Restoring Systemic GDF11 Levels **Reverses Age**-Related Dysfunction In Mouse Skeletal Muscle *Vascular And Neurogenic **Rejuvenation** Of The Aging Mouse Brain By Young Systemic Factors* Reversal Of Diabetes With **Insulin-Producing** Cells Derived In Vitro From Human Pluripotent **Stem Cells** *Generation Of Functional Human **Pancreatic** B Cells In Vitro* Bidirectional Switch Of The Valence Associated With A **Hippocampal** Contextual Memory Engram *Creating A **False Memory** In The Hippocampus* A **Semi-Synthetic Organism** With An **Expanded Genetic Alphabet** *Designer Microbes Expand Life's Genetic Alphabet* A Three-Dimensional Human **Neural Cell Culture** Model Of Alzheimer's Disease *Sleep Drives Metabolite Clearance From The Adult Brain* The Dizzying Journey To A New Cancer Arsenal *Double Nicking By RNA-Guided **CRISPR Cas9** For Enhanced Genome Editing* High-Frequency Off-Target Mutagenesis Induced By CRISPR In Human Cells *The **Intestinal Microbiota** Modulates The Effects Of Cyclophosphamide*

# SYMPOSYM 2017

**Nov. 4-5 | Austin**

**T**exas
**T**aiwanese
**B**iotechnology
**A**ssociation

## Table of Contents

## About

Texas Taiwanese Biotechnology Association

德州台灣人生物科技協會
Texas Taiwanese Biotechnology Association

Texas Taiwanese Biotechnology Association (TTBA) was established by groups of vibrant Taiwanese graduate students and young professionals from top-notch biomedical research institutions in Texas. Our goal is to facilitate intellectual conversation and professional networking among young Taiwanese biomedical talents and foster their career development in the US and Taiwan.

The aims of TTBA symposium are to:

- Encourage in-depth communication, networking, and collaboration among the Taiwanese scientific communities.
- Provide a conversation platform to facilitate interdisciplinary discussion about the current and future scientific landscape.
- Provide opportunities for well-established Taiwanese scientists and entrepreneurs to share global views and experiences in career development.

## Welcome Message

Dear TTBA Members, Supporters, and Friends,

On behalf of the Texas Taiwanese Biotechnology Association (TTBA), I sincerely welcome you to the TTBA 2017 Symposium, Austin, TX.

To unleash the potential of your career development, TTBA 2017 symposium will bring you 2 keynote speeches given by Dr. Mien-Chie Hung, the Vice President of MD-Anderson, and Mr. Gene Lay, the Founder and CEO of BioLegend, to share their visions of how innovations reshape the world. TTBA will also host 5 panel discussions covering (1) academic entrepreneurship, (2) jobs beyond the bench, (3) from startup to scale up, (4) an in-depth discussion of the biotech ecosystem in the States, and (5) the opportunity in Taiwan. We truly believe that the 2-day symposium will expand the horizon of your career and root your connection into the fields where your calling is.

Founded in 2014, TTBA aims to foster individual career development, to enhance scientific collaborations, and to strengthen networking among academic and industrial bioscience communities in Taiwan and the US. With these core values, we have held 2 TTBA symposiums and 15 webinars and co-hosted 3 SETS conferences, and totally, we invited 61 speakers from academia, industry, and government and successfully connected 150+ young people. Thus, we forge the community with these events and sharpen our vision with speakers' wisdom.

Comprised of Boston Taiwanese Biotechnology Association (BTBA), TTBA, SoCal Taiwanese Biotechnology Association (SoCal TBA), Europe-Taiwan Biotech Association (ETBA), the alliance of TBAs is the FASTEST growing Taiwanese professional community worldwide. All the associations hold their own annual symposiums attracting totally more than 850 Taiwanese professionals from the bio-related fields each year. I believe that we are creating a talent pool of overseas Taiwanese who identify the TBA spirit and eventually will contribute ourselves to advance Taiwan's biotech development in both academia and industry.

I would like to thank the 2017 TTBA Symposium Executive Committee for their hard work in ensuring a high-quality conference program. Our partners, Ministry of Science and Technology of Taiwan and Taipei Economic & Cultural Office in Houston, also made a tremendous effort to support the TTBA symposium. Special thanks to all the generous sponsors and the support from the University of Texas at Austin that made it possible to organize this event. Last but not least, I'd like to express my utmost gratitude to each individual who is a part of TTBA, TTBA wouldn't thrive without your participation.

TTBA is proud of hosting the high-quality symposium and creating an engaging network environment filled with the Taiwanese hospitality. I am very much looking forward to meeting you at TTBA 2017 symposium.

Sincerely yours,

Allen Yen-Liang Liu

President, Texas Taiwanese Biotechnology Association

## Agenda

### SATURDAY, November 4, 2017

| | |
|---|---|
| **11:30 am** | **Registration** |
| **12:30 pm** | **Opening Remarks**<br>**Mr. Yin-Tso Lin**, Deputy General Director of TECO-Houston<br>**Dr. Tiffany Yu**, Director of Science and Technology Division, TECO |
| **1:00 am** | **Keynote 1 @ Mulva Auditorium**<br>**Forty years in cancer research: review and prospect**<br>**Mien-Chie Hung, PhD, Vice President for Basic Research**<br>**The University of Texas MD Anderson Cancer Center, Houston**<br>**Session Chair: Yen-Liang Liu** |
| **2:00 pm** | **Panel 1: Academic Entrepreneur @ Mulva Auditorium**<br>**How does academic innovation initiate entrepreneurship?**<br>**Moderator: Gary Kao; Producer: Yen-Liang Liu**<br>**Tim Hui-Ming Huang**, PhD, UT Health Science Center at San Antonio<br>**Hsian-Rong Tseng**, PhD, The University of California Los Angeles<br>**Lidong Qin**, PhD, Institute for Academic Medicine Houston Methodist<br>**Tim Hsin-Chih Yeh**, PhD, The University of Texas at Austin |
| **3:00 pm** | **Coffee Break** |
| **3:30 pm** | **Panel 2: Beyond the Bench @ Mulva Auditorium**<br>**How could we marry biotechnology with a different field?**<br>**Moderator & Producer: Vicky Chen**<br>**George C.J. Chang**, PhD, US FDA Center for Drug Review and Research<br>**Yuan-Ping Huang**, PhD, Lam Capital<br>**Kay Kai-Yun Chuang**, MS, GenScript<br>**Carol Chuang**, PhD, MD Anderson Cancer Center |
| **4:30 pm** | **Panel 3: From Startup to Scaleup @ Mulva Auditorium**<br>**Let's dive in the shark tank!**<br>**Moderator: Bob Yeh; Producer: Yen-Liang Liu**<br>**Lida Huang**, PhD, CalexFit.com<br>**Will Po-Jen Yen**, PhD, Voyager Therapeutics<br>**Ray Lin**, PhD, OriGene Technologies<br>**Ya Luan Hsiao**, MD, MPH, Milken Institute |

