



WELCOME!

2nd Annual Triangle Biotech Research Symposium 2013

INNOVATION, INVENTIVENESS, AND INGENUITY

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Agenda:

- 8:00 **Registration and Networking**
- 9:00 **Welcome: Dolly Koltchev, Ph.D., Program Director, BioPharma Research Council**
- Opening Remarks: Deborah M. Thompson, Ph.D.,
Science and Technology Development Program Analyst, North Carolina Biotechnology Center**
- 9:15 **Assault on Biotech: Recent Case Law Impacting Biotechnology Inventions**
Alice Bonnen & Rob Schwartzman, Attorneys, Myers Bigel Sibley & Sajovec
- 9:35 **The Role of Literature Mining in a Biotechnology Company**
Nancy Baker, Ph.D., Owner, ParlezChem
- 9:55 **Potential New Treatments for Chronic Kidney Disease**
Deanna Nelson¹, Ph.D., and Keith Hruska², MD
¹BioLink Life Sciences, Inc.; ²Washington University, St. Louis, MO
- 10:15 **Coffee Break**
- 10:45 **Rational Design of Nucleoside Phosphonates for Intracellular Delivery
Using Lipid Conjugation**
Randall Lanier, Ph.D., Senior Director of Virology, Chimerix, Inc.
- 11:05 **Strategies for Glycan Profiling and Site-Specific Glycan Analysis of Glycoprotein Therapeutics and Vaccines**
Hongwei Xie, Song Klapoetke, Jeremy Woods, and Tyler Davis, KBI Biopharma
- 11:25 **Keynote: Innovation Economics: The Race for Global Advantage**
Stephen Ezell, Senior Analyst, Information Technology and Innovation Foundation (ITIF)
- 12:05 **Lunch, Exhibits and Poster Session**
- 1:15 **Water Soluble Carbon Dots for Target Cancer Drug Delivery & Bio-Imaging**
Afreen Allam and S. Sarkar, Ph.D., Cromoz Inc.
- 1:35 **Microfluidics-Based Diagnosis-on-a-Chip using Enzyme Activity Detection**
Sissel Juul¹, Yi-Ping Ho², Birgitta R. Knudsen², and Kam W. Leong¹
¹Biomedical Engineering, Duke University; ²Aarhus University, Denmark



- 2:00 **Burrows-Wheeler Mapping and SeqNFind: a Comparative Analysis of Genome Mapping Tools**
D. Andrew Carr¹, Swanthana Rekulapally², Christine Paszko¹, and Donald J. Kolva¹
¹Accelerated Technology Laboratories
²College of Computing and Informatics, University North Carolina Charlotte
- 2:25 **Big Data Enters the Biological Sciences**
Al Shpuntoff, Bioinformatics Consultant, AFS Informatics
- 2:50 **Coffee Break**
- 3:20 **Engineered Cell Cultures for More Predictive Preclinical Drug Studies**
Sonia Grego, Ph.D., Research Scientist, RTI International
- 3:45 **Reconstitution of the Human Immune System in Mice: Utility in Preclinical Research**
Yan Yang, Ph.D., Business Unit Manager, The Jackson Laboratory
- 4:10 **Proof of Concept Community Labs- Neighborhood R&D's**
Wanona Satcher, Project Manager, City of Durham
- 4:30 **Trace Impurity Resolution: The Path to Unambiguous Structural Identification and Control**
Jack Thornquest, Senior Researcher Scientists Mass Spectrometrist, Scynexis, Inc.
- 4:50 **Formal Meeting Adjourns: Joanne Gere, Executive Director, BioPharma Research Council**
- 5:00-6:00 **Reception and Networking**

Program subject to Change

About Us:

Since 2009 The BioPharma Research Council has produced symposia and forums for researchers from academic and pharma labs, government, suppliers and nonprofit groups. By building diverse programming and inviting the entire biotech/pharma community to participate, we are helping make connections that affect the development of healthcare breakthroughs across the eastern US and beyond.



Presentation Abstracts:

9:00 am Welcome Remarks -

Deborah M. Thompson, Ph.D., Science and Technology Development Program Analyst, NC Biotechnology Center

9:15 am- Assault on Biotech: Recent Case Law Impacting Biotechnology Inventions

Alice Bonnen and Rob Schwartzman, Attorneys, Myers Bigel Sibley & Sajovec

Recent developments in the case law of relevance to the biotech community. Including decisions affecting subject matter eligibility; self-replicating technology and patent exhaustion and licensing; and a discussion of the practical issues raised in these decisions and possible strategies for addressing these issues.

