

Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Large-Scale Organization of Glycosylation Networks PAN-JUN KIM, University of Illinois at Urbana-Champaign, DONG-YUP LEE, National University of Singapore, HAWOONG JEONG, Korea Advanced Institute of Science and Technology — Glycosylation is a highly complex process to produce a diverse repertoire of cellular glycans that are frequently attached to proteins and lipids. Glycans participate in fundamental biological processes including molecular trafficking and clearance, cell proliferation and apoptosis, developmental biology, immune response, and pathogenesis. N-linked glycans found on proteins are formed by sequential attachments of monosaccharides with the help of a relatively small number of enzymes. Many of these enzymes can accept multiple N-linked glycans as substrates, thus generating a large number of glycan intermediates and their intermingled pathways. Motivated by the quantitative methods developed in complex network research, we investigate the large-scale organization of such N-glycosylation pathways in a mammalian cell. The uncovered results give the experimentally-testable predictions for glycosylation process, and can be applied to the engineering of therapeutic glycoproteins.

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Date submitted: 17 Nov 2008

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