

NIH COMMON FUND HIGH-RISK HIGH-REWARD RESEARCH SYMPOSIUM

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POSTER ABSTRACTS – SESSION 1 (DEC. 15, 2014)

Selective Penicillin-Binding Protein Imaging Probes Reveal Substructure in Bacterial Cell Division

Awardee: Erin E. Carlson

Award: New Innovator Award

Awardee Institution: University of Minnesota

We are working to understand the enzymes involved in the biosynthesis of peptidoglycan (PG), a complex polymeric structure that is a major component of the bacterial cell wall and is essential for survival. PG is a common target for antibiotic therapy, but its structure and assembly are only partially understood. PG synthesis requires a suite of penicillin-binding proteins (PBPs), the individual roles of which are difficult to determine because each enzyme is often dispensable for growth perhaps due to functional redundancy. To address this challenge, we generated fluorescent derivatives of the β -lactam-containing antibiotic cephalosporin C to enable selective examination of a subset of PBPs. These probes facilitated specific *in vivo* imaging of active PBPs in both *Bacillus subtilis* and *Streptococcus pneumoniae* and revealed that even PBPs that are located at a particular site (e.g., septum) are not all intermixed, but rather that PBP subpopulations are discretely localized. Presently, we are working to generate probes with other selectivity profiles, which will facilitate the construction of a more comprehensive understanding of bacterial growth and pathogenesis.