9:35 am- The Role of Literature Mining in a Biotechnology Company

Nancy Baker, Ph.D., Owner, ParlezChem

The biomedical literature is a rich source of information, but the number of articles is large and growing at a high rate, making it harder to keep current in a field through article retrieval tools such as PubMed. Automated literature mining methods are becoming more common to extract the information into a usable form. This talk will briefly discuss literature mining in general, and then present examples of literature mining output specifically designed to support the work of a small to medium sized biotech in the areas of basic research, drug discovery, drug repositioning, due diligence, and toxicology.

9:55 am- Potential New Treatments for Chronic Kidney Disease

Deanna Nelson¹, Ph.D., and Keith Hruska², MD

¹BioLink Life Sciences, Inc.; ²Washington University, St. Louis, MO

Hyperphosphatemia contributes to atherosclerotic cardiovascular disease, the most important cause of death in all stages of renal failure and greatest threat to survival of ESRD patients. Patients use cationic drugs to bind phosphate (Pi) in the GI tract and prevent its uptake. Combinations of calcium succinate (CS) and magnesium lipoate (ML) have potential for Pi-binding with reduced calcium load and pleiotropic benefits. Anephric LDLR^{-/-} mice were fed high fat/high cholesterol diets. Untreated mice were hyperphosphatemic. Diets supplemented with 1% or 3% (w/w) sevelamer carbonate (SC; a standard of care) or 1% or 3% (w/w) CS/ML dose-dependently decreased the serum Pi and caused similar effects on vascular calcification and bone remodeling. CS/ML also effected: (a) Significant reduction in serum glucose. (b) 30% reduction in serum cholesterol. (c) Absence of weight gain. Thus, CS/ML may provide cost-effective, pleiotropic benefits to ESRD patients as compared to current treatments.

10:45 am Rational Design of Nucleoside Phosphonates for Intracellular Delivery Using Lipid Conjugation

Randall Lanier, PhD, Senior Director of Virology, Chimerix, Inc.

Acyclic nucleoside phosphonates (ANPs) are highly effective antivirals, but are not readily taken up by cells. Chimerix has used lipid conjugation of ANPs to improve the absorption, distribution, metabolism and excretion (ADME) profiles of these agents. For example, CMX001 is an oral, lipid-ANP, which is converted inside cells to the active antiviral agent, cidofovir diphosphate (CDV-PP). CDV-PP acts as an alternative substrate inhibitor for the cytomegalovirus (CMV) viral DNA polymerase (UL54), the primary target for anti-CMV drugs. CMX001 is in Phase 3 development for prevention of CMV in the setting of stem cell transplantation. Learnings surrounding intracellular delivery of orally administered antivirals will be discussed, with specific review of lipid conjugation of ANPs and CMX001 as examples of successful approaches.



11:05 am- Strategies for Glycan Profiling and Site-Specific Glycan Analysis of Glycoprotein Therapeutics and Vaccines

Hongwei Xie, Song Klapoetke, Jeremy Woods, and Tyler Davis, KBI Biopharma

Besides monoclonal antibodies (mAbs), more and more glycoproteins are targeted for biotherapeutics or vaccines. In biopharmaceutical industry, LC-MS analysis of intact/reduced protein was often used to quickly provide glycoprofiles of mAbs and fusion proteins, and released glycan analysis to provide profile of total glycans. However, to monitor site-specific glycans and site-occupancy is important and challenging for multiple-site glycosylated protein drugs and vaccines. In this study, sensitive identification and profiling of procainamide-labeled released glycans by HILIC LC-MS/FLD was presented. Complementary RP and HILIC LC-MS/MS peptide mapping for searching identified glycans as optional modifications were developed for effective characterization of site-specific glycoprofiles. HILIC LC-MRM was designed and investigated for rapid monitoring site-specific glycans. Strategies for glycosylation analysis in protein, peptide and glycan levels were compared for different applications.

11:25 am- Keynote: Innovation Economics: The Race for Global Advantage

Stephen Ezell, Senior Analyst, Information Technology and Innovation Foundation (ITIF)

Innovation drives economic growth. Recognizing this, virtually all countries have enacted a range of sophisticated policies to drive innovation-based economic growth, causing a fierce race for global innovation leadership among countries to emerge, as ITIF writes in [Innovation Economics: The Race for Global Advantage](#). Mr. Ezell's presentation will examine how countries are faring in this competition and assess which policies work best in supporting innovation-based economic growth. Unfortunately, because the United States lacks a robust innovation and competitiveness policy and has taken the attitude that it will always be first in innovation without having to invest in improving its national innovation ecosystem, U.S. global innovation leadership has become increasingly imperiled. The presentation will also assess countries' competitiveness in the life sciences industry, drawing lessons from ITIF's report [Leadership in Decline: Assessing U.S. International Competitiveness in Biomedical Research](#). It concludes with recommendations that executives and policymakers at the state, federal, and international levels can implement to maximize the innovation potential of firms, nations and the global economy.