| | |
|---|---|
| 5:30 pm | Elevator Talk @ Mulva Auditorium |
| 6:30 pm | Reception dinner |
| 7:30 pm | Information session<br>Group 1 @ EER0.702 Academia<br>Group 2 @ EER0.708 Biotechnology<br>Group 3 @ EER0.824 Cancer research<br>Group 4 @ EER0.825 Development<br>Group 5 @ EER0.806 Enactment |
| 9:00 pm | Social night at 6th street |

## SUNDAY, November 5, 2017

| | |
|---|---|
| 08:00 am | Refreshments |
| 9:00 am | **Panel 4: BioGroup** @ Mulva Auditorium<br>**Introduction of BioGroup platform of NTU**<br>Moderator: Grace Lin<br>**Hsinyu Lee**, PhD, National Taiwan University<br>**Tang-Long Shen**, PhD, National Taiwan University |
| 9:30 am | **Panel 5: Industry** @ Mulva Auditorium<br>**An in-depth discussion of the biotech ecosystem in the States.**<br>Moderators & Producers: Grace Lin and Yi-Li Min<br>**Hannah Shen**, PhD, Benchling<br>**Eric Haofan Peng**, PhD, Biogen |
| 10:30 am | **Keynote 2** @ Mulva Auditorium<br>**Monoclonal Antibody and Entrepreneurships**<br>**Gene Lay**<br>**Founder and CEO, BioLegend**<br>Session Chair: Min-Shan Chen |
| 11:30 am | Closing Remarks and Award Ceremony |

Keynote 1

# Forty Years in Cancer Research: Review and Prospect


## Mien-Chie Hung
洪明奇

*Vice President for Basic Research,*
*The University of Texas MD Anderson Cancer Center, Houston, TX*


Mien-Chie Hung, Ph.D. received undergraduate and graduate degrees from the National Taiwan University and his PhD from Brandeis University. After completing postdoctoral training with Dr. Robert A. Weinberg at the Whitehead Institute/Massachusetts Institute of Technology. Dr. Hung was recruited to MD Anderson in 1986. Dr. Hung is internationally recognized for his studies of signal transduction pathways regulated by tyrosine kinase growth factor receptors, such as EGFR and HER-2/neu, as well as molecular mechanisms of tumorigenesis. Up to date, Dr. Hung has published more than 475 peer-reviewed articles and his lifetime h-index is 107. Dr. Hung has served on many study sections of the NIH and various funding agencies in many other countries to select awardees. He is one of the members of Selection Committee for Tang Prize in Biopharmaceutical Science category and 2016 Pezcoller Foundation-AACR Award. Dr. Hung also serves as an editorial member for many journals in cancer research to evaluate the quality of the submission. Notable, he is one of the founding Editorial Members for Cancer Cell and Editor-in-chief for American Journal for Cancer Research. Dr. Hung was inducted as an Academician of the Academia Sinica in Taiwan in 2002. In addition, Dr. Hung was selected as a Fellow in Biological Sciences section, American Association for the Advancement of Science in 2010. Dr. Hung is a basic scientist with a keen translational vision and especially his recent research effort has significantly contributed to understanding the biology of cancer and to developing combinational cancer therapies to overcome resistance. His laboratory has a long-term commitment to 1) discovery of novel functionality of epidermal growth factor receptor (EGFR) family which may provide useful insight to understand cancer formation and development; 2) identification of crosstalks of signal pathways/networks in cancer cells and tumor microenvironment which could potentially predict resistance to target therapy; and 3) development of marker-guided targeted therapy including immune checkpoint therapy which will effectively treat cancer patients.

## Keynote 2

# Monoclonal Antibody and Entrepreneurship

**Gene Lay**
賴正光

*Founder and CEO*
*BioLegend*

Gene Lay, M.S., D.V.M., is the Founder, President, and CEO of BioLegend, a global leader in life Science company headquartered in San Diego. Gene grew up in Taiwan, where he completed his undergraduate studies at National Pingtung University of Science and Technology, College of Veterinary Medicine. Gene pursued graduate study in University of Louisiana, Lafayette. In 1987, he and Ernie Huang co-founded PharMingen. In 1997, PharMingen was acquired by Becton Dickinson, now BD Biosciences PharMingen. After 5 years with BD Biosciences, Gene founded BioLegend in 2002. In 2016, Gene received EY Entrepreneur of the Year San Diego Award in Life Science and National Finalist in Life Science.

In his talk, Gene is going to talk about the history of monoclonal antibody and its impact of today's cancer immunotherapy, and to share his experience of building two successful companies, **PharMingen** (now BD Bioscience Pharmingen) and **BioLegend**, and how to start up a business from concept to commercialization and his advice to other entrepreneurs.

