP, P_i and glycolytic intermediates). Most interestingly, in certain pathogens PTS components are also involved in virulence regulation. This is the case for example in *Listeria monocytogenes*, *Brucella melitensis* and *Neisseria meningitidis*. The role of the PTS in these organisms will be discussed in detail.

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Institute for Genetics,
Zülpicher Str. 47 a, Lecture hall, 4th floor

Host: Karin Schnetz, Institute for Genetics,
University of Cologne

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