12:05 pm- Lunch, Exhibits and Poster Session

1:15 pm- Water Soluble Carbon Dots for Target Cancer Drug Delivery & Bio-Imaging

Afreen Allam and S. Sarkar, Ph.D., Cromoz Inc.

Biologists for years have been thinking to visualize the movement and action of proteins and other molecules in and around cells and tissues. Water-soluble carbon nano-materials are introduced as a nontoxic, fluorescent reagent; enabling a living species to be imaged alive. This extends the possibility of tagging drug molecules so that they can be delivered to the proper site guided by image movement of the fluorescent tag. Our research has produced water soluble fluorescent multi-walled Carbon Dots (C. Dots) by functionalization of the surfaces and with no external passivation of surfaces with any organic wrappers. These carbon nano materials are produced from simple natural organic resources on pyrolysis and not from the commonly used laser ablation techniques on graphitic carbon. We have successfully conjugated these water-soluble functionalized C.Dots with Paclitaxel and Gemcitabine. Initial in vitro studies on certain cancer cell lines at Johns Hopkins have shown no cytotoxicity.



1:25 pm- Microfluidics-Based Diagnosis-on-a-Chip using Enzyme Activity Detection

Sissel Juul¹, Yi-Ping Ho², Birgitta R. Knudsen², and Kam W. Leong¹

¹Biomedical Engineering, Duke University; ²Aarhus University, Denmark

We will present a lab-on-a-chip setup for highly sensitive detection of DNA-modifying enzymes specific for prediction of chemotherapeutic response in cancer patients or detection of infectious diseases such as malaria caused by Plasmodium parasites. Diagnosis is accomplished by combining customized emulsion microfluidic platforms with specially designed DNA-based sensor systems. Diagnostics in droplet microfluidics, compared to bulk assays, is characterized by low sample consumption and short processing time. The confined reaction in pL-sized droplets, where each droplet represents an individual microreactor, offers efficient mixing of reagents resulting in improved extraction of cell suspensions and faster reaction kinetics. Thus, by combining the previously REEAD assay with droplet microfluidics, the need for extensive sample preparation is abolished, and assays are performed with small clinically relevant samples (a drop of whole blood or saliva) or in single cancerous cells.

2:00 pm- Burrows-Wheeler Mapping and SeqNFind: a Comparative Analysis of Genome Mapping Tools

D. Andrew Carr¹, Swanthana Rekulapally², Christine Paszko¹, and Donald J. Kolva¹

¹Accelerated Technology Laboratories

²College of Computing and Informatics, University North Carolina Charlotte

Ok, so you have a plethora of NGS data – now what? Analysis. First steps in analyzing data requires either a de novo contig construction or a mapping of the result set to one or more known genomes. As the number of readily available human genomes become available. Mapping to a single genome may no longer be considered sufficient. In the future, medicine and science may examine the genome in various different states of health. Individualized medicine may eventually require mapping NGS sequence reads to multiple genomes. SeqNFind® offers a solution to this challenge, we present here a comparative analysis examining the genomic Burrows-Wheeler based mapping tools designed for the next generation of super computers that rely on the speed and accuracy of the GPU architecture. We discuss the pros and cons of such systems, and examine their ability to handle multiple genomic searches.

2:25 pm- Big Data Enters the Biological Sciences

Al Shpuntoff, Bioinformatics Consultant, AFS Informatics

"Big Data" is an important new buzzword for the industry; it represents new capabilities as well as presenting new challenges. This talk is about the fundamental differences between "lots of data" overwhelming a traditional biologist, and the new world of opportunities that are possible with Big Data analytic techniques. Characteristics of major big data systems (Hadoop, etc) are introduced, and contrasted to other HPC environments.

3:20 pm- Engineered Cell Cultures for More Predictive Preclinical Drug Studies

Sonia Grego, Research Scientist, RTI International

Engineered cell cultures are a promising tool for more predictive preclinical studies that enhance the success probability of new drugs entering clinical trials. This talk will describe two engineered cell culture approaches for drug studies designed as a more physiologically relevant model of the lung and of the heart. We have developed a biomimetic multicellular lung model using all primary human cells and microfluidics. This lung-on-a-chip is designed to reproduce tissue-tissue interfaces in the human airways and their response to drugs and respiratory viruses.