## Panel 1: Academic entrepreneur

**Tim Hui-Ming Huang**
*Professor and Chair, Department of Molecular Medicine, UT Health Science Center at San Antonio*

Dr. Tim Hui-Ming Huang received his bachelor's degree in biology from Tunghai University, Taiwan in 1980 and his Ph.D. degree in genetics from the University of California at Davis in 1989. From 1989 to 1991, he was a clinical cytogenetics fellow at Baylor College of Medicine, Houston. He was a faculty member at the University of Missouri-Columbia (1991-2003) and the Ohio State University (2003-2011). In 2006, Dr. Huang was named as a Fellow of the American Association for the Advancement of Science. Presently, he is Alice P. McDermott Distinguished University Professor and Chairman in the Department of Molecular Medicine at the University of Texas Health (UTH) - San Antonio and Deputy Director of UTH Cancer Center - San Antonio. Dr. Huang has published $^{3}$300 peer-reviewed papers and book chapters related to cancer epigenetics and genetics and has patented technologies for global methylation screening in cancers.

**Lidong Qin 秦立冬**
*Professor, Nanomedicine, Institute for Academic Medicine Houston Methodist*

Dr. Lidong Qin received his Ph.D. in Chemistry from Northwestern University, Evanston, Illinois and completed the postdoctoral traineeship in Cancer Nanotechnology at the California Institute of Technology. He joined the Department of Nanomedicine, Houston Methodist Research Institute, in July 2010 and was awarded a prestigious startup award, the Cancer Prevention and Research Institute of Texas (CPRIT) recruitment award for first-time, tenure-track faculty. Dr. Qin has developed nonconventional technology platforms for cancer diagnosis and risk analysis, measurement of cancer cell mechanical properties and phenotype enrichment, and in vitro models for the study of the cancer cell microenvironment. The combination of his technological strengths and understanding of cancer cell biology has helped us develop several interesting technological innovations and opened many new avenues of future research direction.

## Panel 1: Academic entrepreneur

**Tiencheng Arthur Chang** 張典正
*Associate Professor, Dept. of OB/GYN, University of Texas Health Science Center at San Antonio*
*Director, Clinical Assisted Reproductive Technology Labs, UT Medicine San Antonio*

Dr. Chang obtained his BS degree in Animal Science from National Taiwan University, MS and PhD in Endocrinology-Reproductive Physiology from the University of Wisconsin-Madison, and clinical laboratory director/consultant board certification from American Board of Bioanalysis (ABB). His clinical and research interests include reproductive medicine, in vitro fertilization (IVF), embryology, preimplantation genetic diagnosis (PGD), embryo implantation, stem cell, laboratory quality management and regulatory compliance, healthcare business, as well as non-human primate animal models for reproductive and regenerative medicine. He has served on boards and committees of various academic associations and professional societies, currently as President of Society of Reproductive Biologists and Technologists (SRBT), and consultant roles to the industry and governments. We believe that Dr. Chang's profound expertise in laboratory medicine and research makes him an excellent role model for young professionals to develop their career in translational medicine.

**Tim Hsin-Chih Yeh** 葉信志
*Assistant Professor, Department of Biomedical Engineering, the University of Texas at Austin*

Dr. Tim Hsin-Chih Yeh obtained his BS degree from National Taiwan University, MS degree from the University of California, Los Angeles, and PhD from Johns Hopkins University, all in mechanical engineering. After graduation from UCLA, he worked at Optical Micro Machines Inc. in San Diego from 1998 to 2003 as an R&D engineer, developing MEMS-based photonic switches for telecommunications. Dr. Yeh received his postdoctoral training at Los Alamos National Laboratory from 2009 to 2012, in the Center for Integrated Nanotechnologies. Dr. Yeh joined the Biomedical Engineering Department at the University of Texas at Austin in 2012 as an Assistant Professor. His research interests include nanobiosensor development, 3D molecular tracking, and super-resolution imaging.

## Panel 2: Beyond the bench

**C.J. George Chang** 張景杰

*Senior Pharmacologist, US FDA Center for Drug Review and Research (CDER)*

Dr. C.J. George Chang is a veterinarian, veterinary pathologist, and toxicologist by training and a self-trained analytical chemist. Currently, he is a senior pharmacologist in the premarket review team for new oncology drugs at the FDA Center for Drug Evaluation and Research (CDER) since 2011 and he was on a 6-month detail for GLP inspection operation in 2016. Dr. Chang was a regulatory biologist at the FDA Center for Veterinary Medicine (CVM), responsible for the safety evaluation of new feed ingredients for US animals. Before joining the Federal workforce, Dr. Chang had worked in agrichemical, contract research, bioinformatics, and pharmaceutical industries. Dr. Chang received his veterinary medicine bachelor degree from National Taiwan University, his first MS degree in veterinary pathobiology from the University of Minnesota, and his second MS degree and PhD in veterinary physiology and pharmacology from the Ohio State University. He completed his postdoc training at the Wake Forest University Bowman Gray School of Medicine and R.J. Reynolds Tobacco with research on the dosimetry of tobacco-specific nitrosamines. Dr. Chang is the inaugural and current chair for biomed/biotech SIG of the American Society for Quality DC and Central Maryland chapter. He has been on the boards of a variety of local nonprofit organizations. (gchang2008@yahoo.com; LINE: gchangline2015)

**Yuan-Ping Huang** 黃元平

*Life Science VC associate, Lam Capital*

Dr. Yuan-Ping Huang received his PhD in Biomedical Sciences from Columbia University in 2014. Afterward, he worked as an Associate at McKinsey & Company in New York, where he advised top global pharmaceutical companies on R&D and operations strategy. Recently, he joined Lam Capital, the venture arm of Lam Research in Fremont, California. He is responsible for leading life sciences investments in proteomic profiling technologies.

