POGORELOV LAB: MOLECULAR INFORMATION TRANSFER IN THE CELL

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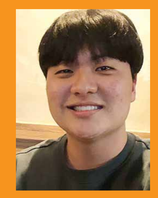
Class of 2024

ANIKA HONG
Bioengineering
Class 2026

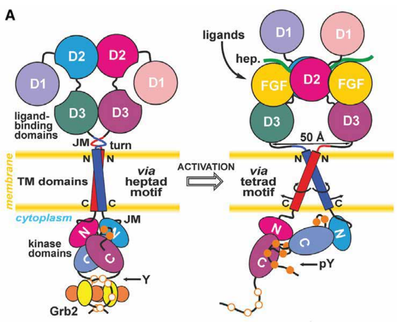


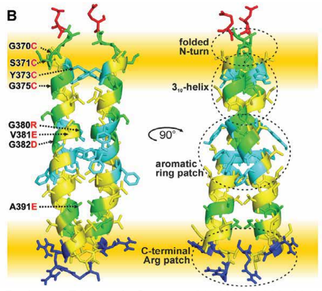
HAJUN LEE
Bioengineering
Class 2026

Collaborators: Kalina Hristova (JHU), Kai Zhang, Chad Rienstra (U Wisconsin-Madison)

Signaling through cell membranes

Receptor tyrosine kinases: dimer structures and pathological mutations



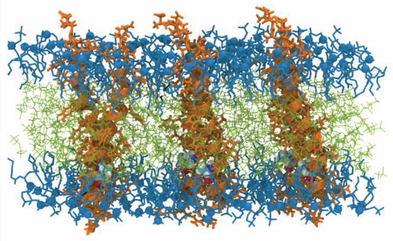


Bocharov, E.V., et al., Structure 21, 2087–2093, 2013

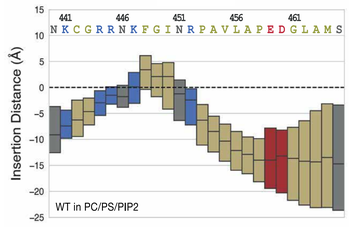
Fibroblast growth factor receptor FGFR3-TM
– human receptor tyrosine kinase
– dimer (33/43 res) PBD ID 2LZL (NMR - micelle)
– extended heptad motif: $YA_{374}X_2L_{377}X_2G_{380}X_2FF_{384}X_2IL_{388}X_2A_{391}$

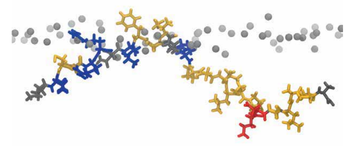
FGFR3-TM A391E mutant
– development disorders and cancer
– increases dimerization and activation

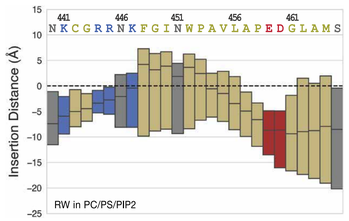
Spontaneous TM dimer formation: MD with HMMM



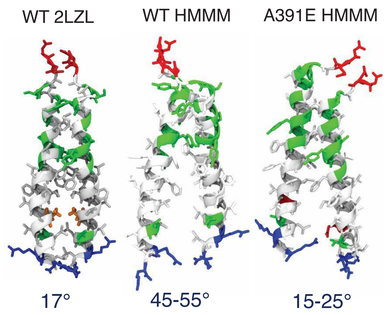
Disordered TrkA juxtamembrane domain insertion into membrane







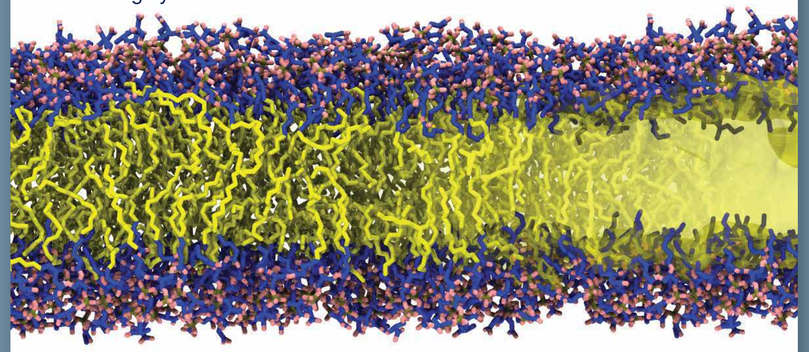
TM domain structure influenced by pathological mutations