We have developed a capability for non-invasive monitoring of cardiomyocytes for improved drug cardiotoxicity prediction. The approach relies on the multielectrode array measurement of cardiac electrical activity of spontaneously beating cardiomyocytes and on a sophisticated analysis of the electrical signals to reveal drug effects.

3:45 pm- Reconstitution of the Human Immune System in Mice: Utility in Preclinical Research

Yan Yang, PhD, Business Unit Manager, The Jackson Laboratory

Drug discovery research requires predictive animal models that can better mimic human biology. Immunodeficient mice engrafted with a human immune system enable scientists to study human biological processes in vivo without putting patients at risk. The mice with an engrafted human immune system represent one form of humanized mouse models and leverage the severely immunodeficient mouse strain, NOD scid IL2 receptor gamma chain knockout mice (NSG) which readily supports the engraftment and multi-lineage differentiation of human hematopoietic stem cells. This presentation will discuss various methodologies to establish engraftment, functional characterization of the reconstituted human immune system and research applications in a broad range of therapeutic areas such as infectious disease, hematopoiesis, stem cell differentiation and autoimmune disorders.

4:10 pm- Proof of Concept Community Labs- Neighborhood R&D's

Wanona Satcher, Project Manager, City of Durham

The problem being addressed here is the illusion of lack of possibility and potential in inner city neighborhoods coupled with the reality that there are limited resources and commitment for positive change.

Our solution is to create an environment where residents, partners and investors break down perceived and real barriers, and redefine community investment and resiliency by allowing core needs to inspire and propel collective action. This solution consists of three proof of concept community labs (POC2Ls) where residents, entrepreneurs, university students and City (actors) officials collaborate to solve real-world challenges. These challenges will be identified through an iterative process that begins with residents telling their stories. Within these labs, teams of the partners listed above will design need-specific prototypes that reflect cross-pollination of ideas, risk-taking and imagination and promote practical application to accelerate systematic change.

4:30 pm- Trace Impurity Resolution: The Path to Unambiguous Structural Identification and Control

Jack Thornquest, Senior Researcher Scientists Mass Spectrometrist, Scynexis, Inc.

Identification of impurities is a challenge present at all stages of drug development and manufacturing. Novel impurities can arise unexpectedly and from many different sources. The impact of impurities becomes more dramatic the further along a compound is on the road from early synthesis, through clinical development, and ultimately to marketed product. Investing the necessary amount of effort in identifying impurities at each stage represents a key decision impacting the timelines of the drug's development.



Poster Abstracts:

A Biomarker Panel to Aid in the Diagnosis of Major Depressive Disorder

John Bilello¹, Linda M Thurmond¹, Suzin M Wright², Katie M Smith³, Bo Pi⁴, Robert Rubin⁵ and Floyd Taub²

¹R&D Ridge Diagnostics Inc. RTP, NC; ²R&D FindCure.org, Aurora, CO; ³Regulatory and ⁴R&D Ridge Diagnostics, San Diego CA; ⁵Whittier College, Whittier, CA

We previously described a biomarker panel which can be used as an aid to MDD diagnosis (Molecular Psychiatry 18, 332-339, 2013). It consisted of nine biomarkers associated with the neurotrophic, metabolic, inflammatory and HPA axis pathways. This panel and the algorithm produced clinically useful sensitivity and specificity in differentiating MDD patients from non-MDD individuals. We undertook a study to determine if the addition of gender and BMI to the algorithm would enhance the test's clinical performance. Training set (n=102) biomarker data were used to develop gender-specific, BMI-adjusted algorithms which were then applied to a validation set (n=52). While the confidence interval of the smaller validation set was larger, the results were essentially identical, and the resulting sensitivity was 94%, specificity 92% and AUC 0.96. MDDScore is currently the only available objective test for clinical depression.

A Novel Image-Based Cytometry Method for Autophagy Detection in Living Cells

Leo L. Chan^{1,2}, Dee Shen³, Alisha R. Wilkinson^{1,2}, Wayne Patton³, Ning Lai¹, Eric Chan³, Dmitry Kuksin^{1,2}, Bo Lin¹, and Jean Qiu¹

¹Nexcelom Bioscience LLC, 360 Merrimack St. Building 9, Lawrence, MA 01843

²Center for Biotechnology and Biomedical Sciences, Merrimack College, North Andover, MA 01845

³Enzo Life Sciences, Farmingdale, NY 11735

Autophagy is an important cellular catabolic process that plays a variety of important roles, including maintenance of the amino acid pool during starvation, recycling of damaged proteins and organelles, and clearance of intracellular microbes. In this study, we developed a novel method using the Cellometer image-based cytometer in combination with Cyto-ID® Green dye for autophagy detection in live cells. The method is compared to flow cytometry by measuring macroautophagy in nutrient-starved Jurkat cells. Results demonstrate similar trends of autophagic response, but different magnitude of fluorescence signal increases. The possibility of using this method for drug discovery applications is also demonstrated through the measurement of dose-response kinetics upon induction of autophagy with rapamycin and tamoxifen. The described image-based cytometry/fluorescent dye method should serve as a useful addition to the current arsenal of techniques available in support of autophagy-based drug discovery relating to various pathological disorders.