## Panel 2: Beyond the bench

**Kay Kai-Yun Chuang** 莊凱雲
*Regional Business Development Manager, GenScript*

Kay is a Regional Business Development manager at GenScript. She leads and supports a cross-functional team to develop new business and collaborations in New England, Canada, and Mid-west. Previously, she worked at Life Technologies as a Global Market Development specialist, launching new recombinant protein products by Gibco and Invitrogen. Kay received her B.Sc. in Biomedical Sciences from Chang Gung University and M.S. in Biotechnology from Johns Hopkins University. When Kay is not working with clients, she enjoys traveling with her husband Hsien-Yi and spending time with her cat Meowshienbao. She can be contacted at kay.chuang@genscript.com

**Carol Chuang** 莊可柔
*Sr. Clinical Research Program Coordinator, Department of Investigational Cancer Therapeutics at MD Anderson Cancer Center*

Dr. Chuang received her Ph.D. in biomedical sciences from Baylor College of Medicine with a focus on molecular and cellular biology. Prior to joining the Department of Investigational Cancer Therapeutics (ICT) at The University of Texas MD Anderson Cancer Center (MDACC), she was a patent research analyst at Global Patent Solutions and a postdoctoral fellow at MDACC. Dr. Chuang joined ICT as a regulatory coordinator in September 2014. Her various experiences have provided her with the tools to meet tight deadlines and to effectively communicate expected timelines and deliverables to the study Sponsor/CRO.

## Panel 3: From startup to scaleup

**Lida Huang 黃立達**

*CEO and President, CalexFit.com, Foot Pain Relief Store*

Li-Da Huang received the Ph.D. degree in computer sciences from the University of Texas, Austin, 2003. From 2000 to 2006, he was a Senior Mixed-Signal IC Designer with Texas Instruments, Austin, TX. From 2006 to 2010, he was leading the projects for the router in design for manufacturing with Magma Design Automation. From 2010 to 2012, he served as the director of product engineering in Customer Design Business Unit, Magma Design Automation. He was in charge of analog design optimization and device modeling. Afterwards, he was with Analog Mixed-Signal Group in Synospys as Senior Research Staff. Currently, he is the founder and CEO of Calex Tech Inc. at Taiwan, Calex LLC in the United States. He is also the President of Foot Pain Relief Store LLC that focuses on the orthotic solutions and gait analysis for the medical and professional athletic cases. Dr. Huang's research includes circuit design, design automation, computer vision, signal processing and neural sciences. He published more than 30 papers and patents. Several papers are regarded as pioneer works in design for manufacturing in OPC-friendly routing, Antenna effects in routing, and Redundant via insertion, which was nominated as the Most Influential Paper in the Past Decade in ASPDAC 2015. Recently, he is focusing on brain modeling, cognitive function enhancement, the aging process and bio-modulation. He is a member of Upsilon-Pi-Epsilon, the international honor society for the computing and information disciplines.

**Po-Jen (Will) Yen**

*Business Development, Voyager Therapeutics*

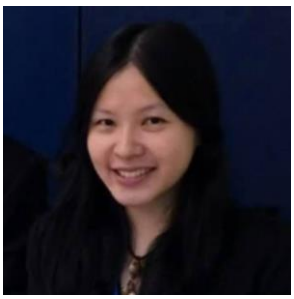
Will currently works at Voyager Therapeutics, a young gene therapy company focusing on severe neurological diseases. As a core member of Business Development team in a small company, Will not only contributes to every aspect of business development activities, but also plays significant roles in various functions, including strategy, competitive intelligence, commercial, as well as supporting research and development with his science expertise. Prior to Voyager, Will worked at Biogen Corporate Strategy, where he looked at neurodegenerative disease space with a comprehensive view to identify trends and barriers of the field, thereby informed the company's investment opportunities and long-term growth strategy. Before transitioning to business development/strategy roles, Will started his career as a research scientist at Agios. Will received his scientific training in a PhD in Virology at Harvard University, a Master in Biotechnology at University of Pennsylvania, and a Bachelor in Zoology at National Taiwan University.

## Panel 3: From startup to scaleup

**Ray Lin 林伯睿**

*Senior Scientist, Assay Development, OriGene Technologies, Inc.*

Ray Lin graduated from National Taiwan University with a B.S. degree in Agriculture Chemistry. He received his PhD degree in Biology from Georgia State University, where he developed two-electrode voltage clamp and patch clamp techniques to study E. coli protein-conducting channels. He also received his MBA degree from Johns Hopkins Carey Business School. Ray has worked as a postdoctoral fellow at Leidos Biomedical Research and focused on HIV and cancer research. He then joined OriGene Technologies as a senior scientist and product manager and worked on a variety of projects in the Antibody, Assay, and Molecular Biology departments, including developing high-affinity SISCAPA antibodies, expanding ELISA & multiplexed Luminex assay, and optimizing lentivirus production and manufacturing processes. Ray also worked with OriGene's Marketing team and performed product market analyses as well as coordinated new product launches for Assay and Molecular Biology product lines.



**Ya Luan Hsiao**

*Philanthropy Advisor, Milken Institute*

Dr. Hsiao is trained and Board-certified in Family Medicine and has completed fellowships in both Palliative Care and Geriatrics. During her residency and fellowship years, she participated in clinical trials and worked closely with researchers on quality improvement projects, especially for the elderly in Taiwan. To continue her interest in quality improvement, she received an MPH from Johns Hopkins School of Public Health. Ya Luan most recently was a faculty research associate at Johns Hopkins University where she conducted research on several important public health issues—from tracking the effectiveness of vaccines in Bangladesh to understanding the impact of e-cigarettes on youth. Currently, she serves as a consultant where she uses her clinical training and expertise for advisory services in venture philanthropy. She is also a Director in a Japanese-based start-up on mobile apps. Dr. Hsiao received a M.D. degree from National Yang Ming University in Taipei, Taiwan, and an MPH from the Johns Hopkins University School of Public Health.

## Panel 4: BioGroup @ NTU

**Hsinyu Lee 李心予**
*Director of Center for Biotechnology, National Taiwan University*

Dr. Hsinyu Lee received his PhD degree from University of California, San Francisco. He is currently the Director of Center for Biotechnology and a jointed professor in the Department of Life Science and Department of Electrical Engineering at National Taiwan University. His research focuses on using human endothelial cell as a model system to investigate the molecular and physiological functions of lysophospholipids, LPA and S1P. The research results demonstrated that LPLs might be important regulators of blood vessel formation. In his recent works, he found that LPLs are potent stimulators for the expression of cell adhesion molecules and chemotactic factors of endothelial cells.

