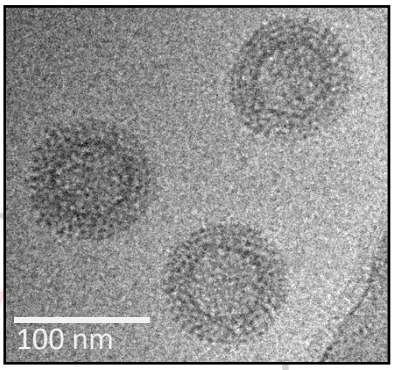
QCB Evenings

Wednesday, Dec. 2 • 5:30pm • Chemistry C122

A Template-directed Assembly Approach to Understand HIV Structure

POOJA SAXENA, DRAGNEA LAB



Assembly of Human Immunodeficiency Virus type-1 (HIV-1), prior to its maturation into the infectious capsid, is an unclear step in the lifecycle of the virus and therefore, an unexplored target for anti-viral therapy. A challenge with the study of immature HIV-1 is the pleomorphic nature of native particles, with several levels of heterogeneity amongst capsids. This hampers the use of conventional methods for ultra-structural analysis since they involve averaging. We have developed a method for assembly of isometric virus-like particles of immature HIV-1 in vitro by deploying templates derived from the bacteriophage P22. The use of a monodisperse template with Gaussian curvature leads to reduced size polydispersity and high reproducibility, overcoming the limitations with native immature HIV-1. Our study reveals tight dependence of HIV-1 assembly on the charge density of the packaged cargo. This closely regulated template-directed assembly approach allows, for the first time, generation of uniform and morphologically identical spherical shells of immature HIV-1 that are being used to deduce physical principles behind virus assembly.

Investigating bacterial peptidoglycan (PG) synthesis dynamics through use of fluorescent molecular probes

YEN-PANG HSU, VANNIEUWENHZE LAB

"How do bacteria coordinate PG biosynthesis with cell division?" PG, also known as bacterial cell wall, provides cells with mechanical strength to maintain their integrity in the environment. PG biosynthesis has two important roles in cell division: 1) formation of the division septum and, 2) the synthesis and modification of new poles to separate the daughter cells. Our understanding of septal PG growth, however, is highly limited because of the scarcity of tools available for tracking PG growth in real time. To gain new insights into cell division, we tracked septal PG synthesis activity using fluorescent D-amino acids (FDAAs). FDAAs are covalently incorporated into PG covalently by PG synthases. Probe incorporation enables real-time tracking of PG synthesis activity. Our study revealed that, in Bacillus subtilis, septal PG grows in a heterogeneous and rotational manner, which is driven by protein complexes revolving around division site. We also report a post-septational growth model showing how division septum is cleaved into new poles.

All QCB Trainer Lab Personnel are invited to attend.
Food and beer will be provided.

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