Using Image Cytometry as a Tool for Visual Verification of Flow Cytometry Gated Cell Populations

Dmitry Kuksin, Leo L. Chan, Bo Lin, Peter Y. Li, and Jean Qiu, Nexcelom Bioscience

Many cell-based assays that analyze cell populations and functionalities have been performed using flow cytometry. Recently, a novel image cytometry system (Cellometer) has been developed by Nexcelom Bioscience LLC for automated cell concentration and viability measurement using bright-field and fluorescent imaging methods. The image cytometer is capable of capturing bright-field and fluorescent images and generates fluorescence intensity data for each analyzed cell. The system can perform gating operations based on fluorescence intensity and cell size, similar to flow cytometry. The ability to visually observe the gated cell population allows the elimination of data uncertainties generated using flow cytometry. Using Calcein AM and propidium iodide, image cytometry allows for visual confirmation that the population of cells gated using flow analysis is indeed the population of interest.



Simple Western Analysis of Signaling Cascade Proteins

Uyen Nguyen, Irina Kazakova, Francisco Ramirez, Hui Xu, and Robert Gavin, ProteinSimple

Proteins in the AKT signaling cascade are associated with tumor cell survival, proliferation, and invasiveness. The activation of AKT is also one of the most frequent alterations observed in human cancer and tumor cells. Understanding how AKT signaling impacts disease progression is important to the development of novel therapeutics. Cell signaling events are routinely assessed using traditional Western blot analysis. The Western blot technique is very labor intensive and generally yields results that are semi-quantitative. The Simple Western platform described here completely automates the manual steps involved in traditional Western blot protocols and can analyze up to 96 samples in a single experiment. Because Simple Western protocols consume only microliter sample volumes, reproducible and quantitative results can be generated from precious or quantity-limited samples.

AccuCell® PBMC as a Tool for Immunological Studies

Faith Bahunde, Precision Bioservices, Inc., Frederick MD

AccuCell® PBMC and CBMNC provide an excellent alternative to fresh cells as a tool for assay validation, phenotypic analysis, and functional immunological studies. Optimal retention of PBMC functionality during cryopreservation depends on optimized and standardized cell isolation, freezing, and storage conditions. Precision's AccuCell PBMC, frozen by our efficient cryopreservation techniques, fully retain their functional and differentiation capability. AccuCell PBMC have been extensively characterized to provide a wide selection basis for different platforms. Characterization data include donor demographics, HLA class I and II at intermediate and high resolution, and reactivity data for CEF and CMV peptide pools. AccuCell PBMC have been tested for the secretion of IFN- γ , IL-2, TNF- α , and IL-4, antibody dependent cellular cytotoxicity (ADCC) activity and phosphoflow detection.

In addition to use in direct assays, AccuCell PBMC are invaluable as controls in PBMC assays conducted over time. Current stability data demonstrates that AccuCell PBMC remain stable for over 8 years when kept frozen, and studies are ongoing. Thus, a single lot of AccuCell PBMC can be used as an assay control for samples collected over multiple years. Providing this matched control in multiple assays conducted over time allows for standardization of the results and can help account for assay variation and drift, permitting more confidence to be placed in the results.

AccuCell PBMC are available in lots of over 300 vials, ensuring matched samples or standards for hundreds of assays. With greater than 90% viability post thaw and diverse donor demographics, AccuCell PBMC provides superior quality and streamlines immunological testing. Data on stability, viability, purity, and functionality of the AccuCell PBMC are shown.

Digital Dispensing for Direct Dilution: New Flexibility in Dose-Response Analyses

Michael Reitman, HP Sales Product Specialist, Tecan

Better dose-response results are obtained with Hewlett-Packard's D300 Digital Dispenser. New features of the system now enable improved flexibility in plate layout and operation, including cell and enzymatic assays within the same protocol. Powerful software design tools to enable the easy generation of traditionally-difficult dose response analyses, such as drug-drug interaction experiments. Titrating one drug down the plate while another drug is titrated orthogonally across the plate enables two (or more) drug doses to be independently generated in every well. This poster will show how the excellent dispensing precision and dynamic range of HP's direct dilution technology combined with the methodological advantages of a non-contact digital technology enable experiments that would not otherwise be practical. Detailed examples of these advantages will be shown, demonstrating the flexibility of direct digital dilution using HP technology relative to manual or robotic serial dilution.