**Tang-Long Shen 沈湯龍**
*Professor, Department of Plant Pathology and Microbiology, National Taiwan University*

Dr. Tang-Long Shen received his BS and MS degrees from National Taiwan University and PhD from Cornell University in Department of Molecular Medicine. Dr. Shen joined the Department of Plant Pathology and Microbiology at the National Taiwan University in 2004. His research goal aims to explore key components, including proteins, trace elements and bioactive metabolites and their modes of action in the modulation of various physiologic and pathologic roles. Firstly, we are interested in understanding the molecular mechanism of cancer progression, especially to elucidate how cancer cells and tumor microenvironment participate in cell migrate, the formation of pre-metastatic niches and contributing to metastatic organotropism. Several biomolecules, including integrins, receptor tyrosine kinases, and cytokines as well as extracellular vesicles exosomes, are main targets in our studies. Additionally, Shen lab is also seeking useful natural products and de novo protein components in human cells including critical secondary metabolites from traditional Chinese medicinal fungi, Cordyceps spp, Antrodia cinnamomea, and metallothioneins, to apply on anti-cancer, anti-aging or other complication therapeutics.

## Panel 5: Industry

**Hannah Shen 沈敬涵**
*Scientist, Marketing, Benchling*

Dr. Ching-Han (Hannah) Shen joined Benchling in 2016. Benchling is a Series-B software startup providing knowledge management solutions to biopharma R&D organizations backed by Andreessen Horowitz, Thrive Capital, Founder's Fund, and Y Combinator. As the third commercial hire at Benchling, her responsibilities include market development, marketing strategy, and competitive intelligence.

Hannah received her Bachelor's degree in Biochemical Science and Technology from National Taiwan University in 2009 and Ph.D. in Biology from Harvard in 2016. Her thesis work led to a co-first author publication in Nature, demonstrating how to control the food searching behavior in Caenorhabditis elegans with optogenetics and new optical tools. Outside of work, Hannah enjoys playing volleyball, arranging pop songs on the piano, planning overly ambitious hiking & biking trips, and introducing friends to new bubble tea shop.

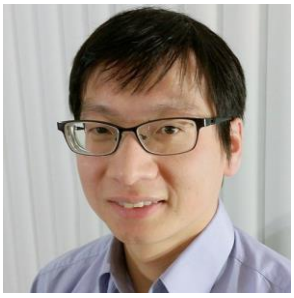
**Haofan Eric Peng 彭浩帆**
*Senior Engineer II, Biogen*

Eric is a senior engineer in Biogen focusing on biologics process development in Multiple Sclerosis, Hemophilia, and Alzheimer. His main role is to ensure large-scale manufacturing's success in upstream and downstream as well as in clinical and commercial campaign (2000L to 15,000L). He also supported next-generation facility design focusing on continuous perfusion process. He leads several cross-companies projects including CMO partnership, raw material investigation, cell line robustness, medium optimization, instrument automation, product quality comparability, assay alignment in BIIB's internal high titer development. Aside from the lab, he works closely with external partners in supporting domestic or international vendor qualification, raw material analysis and trace metal impurity to ensure supply chain consistency. Eric published several papers in mitigating the cell-damaging and raw material qualification in collaboration with AD, QC, regulatory, supply chain, and external partners/vendors. He obtained BS degree in National Taiwan University and PhD in SUNY Buffalo in gene therapy, regenerative medicine, and preclinical animal model.

## Information Session

**Ian Y. Lian** 連裕仁
*Assistant Professor, Department of Biology*
*Lamar University*

Dr. Lian conducted his undergraduate study in engineering physics and bioengineering, and mentored by Dr. Shu Chien during his graduate study in UCSD. To compliment his training in the engineering field, Dr. Lian receives his postdoc apprenticeship under Dr. Kun-Liang Guan in the area of cancer and stem cell biology. As an independent investigator at Lamar University, Dr. Lian combines basic science and engineering approaches to study the effect of microenvironment on the metastatic potential of cancer cells. In addition, his lab collaborated with teams of several biotech startups to develop amplification-free molecular as well as portable cellular detection platforms for biomedical and environmental science applications.



**Tai-Yen Chen**
*Assistant Professor, Department of Chemistry*
*University of Houston*

Dr. Tai-Yen Chen is an assistant professor of Chemistry at the University of Houston. He received his BS and MS from National Tsing Hua University, Taiwan, in 2002 and 2004 and obtained his Ph.D. with Prof. Dong Hee Son in physical chemistry from Texas A&M University in 2010. He then did postdoctoral research in single-molecule biophysics with Prof. Peng Chen at Cornell University before starting at the University of Houston in 2016. His current research investigates metal homeostasis in healthy and diseased neurons using single-molecule techniques, with the goals to understand how metals affect neuronal signaling and cause neurodegenerative diseases.

## Elevator Talks

| Presenter | Title |
|---|---|
| **Diane Yang** | Human Pancreatic Niche Promotes β Cell Differentiation via WNT5A/JNK/AP1 and BMP Signaling |
| **Shuo-Fu Yuan** | RNA-Aptamer-in-Droplet (RAPID) High Throughput Screening for Secretory Phenotypes |
| **Wan-Hung Lee** | Disruption of Protein-Protein Interactions Downstream of NMDA Receptors as a Novel Analgesic Strategy |
| **Chu-Chiao Wu** | Caspase-9 Swings Both Ways in the Apoptosome |
| **Yen-Chun Lu** | Scalable Production and Cryo-Storage of Organoids Using Core-Shell Decoupled Hydrogel Capsules |
| **Cheng-Hsin Liu** | A Hierarchy of Î²-Spectrin Homologs Stabilize Sodium Channels at Axonal Excitable Domains Through a Neuron Subtype-Dependent Manner |
| **Lee-Jae Guo** | A New Technique to Perform CT and MRI Angiography for Studying Cardiovascular Structures in Bowhead Whale Fetus |
| **Min-Shan Chen** | Limiting the Toxicity of Chemotherapy by Enhancing Regeneration of Intestinal Stem Cells |
| **Yi-Yen Tsai** | Liquid Crystalline Epoxy Resin for Orthodontic Bracket |
| **Richard I. Han** | The Effect of Focal Adhesion on the Mechanobiology of Lung Cancer Cell During Metastasis |

