CryoEM Current Practices Webinar

Mechanisms driving molecular innovation: Cryo-EM studies of CRISPR-associated transposons

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CRISPR-associated transposition systems allow guide RNA-directed integration of a single DNA cargo in one orientation at a fixed distance from a programmable target sequence. In published work, we defined the mechanism explaining this process by characterizing the transposition regulator, TnsC, from a type V-K CRISPR-transposase system using cryo-electron microscopy (EM). Polymerization of ATP-bound TnsC helical filaments could explain how polarity information is passed to the transposase. TniQ caps the TnsC filament, establishing a universal mechanism for target information transfer in Tn7/Tn7-like elements. A post-hydrolysis structure of TnsC is incapable of forming filaments and can serve as a 'molecular ruler' to measure the distance between the CRISPR protospacer and the ultimate point of insertion.

More recently, we have focused on the transposition mechanisms that appear to be evolutionarily conserved across diverse transposons, including that of bacteriophage Mu. I will also discuss how our mechanistic studies are revealing functional links between the CRISPR-effector complex and the transposition system components. Finally, I will discuss how these insights are allowing us to focus on the future of re-engineering CRISPR-associated transposons.

All are welcome to attend. Registration is at no-cost, but sign-up is required:
https://us02web.zoom.us/webinar/register/WN_a_kLoNeIS3u6XDYhBseALQ

This webinar series is jointly hosted by the NIH Transformative High Resolution CryoEM Program Service Centers: the National Center for CryoEM Access and Training (NCCAT), the Pacific Northwest Center for CryoEM (PNCC), and the Stanford-SLAC CryoEM Center (S2C2) who provide no-cost access to cryoEM instrumentation and training. In this monthly series, we will highlight cryoEM methods and use the Q&A session after the seminar to stimulate discussion of best practices and interesting challenges that will be helpful to researchers new to the field. Representatives from all three service centers will also be on hand to answer questions about the cryoEM resources available to biomedical researchers and how to access them.