Virtual Reality Solutions for Physical Therapy

Christopher K. Rhea, Ph.D., Assistant Professor, University of North Carolina at Greensboro

Dr. Rhea's research team focuses on developing virtual reality (VR) solutions to enhance physical therapy. The team has created the REVIVE™ project (Rehabilitation Engagement Visualized In Virtual Environments), which consists of a series of VR applications to restore functional mobility after injury or pathology. The goal of the REVIVE™ project is to develop cost effective therapies that prevent falls and improve performance. The REVIVE™ project can be delivered in clinical or research settings and consists of a series of prescriptive/interactive elements to enhance traditional physical therapy protocol. For example, an avatar is shown on a screen in front of a treadmill and the patient's goal is to mimic the walking avatar's movement patterns. The uniqueness of the avatar is that it is programmed to walk like a healthy adult, using nonlinear dynamics to control each stride. Patients who have had knee surgery and stroke patients are currently being tested.

Recombinant Vitellogenin-mimicking Protein: A Novel System for Transgenerational Delivery of Bioactive Materials into Eggs and Offspring

Justin Schilling, Benjamin J. Reading, and Craig V. Sullivan, NC State Dept. of Applied Ecology

Vitellogenins (Vtgs) are deposited into oocytes and serve as the dominant yolk precursors that support embryogenesis in egg-laying vertebrates. Deposition of Vtgs from the blood occurs via interactions with receptors (Vtgrs) that are expressed exclusively on the surface of growing oocytes. We present a novel biotechnology enabling targeted delivery of biologically active agents across generations, one that involves a recombinant protein that mimics the domain of Vtg that binds to the Vtgr. We discovered that such a Vtgr-binding protein (VRBP) is selectively delivered to the egg yolk when injected into female zebrafish (*Danio rerio*). We envision using VRBP to shuttle bioactive cargoes into oocytes, potentially enhancing livestock egg quality and progeny performance. We are poised to begin testing additional VRBP cargoes, which could include therapeutic, prophylactic, or other agents such as vaccines, growth factors, biochemical tags, toxicants, viruses or other DNA/RNA carriers.

Ten Minutes per Sample Injection Throughput is Possible for High Resolution mAb Platform Methods Using iCE3 IEF Analyzer

Jiaqi Wu, Principal Scientist, ProteinSimple

ProteinSimple's iCE IEF Analyzer has become golden standard for protein charge heterogeneity characterization in biopharmaceutical industry because of its ease of use, platform method and high throughput. Because of the competition of the UPLC, the throughput of <10 min/injection is required by some iCE users on the iCE based high resolution mAbs platform methods.

At ProteinSimple, the requirement is addressed by increasing the speed of sample injection and column washing as well as shortened focusing time. All these may be realized by using new column coatings. The entire sample injection and column washing circle can be completed in 25 seconds on the iCE3-PrinCE Next system compared to 2.5 minutes for solutions containing polymers. Also, because of the low viscosity, the focusing time is reduced by 2-3 minutes for a high resolution mAb platform method. Combine all these time savings, throughput of 10 min/injection is achieved on the iCE3-PrinCE Next



**Thank you to everyone who submitted an Abstract!
Congratulations to those accepted by the committee:**

Biographies- Oral Presentations:

Afreen Allam, President, Cromoz Inc.



Afreen Allam is responsible for business operations setting the direction for Cromoz R&D program. She has conducted extensive studies on application of carbon nanotechnology in drug delivery and bio-imaging. She has done preliminary testing at Johns Hopkins Medical School with Pancreatic Cancer cell lines. She is a graduate of North Carolina State University with a double major in Microbiology & Biochemistry. She also has a Masters in Finance and Banking.

Coauthor **Dr. S. Sarkar** did his PhD in Chemistry in 1975. He did his Post-Doctoral Research project at University of Dortmund, Germany and University of Belfield, Germany. He joined IIT-Kanpur as a Lecturer in the Department of Chemistry in 1978. He has been a visiting Scientist and Professor to various universities in US and Germany. He was invited to lectures in several National and International Conferences, University Colloquia. His research interests are metallo enzymes, transition metals, Metal Clusters-Supramolecular Chemistry, Fullerene and Bioinorganic Chemistry.