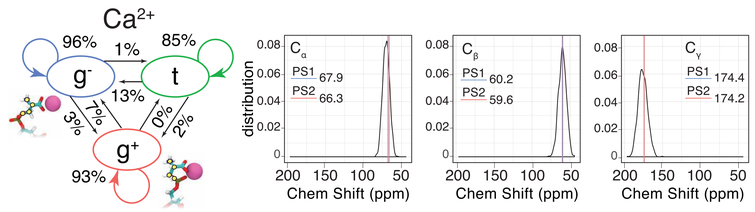
Collaborators: Chad Rienstra, Marty Burke, Jim Morrissey, Emad Tajkhorshid

Membrane-associated phenomena

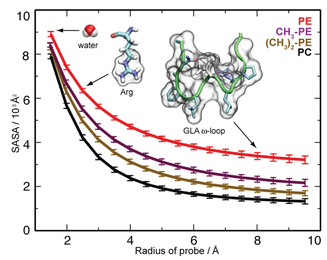
HMMM: Highly Mobile Membrane Mimetic Model

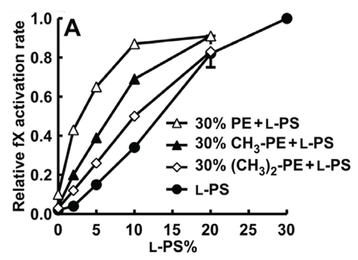


Membrane sculpturing by charges: phosphatidylserine and calcium



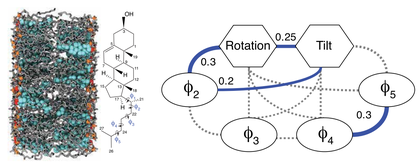
Membrane as platform for protein activation: blood coagulation cascade





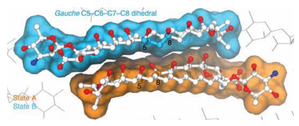
Membrane active agents and sterols

Cholesterol dynamics in membrane is coupled



Cholesterol POPC membrane

Antifungal drugs: Amphotericin B (AmB)

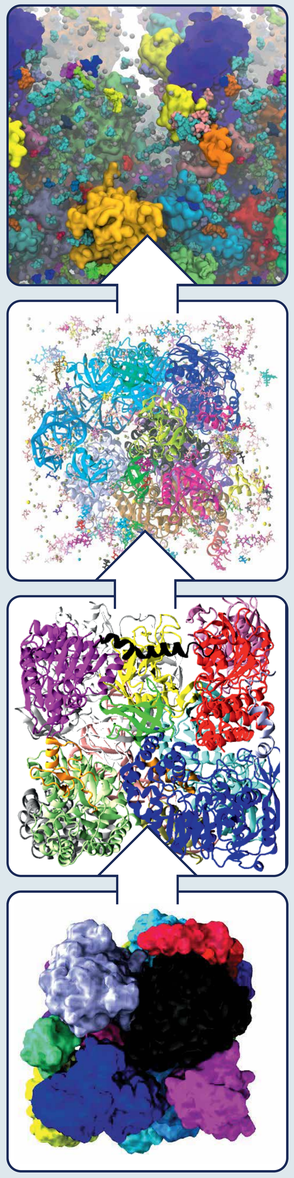


Fungicidal AmB sponges are assemblies of asymmetric head-to-tail homodimers

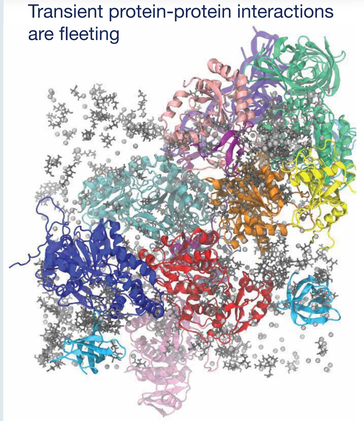
Collaborators: Martin Gruebele, Matthias Heyden (ASU)

In silico cell: protein dynamics

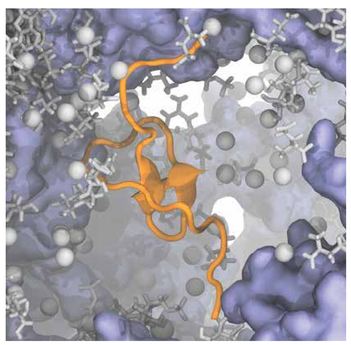
Building cytoplasm models: *E.Coli*



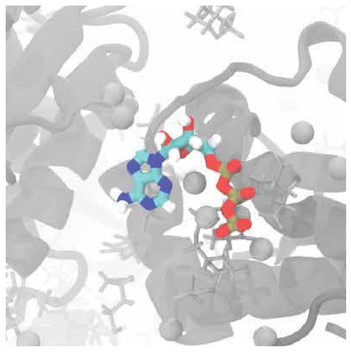
Transient protein-protein interactions are fleeting



WW domain folding: secondary & "chimeric" structures



ATP dynamics is impacted



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