## Elevator Talks

Poster Number: 1

### Human Pancreatic Niche Promotes β Cell Differentiation via WNT5A/JNK/AP1 and BMP Signaling

Diane Yang, Jolanta Chmielowiec, and Malgorzata Borowiak*

Molecular and Cellular Biology Department, Baylor College of Medicine, Houston, TX

***Keywords: pancreatic development, stem cell differentiation, stem cell niche***

Insulin-secreting pancreatic β cells derived from human embryonic stem cells (hESC) could not only be the source in replacing β cells loss for diabetics, but also serve as a model to study human β cell development. However, current efforts to differentiate pancreatic progenitors (PPs) into mature human β cells are hindered by a lack of understanding the conditions that promote differentiation, especially the maturation of cells into physiologically functional, glucose-responsive cells.

Here, we established various human pancreatic mesenchymal-endothelial cells (pMEC) at different stages of development (week 9-20.1) to delineate the contribution of the pancreatic niche in differentiating β cells. Coculture of hESC-derived PPs with the stage-specific pMEC greatly increased β cell number and their glucose responsiveness, with comparable levels to cadaveric islets.

To best apply this knowledge to future transplantation treatments, we identified and determined the functions of a panel of secreted factors in endocrine differentiation. We found that WNT5A, in particular, markedly improved β cell differentiation in vitro by increasing expression of the endocrine and β cell markers Chromogranin A and insulin, respectively. We further performed RNA sequencing to determine the mechanism of WNT5A and demonstrated that WNT5A acts through the non-canonical WNT/PCP signaling pathway and additionally cooperates with Gremlin to inhibit BMP pathway. In conclusion, we identified novel signals from the human pancreatic niche that promote β cell differentiation and maturation, and these factors can be used to mimic in vivo conditions in an in vitro system to generate bona fide β cells for translational applications.

## Elevator Talks

Poster Number: 2

### RNA-Aptamer-in-Droplet (RAPID) High Throughput Screening for Secretory Phenotypes

Shuo-Fu Yuan[1], James Wagner[2], Joseph Abatemarco[2], Maen Sarhan[3], Jyun-Liang Lin[2], Leqian Liu[3], Wafa Hassouneh[3], Adam R. Abate[3], and Hal S. Alper*[2]

[1]Institute for Cellular and Molecular Biology, The University of Texas at Austin, TX

[2]Department of Chemical Engineering, The University of Texas at Austin, TX

[3]Bioengineering and Therapeutic Sciences, University of California San Francisco, CA

***Keywords: High-throughput screening, Microfluidics, Synthetic biology***

Synthetic biology tools have been used to rewire a wide range of microorganisms to create living foundries for the biorenewable production of high-value chemicals. This engineering process often comprises a long and costly design-build-test cycle in which libraries of very large numbers of variants must be constructed and tested to optimize performance. 96-Well plate assays are flexible and achieve this goal with limited throughput, but droplet microfluidic techniques can enable ultrahigh-throughput screening for secretory production. Here, we present RNA Aptamers In Droplets (RAPID) screening, a method that greatly expands the scope and generality of high throughput microfluidic screening.

Using in vitro transcribed RNA aptamers as sensors, we synthetically transduce target product concentration into fluorescence, allowing modular biosensor construction, fast measurement, and rapid screening of millions of variants in droplets. In order to further improve the performance and robustness of the RNA sensors, we are also optimizing tRNA scaffolds to facilitate aptamer folding in vitro. This approach can yield brighter, more stable fluorescence signals for enhancing the capabilities of RAPID screening. We ultimately apply the RAPID approach to increase secreted production of a small molecule metabolite (tyrosine) and a recombinant protein (streptavidin) from yeast. Our proof-of-concept results demonstrate that RAPID screening affords a useful and general approach to massively enhancing screening power for secretory phenotypes.

## Elevator Talks

Poster Number: 3

### Disruption of Protein-Protein Interactions Downstream of NMDA Receptors as a Novel Analgesic Strategy

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***Keywords: NMDA receptor, PSD95, nNOS, NOS1AP, Neuropathic pain***

Approximately 20% of the population globally is suffering from chronic pain. However, current treatments are far from adequate. Central sensitization contributes to the establishment and maintenance of chronic pain. Elevated NMDA receptor (NMDAR) activity is one of the underlying mechanisms for central sensitization. However, NMDAR antagonism is not a valuable strategy for disrupting abnormal NMDAR activity due to unwanted CNS side effects associated with other critical NMDAR-mediated physiological functions. Here, we demonstrate a novel strategy for combating NMDAR overactivation-mediated pronociceptive signaling by targeting protein-protein interactions downstream of NMDARs such as the PSD95-nNOS and nNOS-NOS1AP protein-protein interfaces. I demonstrated that targeting PSD95-nNOS or nNOS-NOS1AP interactions with either small molecule or peptide inhibitors is neuroprotective in primary cortical neurons and produces antinociception in rodent models of inflammatory and neuropathy pain without unwanted CNS side effects associated with NMDAR antagonists. In addition, intrathecal administration of a peptide inhibitor of nNOS-NOS1AP interactions reduced spinal activation of p53, a substrate of p38MAPK, and the antinociceptive effect is independent of the ERK pathway in the paclitaxel-treated animals. Lastly, using functional group modification, several novel analogs were designed and synthesized based on lead small molecule inhibitors of PSD95-nNOS. Among them, we identified several candidates that are as potent as currently available PSD95-nNOS small molecule inhibitors but exert distinct antinociceptive profiles in the formalin pain model.