Nancy Baker, Ph.D., Owner, ParlezChem



Nancy Baker is a literature informatics researcher working for Lockheed Martin as a contractor to the US EPA's National Center for Computational Toxicology. She received her Ph.D. in Information Science from UNC, Chapel Hill, School of Information and Library Science, along with the certificate in Bioinformatics and Computational Biology. Before graduate school she worked for 16 years at GSK in information technology. Dr. Baker has her own company, ParlezChem, which provides literature informatics services.

Alice Bonnen, Attorney, Myers Bigel Sibley & Sajovec



Alice received her Bachelor of Science degree from Michigan State University and Master of Science degree from the University of Minnesota (Plant Physiology). She received her Doctor of Philosophy degree in Plant Pathology from Michigan State University. Her doctoral research focused on mechanisms of disease resistance in Curcubitaceae.

Prior to becoming an attorney, Alice taught and carried out a research program focused on the physiology and biochemistry of edible mushrooms at Pennsylvania State University. Alice received her Juris Doctorate from Wake Forest University in 2004. She is a member of the North Carolina Bar, and is registered to practice before the United States Patent and Trademark Office. Alice is also a member of the Association of University Technology Managers. Her practice is focused on the preparation and prosecution of patents in the biotechnological fields. In addition, Alice prepares and prosecutes plant patent applications and applications for plant variety protection.

D. Andrew Carr, Ph.D., Director of Bioinformatics, Accelerated Technology Laboratories

Dr. D. Andrew Carr received his Ph.D. in Bioinformatics from George Mason University School of Computational Science in 2006. After a year as research faculty working on machine learning methods for matching nano-technology structures he accepted a post-doctoral appointment in the lab of Dr. Jennifer Weller at University of North Carolina Charlotte. In 2009 he accepted the position of Director of Bioinformatics for Accelerated Technology Laboratories, where he leads a team in the development of the SeqNFind® platform. SeqNFind® is the only commercially available GPU super computer-based hardware/software solution that deploys genomics tools (Advanced algorithms such as Smith Waterman and BW) for the fast accurate analysis of NexGen sequence data.

Stephen Ezell, Senior Analyst, Information Technology and Innovation Foundation (ITIF)



Stephen Ezell is a Senior Analyst with the Information Technology and Innovation Foundation (ITIF), where he focuses on science, technology, and innovation; manufacturing; and global trade policy issues. He is the co-author with Dr. Robert Atkinson of *Innovation Economics: The Race for Global Advantage* (Yale, September 2012). Mr. Ezell comes to ITIF from Peer Insight, an innovation research and consulting firm he co-founded in 2003 to study the practice of innovation in service industries. Prior to forming Peer Insight, Mr. Ezell worked in the New Service Development group at the NASDAQ Stock Market, where he spearheaded the creation of the NASDAQ Market Intelligence Desk and the NASDAQ Corporate Services Network. Stephen holds a B.S. from the School of Foreign Service at Georgetown University, with an Honors Certificate from Georgetown's Landegger International Business Diplomacy program.

Sonia Grego, Ph.D., Senior Research Scientist, RTI International



Sonia Grego leads the bioengineering group at the Research Triangle Institute and develops novel technologies for life science applications for federal and commercial clients. Her research interests include microfluidics, engineered cellular platforms for drug safety and efficacy studies and remote physiological monitoring. She is the Principal Investigator for a DoD-funded project to develop a cellular 3-D microfluidic model of the lung. Dr. Grego has expertise in microfabricated devices, MEMS, and optoelectronics, with emphasis on sensor miniaturization, endoscopic medical imaging, and lab-on-a-chip. She earned her Ph.D. in Physics from the University of Copenhagen in Denmark and held a postdoctoral position in cellular and biophysics at the University of North Carolina at Chapel Hill. She has co-authored more than 35 invention disclosures and 40 scientific publications.

Sissel Juul, Ph.D., Post Doctoral Associate, Biomedical Engineering, Duke University



Sissel Juul received her PhD from Aarhus University in Denmark in Molecular Biology (under the supervision of Dr. Birgitta Knudsen) where she participated in the Rolling-circle-Enzyme-Activity-Detection (REEAD) assay development. This assay can specifically detect the activity of important DNA modifying enzymes at the single molecule level. During her postdoc at Biomedical Engineering (Duke University) with Professor Kam Leong, she has incorporated the REEAD assay into a Lab-on-a-Chip format using droplet generating microfluidics.

Randall Lanier, Ph.D., Senior Director of Virology, Chimerix, Inc.



