Chun Ju (Rick) Chen

US Permanent Resident

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Highly competent and motivated enzyme biochemist with 5 years research experience in mechanochemical characterization of recombinant kinesin ATPase molecular motors.

Qualifications Summary:

- Expert in transient-state enzyme kinetic analysis to dissect ATPase mechanochemical pathway of molecular motors using fast kinetic techniques including stopped-flow, and quench-flow methodologies, coupled with thermodynamic and microscopic approaches.
- Extensive experience in the construction and modification of vector and manipulation of native protein construct to express and purify truncated and affinity-tagged kinesin motors of different oligomeric states and origins.
- Strong experience in designing purification protocols involving a combination of different column chromatograph systems to purify heterodimeric molecular motor that incorporate cysteine mutations to crosslink intramolecularly with different chemical linkers.
- Upscale purification of soluble tubulins from the Bovine brain tissues implementing a cold-depolymerization and warm-polymerization strategy, followed by the DEAE column chromatograph.
- Designing the crosslinking and purification protocol for labeling phosphate binding protein with thiol reactive coumarin, MDCC, using the Q-Sepharose column.
- Excellent team player with strong interpersonal skills to collaborate or execute experiment plans for technicians, rotation students, and undergraduate students in a multidisciplinary setting.

Education:

Rensselaer Polytechnic Institute Troy, NY

PhD - Biology June, 2012

- Thesis: Comparative Analysis of heterodimeric Kinesin-14 Kar3Cik1 and Kar3Vik1 for powerstroke mechanisms and microtubule binding patterns.
- GPA: 4.0/4.0

University of Manitoba Manitoba, Canada

B.Sc. - Genetics May, 2007

- First Class Honors
- GPA: 3.89

Professional Experience and Teaching Responsibilities:

Graduate Research Assistant in Center for Biotechnology and Interdisciplinary Studies, RPI

- Execute independent and collaborative projects involving cloning, bacterial/mammalian cell culture, pilot and scale-up protein purification for recombinant kinesin-5, kinesin-7, and kinesin-14 in *E.coli* to yield sufficient proteins for transient-state enzyme kinetics and thermodynamic equilibrium binding analysis.
- Pioneer experiments to dissect ATPase pathway and define kinetic parameters for individual mechanism of pre-steady state kinetics and elucidate specific conformational changes by analyzing transients and substrate concentration-dependent plots from Stopped-flow and Quench-flow data.
- Conceive, design, and perform TIRF fluorescence microscopy experiments and imaging analysis, followed by statistical data analysis on microtubule-promoted motility.
- Develop and standardize transient-state enzyme kinetics and motor proteins purification protocols and automate quantitative analysis procedures using Microsoft Office Suites, VBA, and Kaleidograph.
- Collaborate with X-ray crystallography and cryo-EM groups to investigate conformational changes of molecular motor at different nucleotide state in the pathway by contributing in optimizing motor protein purification and enzyme mechanistic characterization.

Research Expertise:

- Dissect unique enzymatic reaction step by Implementing transient state kinetics and enzyme activity assays with radio-labeled probes, fluorescence analog, GFP marker, and fluorophore-conjugated proteins.
- Quantify and characterize purified proteins with SDS-PAGE, Bradford, Lowry, blotting, and HPLC analysis.

- Expertise in mechanochemistry, binding stoichiometry and affinity study of enzymatic proteins using steady-state, quench-flow, stopped-flow, UV/Vis, and thermodynamic methodologies.
- Implement fluorescence microcopy experiments to determine motility rate of motor-promoted cytoskeleton gliding, microtubule ends elongation/depolymerization, and co-localization investigation.
- Use radiolabeled [α-32P] probe to study steady-state and pre steady-state kinetics of substrate binding and catalysis at the enzyme active site, with quantification by thin layer chromatography.
- Design purification strategy for recombinant proteins, animal cytoskeleton, and fluorophore/GFP-conjugated proteins using AKTA FPLC and Beckman HPLC systems (ion-exchange, affinity-tags, size-exclusion and RP chromatography) in *E. coli* cells and animal tissues.
- Demonstrated proficiency in molecular and cell biology applications: siRNA transfection, vector construction, site-directed mutagenesis, RT-PCR, PCR, cell culture, western blot, IHC, ICC, Southern blot, DNA/RNA isolation, ELISA, and co-immunoprecipitation.

Awards and Honors:

- University 1 Honor List 2002-2003
- Hogg Centennial Entrance Scholarship 2002-2003
- Achievement Award at Dale Carnegie Training 2003-2004
- University of Manitoba Students' Union Scholarship 2003-2004
- International Undergraduate Student Scholarship 2005-2006
- Dean's Honor List 2005-2007
- Rensselaer Graduate Student Presentation Travel Grant 2009
- Rensselaer Graduate Student Presentation Travel Grant 2010
- Biophysical Society Doctorial Student Travel Award 2010
- 2011 Rensselaer Founders Award of Excellence 2011

Publications and Presentations:

Peer Reviewed Journal Paper

- **Chen, C.J.**, Rayment, I., and Gilbert, S.P. (2011). Kinesin Kar3Cik1 ATPase Pathway for Microtubule Cross-linking. J Biol Chem. 286, 29261-29272.
- Rank, K.C.*, **Chen, C.J.***, Cope, J., Porche, K., Hoenger, A., Gilbert, S.P., and Rayment, I. (2012). Kar3Vik1, a member of the Kinesin-14 superfamily, shows a novel kinesin microtubule binding pattern.*Co-First Author. J Cell Biol. 197(7):957-70.
- **Chen, C.J.**, Porche, K., and Gilbert, S.P. (2012). The ATPase Pathway that Drives the Kinesin-14 Kar3Vik1 Powerstroke. J Biol Chem. In review.
- Miguel A. Gonzalez, Julia Cope, Katherine C. Rank, **Chen, C.J.**, Peter Tittmann, Ivan Rayment, Susan P. Gilbert, and Andreas Hoenger (2012). Common Mechanistic Themes for the Powerstroke of Kinesin-14 motors. To be submitted.

Conference Presentations and Invited Talks

- **Chen, C.J.**, and Gilbert, S.P. "Mechanistic Analysis of Minus-End Directed Kinesin-14, Kar3Cik1 for Interpolar MT-MT Crosslinking during Mitosis." 53rd Annual Meeting for Biophysical Society, 2009
- **Chen, C.J.**, and Gilbert, S.P. "Proposed Model for Kinesin Kar3Cik1 interpolar MT-MT Crosslinking Function during Mitosis." 49th Annual Meeting for American Society for Cell Biology Society, 2009
- **Chen, C.J.**, and Gilbert, S.P. "Mechanistic Analysis of Kar3Cik1 for Mitotic Function." 54th Annual Meeting for Biophysical Society, 2010
- **Chen, C.J.**, and Gilbert, S.P. "Elucidation of MT Minus-End Directed Kar3Cik1 ATPase Pathway for Interpolar MT-MT Crosslinking during Mitosis." MusclePalooza 2010, Center for Biotechnology and Interdisciplinary Studies, 2010
- **Chen, C.J.**, and Gilbert, S.P. "Mitotic Kinesin Kar3Cik1 Interaction with Microtubules." 55th Annual Meeting for Biophysical Society, 2011
- Rank, K.C., **Chen, C.J.**, Cope, J., Porche, K., Hoenger, A., Gilbert, S.P., and Rayment, I. "Intramolecular Communication Within the Kar3/Vik1 Heterodimer." The Gordon Research Conference, 2011