## Elevator Talks

Poster Number: 4

### Caspase-9 Swings Both Ways in the Apoptosome

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***Keywords: Apaf-1, apoptosome, caspase-3, caspase-9, molecular timer***

For nearly 2 decades, investigators have debated whether cysteinyl-aspartate-specific protease 9 (caspase-9) is activated within the apoptotic protease-activating factor 1 (Apaf-1) apoptosome through proximity induced homodimerization or through the formation of a holoenzyme. Recently, we have demonstrated that caspase-9 forms (and likely transitions between) both caspase-9 homo- and Apaf-1:caspase-9 heterodimers, each of which plays unique roles in the recruitment and activation of caspase-9.

Using several biochemical approaches, including a novel site-specific crosslinking technique, we provide the first direct evidence that procaspase-9 homodimerizes within the apoptosome, markedly increasing its avidity for the complex and inducing selective intramolecular cleavage at Asp-315. Remarkably, however, procaspase-9 could also bind via its small subunit to the NOD domain in Apaf-1, resulting in the formation of a heterodimer that more efficiently activated procaspase-3. Following cleavage, the intersubunit linker (and associated conformational changes) in caspase-9-p35/p12 inhibited its ability to form homo- and heterodimers, but feedback cleavage by caspase-3 at Asp-330 removed the linker entirely and partially restored activity to caspase-9-p35/p10. Thus, the apoptosome mediates the formation of caspase-9 homo- and heterodimers, both of which are impacted by cleavage and contribute to its overall function.

## Elevator Talks

Poster Number: 5

### Scalable Production and Cryo-Storage of Organoids Using Core-Shell Decoupled Hydrogel Capsules

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Department of Biological and Environmental Engineering, Cornell University

***Keywords: organoid, encapsulation, biomanufacturing, cryopreservation***

Organoids, organ-mimicking multicellular structures derived from pluripotent stem cells or organ progenitors, have recently emerged as an important system for both studies of stem cell biology and development of potential therapeutics; however, a large-scale culture of organoids and cryopreservation for whole organoids, a prerequisite for their industrial and clinical applications, has remained a challenge. Current organoid culture systems relying on embedding the stem or progenitor cells in bulk extracellular matrix (ECM) hydrogels (e.g., Matrigel) have limited surface area for mass transfer and are not suitable for large-scale productions. Here, we demonstrate a capsule-based, scalable organoid production and cryopreservation platform. The capsules have a core-shell structure where the core consists of Matrigel that supports the growth of organoids, and the alginate shell form robust spherical capsules, enabling suspension culture in stirred bioreactors. Compared with conventional, bulk ECM hydrogels, the capsules, which could be produced continuously by a two-fluidic electrostatic co-spraying method, provided better mass transfer through both diffusion and convection. The core-shell structure of the capsules also leads to better cell recovery after cryopreservation of organoids probably through prevention of intracellular ice formation.

## Elevator Talks

Poster Number: 6

### A Hierarchy of β-Spectrin Homologs Stabilize Sodium Channels at Axonal Excitable Domains Through a Neuron Subtype-Dependent Manner

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***Keywords: Spectrin, Axon Initial Segment, Nodes of Ranvier***

Highly-concentrated ion channels at axon initial segments (AIS) and Nodes of Ranvier are necessary to initiate and propagate action potentials in axons. The cytoskeletal protein β4-spectrin is a primary stabilizer of the voltage-gated sodium (Nav) channels found at nodes. Surprisingly, erythrocytic β1-spectrin can rescue this function after loss of β4-spectrin. However, whether β1-spectrin can rescue for AIS is unknown. Also, the possibility of a tertiary compensatory mechanism has not been tested. Furthermore, the function of β1-spectrin in the nervous system has not been studied. To investigate the roles of β1 and β4-spectrin at nodes and AIS, we generated conditional knock-out (cKO) mice. Mice lacking β1-spectrin showed normal clustering of Nav channels in excitatory neurons, whereas β4-spectrin cKO animals showed longer AIS with weaker Nav channel intensity. Unexpectedly, β1-spectrin only targeted to the cortical interneuron AIS of β4-spectrin cKO mice. In addition, loss of β1-spectrin retained Nav channel clustering at nodes, whereas loss of β4-spectrin also showed normal Nav channel clustering due to the compensatory effects from β1-spectrin. Finally, β1/ β4-spectrin double cKO animals showed severe proprioceptive defects and no tertiary compensatory effects from other β-spectrin homologs. These results suggest that β-spectrins are necessary to stabilize Nav channels at axonal excitable domains. Furthermore, β4-spectrin is the primary stabilizer, while β1-spectrin performs secondary functions in a context-dependent manner.

## Elevator Talks

Poster Number: 7

### A New Technique to Perform CT and MRI Angiography for Studying Cardiovascular Structures in Bowhead Whale Fetus

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***Keywords: bowhead whale, cardiovascular, imaging, CT, MRI***

Bowhead whale has been of great interest to comparative scientists, but the current knowledge of the anatomy is still limited. By applying modern imaging modalities to assess formalin-fixed specimens, we now have new approaches to study marine mammals. In this study, we demonstrated a new technique to study cardiovascular structure in bowhead whale fetus and applied 3D modeling to improve the learning outcome. A formalin-fixed carcass of bowhead whale fetus was scanned by 128 slices computed tomography (CT) and 3T magnetic resonance imaging (MRI). The umbilical arteries were cannulated with a 4 Fr catheter. One hundred ml of omnipaque 350 and 10 ml of gadolinium were diluted with 400 ml of water and injected through the umbilical arteries prior to the imaging scans. The CT scan was acquired at 0.6 mm slice thickness in the axial plane and the MRI scan was acquired in the sagittal, coronal, and axial planes using T1 and T2 fat saturation sequences. All images were imported into a workstation for further review. The infused contrast perfused the vasculature and cardiac chambers, including aortic arch, four-chamber heart, and branches of great vessels. The heart valves and different views of cardiac chambers were seen in the MRI images. The formalin-fixed specimen did not have a remarkable effect in the contrast-enhanced images. We further exported the CT images and processed the data for 3D printing and modeling. The 3D models well demonstrated the anatomic structures of the fetal heart and major vasculatures. In conclusion, contrast injection through umbilical arteries provides a new way to perform CT and MRI angiography in the carcass of bowhead whale fetus and creates more potentials to study marine mammals.

