BIOINFORMATICS AND COMPUTATIONAL BIOLOGY

September 19, 2025 12th Annual BICB Industry Symposium: 8:30am-6:30pm

	Activity	Location
6:30 am – 6:45 am	**Bus Boarding**	University of Minnesota, Rochester on S. Broadway
6:45 am – 8:30 am	**Bus Travel (from Rochester)**	ROCH UMTC
8:30 am – 9:00 am	**Registration and Welcome Reception**	CCRB Atrium
9:00 am – 9:10 am	**Welcome:** Chad Myers, PhD BICB Director of Graduate Studies	CCRB 1-125
	Session Chair: Yuk Sham	
9:10 am – 9:45 am	**Bonnie Holub (Artificial Intelligence Consultant, ArcLight Inc) -** *AI and Maximizing Your Career Prospects in the Future*	CCRB 1-125
9:45 am – 10:20 am	**Jaeyun Sung (Associate Professor of Biomedical Informatics, Mayo Clinic) -** *From Lab to Start-Up: 3D Surface Scanning for Next-Generation Stereotactic Neurosurgery*	CCRB 1-125
10:20 am – 10:40 am	**Ray Sajulga Jr. (Advisor: Yung-Tsi Bolon - NMDP) -** *Simplifying the complexities of blood transplant science through NMDP bioinformatics tools*	CCRB 1-125
10:40 - 10:45 am	**Group Picture -** please gather in the atrium for a group photo.	CCRB Atrium
10:45 am – 12:00 pm	**Poster Presentations**	CCRB Atrium
12:00 pm – 1:30 pm	**Lunch and Networking**	CCRB Atrium
	Session Chair: Chad Myers	
1:30 pm – 2:05 pm	**Hongbo Pang (Associate Professor, Department of Pharmaceutics UMN) -** *A peptide guide for precision drug delivery*	CCRB 1-125
2:05 pm - 2:25 pm	**Xiaowei Zhao (Advisor: Jaeyun Sung - Mayo Clinic) -** *Taxonomic and Functional Alterations in the Gut Microbiome of Patients with Lewy Body Dementia and Their Cohabitant Controls*	CCRB 1-125

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Time	Activity	Location
2:25 pm – 3:00 pm	Leena Hilakivi-Clarke **(Professor and Assistant Director for Faculty Affairs, Hormel Institute) -** *Complex relationship between dietary fiber, short chain fatty acids and breast cancer*	CCRB 1-125
3:00 pm – 3:15 pm	Break	CCRB 1-125
3:15 pm - 3:35 pm	New CSE Graduate Career Center Presentation	CCRB 1-125
3:35 pm - 3:45 pm	Technological Leadership Institute will be providing some information about what is available to students	
3:45 pm - 4:25 pm	BICB Faculty & Student Group Meeting	CCRB 1-125
4:25 pm – 4:30 pm	**Closing Remarks** Yuk Sham, PhD BICB Director of Graduate Studies	CCRB 1-125
4:30 pm – 6:30 pm	**Social Event**	Sally's Saloon
6:30 pm – 6:45 pm	**Bus Boarding**	Alumni Center
6:45 pm – 8:30 pm	**Bus Travel to Rochester**	UMTC ROCH

Thank you to our BICB partners:
University of Minnesota
The Hormel Institute
Mayo Clinic
National Marrow Donor Program
Brain Sciences Center | Center for Cognitive Sciences

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Keynote Speakers:

Hongbo Pang (Associate Professor, Department of Pharmaceutics UMN)

Title: A peptide guide for precision drug delivery

Abstract: Peptides with affinity to target proteins associated with a given disease are attractive drug carriers to achieve a higher specificity and/or efficiency. Using phage display, Pang lab actively screens peptides that may selectively home and accumulate in the disease site upon systemic administration. These peptides are then integrated with drugs directly or drug carriers such as nanoparticles, to improve the drug biodistribution and efficacy in vivo. Our lead product now is based on a macrophage-targeting peptide, CRV. Upon conjugation with anti-inflammatory drugs (exemplified by steroids), CRV may increase the drug amount in the inflammatory diseases (e.g. acute lung injury, rheumatoid arthritis) and lower it in the healthy organs. This in turn improves the efficacy and safety of steroid drugs when treating these diseases. Boyan Therapeutics is currently optimizing the drug prototypes and seeking funds for preclinical and clinical investigations.

Jaeyun Sung (Associate Professor of Biomedical Informatics, Mayo Clinic)

Title: From Lab to Start-Up: 3D Surface Scanning for Next-Generation Stereotactic Neurosurgery

Abstract: Stereotactic neurosurgery requires extraordinary accuracy to safely reach deep brain targets. Traditionally, this precision depends on intra-operative CT scans, which add radiation, cost, and workflow delays. In our cadaveric and live patient studies, we showed that three-dimensional surface scanning (3DSS) can achieve sub-millimeter accuracy in frame registration, matching or surpassing CT while being faster, safer, and fully compatible with existing navigation platforms. Building on these results, we launched a Mayo Clinic-licensed start-up company to translate this technology into clinical practice. Through an entrepreneurial license agreement, our team is developing AI-enhanced software modules—such as automated fiducial detection and real-time model updating—to streamline neurosurgical workflows. In this talk, I will present both the technical findings and the early steps of our entrepreneurial journey; how, as a Mayo Clinic faculty member, I helped found a start-up to bring a radiation-free, next-generation neurosurgical navigation systems closer to patients.

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Leena Hilakivi-Clarke (Professor and Assistant Director for Faculty Affairs, Hormel Institute)

Title: Complex relationship between dietary fiber, short chain fatty acids and breast cancer

Abstract: The majority of short-chain fatty acids (SCFAs) are produced by bacterial fermentation of dietary fiber in the gut. Several different bacterial genera have been identified as SCFA producers, although it is not clear whether the abundance of SCFA producing gut bacteria predicts fecal SCFA levels. High fecal SCFAs have been linked to reduced cancer risk, perhaps due to their function in promoting anti-tumor immunity and affecting cellular and mitochondrial metabolism. Consequently, supplementing diet with fiber is recommended to reduce cancer risk and improve responsiveness to cancer immune therapies. On the other hand, obesity, which increases the risk of breast and other cancers, is characterized by elevated SCFA levels, and some studies have found that supplementation with SCFAs increases colon cancer in preclinical models.

Lab chow diets contain 15-20% insoluble and 2-5% soluble fiber from cellulose, hemicellulose, lignins and pectin, while purified AIN93G diet contains 5% insoluble cellulose (called here low fiber diet). Lab chows also contain high levels of estrogenic isoflavones, if their carbohydrate/fiber source is soybean meal and/or alfalfa. We have investigated whether low or high isoflavone lab chow diet or supplementing mice fed low fiber diet with soluble fiber from partially hydrolyzed guar gum (PHGG) increased fecal SCFA levels, reduced triple negative E0771 mammary tumor growth and improved response of this tumor to anti-PD1 therapy.

Our results indicated that mice fed chow diets had higher fecal SCFA levels, compared with mice fed low fiber diet, but mammary tumor burden was similar in low isoflavone lab chow and low fiber diet fed mice. Further, low fiber diet fed mice responded equally well to anti-PD1 immunotherapy than the mice fed low isoflavone, high fiber diet. Mice fed high fiber diet containing estrogenic isoflavones had higher mammary tumor burden than low fiber diet fed mice and they did not respond to anti-PD1, except when mice were also treated with anti-estrogens. The effect of isoflavones on E0771 mammary tumor growth was not mediated by the gut microbiome, since fecal microbiota transplant from isoflavone fed mice did not increase mammary tumorigenesis in host mice. PHGG supplementation did not suppress mammary tumor growth in mice fed low fiber diet, but if cellulose was removed from low fiber diet, PHGG reduced mammary tumor growth. However, PHGG supplementation increased fecal SCFAs regardless of whether low fiber diet contained cellulose or not.

Our results show that high fiber lab chow and PHGG supplementation of low fiber diet increases fecal SCFAs, but fecal SCFAs do not predict diet's/PHGG's ability to reduce mammary tumor growth. In addition, we found that estrogenic compounds in diet increase triple negative breast cancer growth and reduce response to anti-PD1, regardless of fecal SCFA levels, and that this effect is likely mediated by estrogen's effect on tumor microenvironment, rather than the gut microbiome.

Bonnie Holub (Artificial Intelligence Consultant, ArcLight Inc)

Title: AI and Maximizing Your Career Prospects in the Future

Abstract: Dr. Holub will distill 40+ years of Artificial Intelligence career experience in research, academia, and entrepreneurship to provide data points and potential outcomes for students embarking upon careers in science.

Student Speakers:

Ray Sajulga Jr. (Advisor: Yung-Tsi Bolon - NMDP)

Title: Simplifying the complexities of blood transplant science through NMDP bioinformatics tools

Abstract: Blood transplantation, also known as hematopoietic stem cell transplantation (HSCT), is a medical procedure that offers cures for patients suffering from blood cancers and disorders. However, replacing a patient's entire blood system requires similar genetic matching between the patient and donor, amongst other factors such as donor age. At NMDP, we develop bioinformatics tools to handle the immense genetic complexities required for successful transplantation. Moreover, we also analyze data from numerous research studies, clinical trials, search selections, and patient and donor demographics, including information on race and ethnicity. Through tools and analyses, we generate new research and implement existing research to empower transplant decision-makers to improve outcomes for all patients.

Xiaowei Zhao (Advisor: Jaeyun Sung - Mayo Clinic)

Title: Taxonomic and Functional Alterations in the Gut Microbiome of Patients with Lewy Body Dementia and Their Cohabitant Controls

Abstract: Lewy body dementia (LBD), the second most common dementia after Alzheimer's disease, is characterized by the accumulation of misfolded α-synuclein. This leads to neurodegeneration and symptoms such as cognitive fluctuations, visual hallucinations, parkinsonism, sleep behavior disorder, and autonomic dysfunction. Idiopathic REM sleep behavior disorder (iRBD) is recognized as a prodromal stage of synucleinopathies, with up to one in four patients later developing LBD. Emerging evidence implicates the gut microbiome in several neurological disorders through the gut-brain axis. Yet, its role in LBD and iRBD remain largely underexplored. My research aims to identify gut microbiome signatures linked to LBD progression. These findings may provide new insights into gut–brain axis dysregulation in synucleinopathies and inform the development of early diagnostic markers and microbiome-targeted interventions.