## Elevator Talks

Poster Number: 8

### Limiting the Toxicity of Chemotherapy by Enhancing Regeneration of Intestinal Stem Cells

Min-Shan Chen, Yuan-Hung Lo, and Noah Shroyer*

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***Keywords: Chemotherapy, Intestinal stem cell, Cancer, Regeneration***

Chemotherapy is the backbone treatment for most malignancies. Typical cytotoxic chemotherapy drugs also harm normal cells that divide rapidly, such as intestinal stem cells, and cause morbidity and mortality that limits medical treatment. There is a need to reduce chemotherapy toxicity and thus provide a therapeutic benefit and improve the overall quality of life of cancer patients. Growth Factor-Independent 1 (GFI1) is a zinc finger transcriptional repressor implicated in the differentiation of secretory precursors into goblet and Paneth cells in the intestinal epithelium. Here, we hypothesize that following injury, increasing reversion of secretory cells (Gfi1+) into stem cells will improve intestinal epithelium regeneration and mitigate chemo-induced injury. In our injury model, mice were treated with 20 mg/kg Doxorubicin through intraperitoneal injection to cause crypt injury. In Gfi1 reporter mice (Gfi1cre; ROSA26floxSTOP-YFP) we found that YFP+, Gfi1-lineal cells were secretory Paneth and Goblet cells, which were not part of the stem cell pool under homeostatic conditions. After the injury, we found that Gfi1+ secretory cells can re-enter the cell cycle and give rise to all cell lineages of the intestinal epithelium, indicating that Gfi1-lineal cells revert to become active stem cells and repopulate the stem cell pool following tissue injury. To identify potential boosters of intestinal regeneration, we generated three-dimensional organoid cultures from Gfi1 reporter mice which provide a convenient and physiologically relevant model to identify key pathways regulating stem cell injury and regeneration caused by chemotherapy drugs. Our results indicate that PI3kinase/AKT and WNT are key regulators of cell survival and stem cell reversion after tissue injury. Our studies in intestinal stem cells may improve our current understanding injury-induced regeneration and identify potential therapeutic strategies to mitigate the effects of chemo-induced normal tissue injury and improve cancer chemotherapy.

## Elevator Talks

Poster Number: 9

### Liquid Crystalline Epoxy Resin for Orthodontic Bracket

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***Keywords: Liquid crystalline, Epoxy resin, Dental bracket, 3D milling machine, Biocompatibility, Mechanical properties***

Cyclohexylmethyl-3,4-epoxycyclohexanecarboxylate (ECH) epoxy resin is used in making dental plastic bracket but its appearance and strength can be further improved for a better aesthetics and longer use. To address this issue, a new material, ECH-bipheny and tetramethyl biphenol liquid crystalline epoxy resin (ECH-BP), is developed by incorporating BP into conventional ECH epoxy resin. This study demonstrated that ECH-BP offers several benefits: hexahydro-4-methylphthalic anhydride was used as a curing agent in mixing ECH and BP to achieve transparent appearance; A small but statistically significant increase in hardness is measured and is believed to be a result of the cross-linking between BP and ECH, which was identified using scanning electron microscopy; A forty percent decrease in roughness of manufactured surface was observed, which is a benefit of increased material hardness; A higher thermal stability within 300Â°C. Moreover, the biocompatibility of ECH-BP against MG-63 human osteosarcoma cell line is similar to the performance of ECH. Worth to mention, several brackets made of ECH-BP were generated using a 3D milling machine and the biocompatibilities of these brackets in ICR mouse are comparable to the performances of the commercial bracket products. Overall, this study demonstrated that ECH-BP has several desired properties for the dental bracket. A comprehensive consideration on commercializing this material and its application are under process.

## Elevator Talks

Poster Number: 10

### The Effect of Focal Adhesion on the Mechanobiology of Lung Cancer Cell During Metastasis

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***Keywords: lung cancer, metastasis, EMT, focal adhesion***

Introduction: A mouse model of human lung adenocarcinoma driven by mutations in K-ras and p-53 genes was adapted to investigate the roles of mechanics and cellular epithelial-to-mesenchymal transition (EMT) potential. We are particularly interested in the focal adhesion pathway, as the mechanical stimuli from ECM could govern the cell adhesion and migration, pivotal steps in EMT and metastasis. Cell-matrix organization resulting from interfering with the formation of focal adhesions was investigated at the macro- and ultras-structural levels quantitatively. Methods: 344SQ metastatic lung tumor cells, and an integrin beta-1 (ITGB1) knockdown variant were encapsulated in collagen gels under incubated static tensions. Collagen gels with 344SQ cells were treated with dasatinib, a Src inhibitor was investigated. The elastic properties of the gels were measured using the mechanical tester. Gel pieces were stained with DAPI and phalloidin for confocal imaging, and cell spatial distribution was determined using image analysis. SEM imaging was used to determine the cell morphology and collagen alignment. Results: Interfering with focal adhesions, either by ITGB1 KD or inhibiting Src resulted in reduced elastic moduli compared to controls. At the ultrastructural level, blocking the focal adhesion pathway reduced the collagen fiber alignment and induced cellular phenotypic changes, with more cell clustering resembled the non-metastatic epithelial cell morphology. Additionally, cellular spatial distribution changed to a more clustered pattern. Conclusions: Inhibiting the formation of focal adhesions also prevents cells from aligning collagen fibers in the direction of tension to the extent observed in controls, indicating less modulation of ECM. It also appears to drive more cell-cell adhesion in 3D culture, resulting in clusters of cells that suggest a reversion to a more epithelial phenotype. The cells cluster within a few days, leaving less time for organizing the neotissue, which as a result is less strong.

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