Randall Lanier works on research and development activities for a variety of viral indications, including smallpox, CMV, adenovirus, and influenza. He holds a BA degree in Biology from New College and a PhD in Cellular and Molecular Biology from the University of Texas Health Science Center in San Antonio. Prior to joining Chimerix in 2007, Randall contributed to the HIV and cancer programs at Burroughs Wellcome, GlaxoWellcome and GlaxoSmithkline with a primary focus on nucleosides and resistance.

As founder and owner of BioLink, for 12 years I have executed against a business plan for growth into a financially sound, fully equipped small business. I am responsible for operations, business development, finances, internal affairs, quality assurance, and compliance with local, State and Federal regulations. My broad background in pharmaceuticals includes specific training and expertise in key research areas related to biologic and drug development through regulatory submissions. At Baxter Healthcare Corporation, I directed R&D of hemoglobin-based oxygen carriers (i.e., blood substitutes). In addition, I led teams who were developing other drugs for intravenous administration, as well as products for treatment of renal disease and blood and blood component preservation. Research in blood substitutes expanded my expertise to include erythropoiesis, nitric oxide, heme and iron metabolism, and oxidative stress responses. Numerous publications and patents resulted from these studies.

Deanna Nelson, Ph.D., President, BioLink Life Sciences, Inc.



As founder and owner of BioLink, for 12 years I have executed against a business plan for growth into a financially sound, fully equipped small business. I am responsible for operations, business development, finances, internal affairs, quality assurance, and compliance with local, State and Federal regulations. My broad background in pharmaceuticals includes specific training and expertise in key research areas related to biologic and drug development through regulatory submissions. At Baxter Healthcare Corporation, I directed R&D of hemoglobin-based oxygen carriers (i.e., blood substitutes). In addition, I led teams who were developing other drugs for intravenous administration, as well as products for treatment of renal disease and blood and blood component preservation. Research in blood substitutes expanded my expertise to include erythropoiesis, nitric oxide, heme and iron metabolism, and oxidative stress responses. Numerous publications and patents resulted from these studies.

Wanona Satcher, Project Manager, City of Durham



Ms. Satcher is an urban designer, landscape architect intern, and planner originally from Atlanta, Georgia. After graduating from Auburn University (College of Architecture, Design, & Construction) in Auburn, Alabama with honors in the dual Landscape Architecture and Community Planning programs, Ms. Satcher moved to Durham, NC to work in professional design firms. In 2008, she started her own urban design, economic development, and leadership consulting company, CDDG (Community Design Development Group). After consulting with the City of Durham as a grant writer for sustainable programming, she now works in the Neighborhood Improvement Services Department as a Neighborhood Development Specialist. As staff she combines landscape architecture, planning, community engagement, and innovative economic development models to establish and facilitate sustainable revitalization programs, policies, and projects in Durham through interdepartmental collaboration. Her role is to creatively solve problems in our inner city communities through urban design research, social innovation, arts, food access, and economic development financing. Ms. Satcher is project manager for the Durham Urban Innovation Center and Durham Network of Agriculture.

A huge fan of the performing arts, Ms. Satcher produced a unique and contemporary urban rendition titled "The Durham Nutcracker." As producer, she collaborated with Walltown Children's Theatre for the successful show that included ballet, salsa, capoeira, hip hop, tap dancing, African, and singing. Ms. Satcher envisions a future where art and everything we do as city, county, and state officials encourage our youth to imagine, persevere, be passionate, dream, read, and help others.

Rob Schwartzman, Attorney, Myers Bigel Sibley & Sajovec



Rob received his Bachelor of Science degree in chemistry from Rensselaer Polytechnic Institute and his Doctor of Philosophy degree in pharmacology from the University of North Carolina - Chapel Hill. His doctoral research focused on steroid-induced apoptosis in thymocytes. He conducted postdoctoral research at the Carnegie Institution of Washington Department of Embryology on the steroid-induced gene expression program during tadpole metamorphosis. Rob spent six years as an examiner at the United States Patent and Trademark Office, examining applications in the areas of gene expression and regulation, gene therapy, vectors, and cell lines.

He received his Juris Doctor degree from Georgetown University Law Center and has worked in the patent law field since 1996. Rob is a member of the North Carolina and District of Columbia bars and is registered to practice before the United States Patent and Trademark Office. He is a member of the North Carolina Bar Association, Association of University Technology Managers, American Intellectual Property Law Association, and American Bar Association. His practice is concentrated in the area of U.S. and foreign patent prosecution in the biotechnological, chemical, and pharmaceutical arts. Before joining MBSS, Rob practiced at an intellectual property firm in Washington, D.C.

Al Shpuntoff, Bioinformatics Consultant, AFS Informatics



Bioinformatics consultant since 1996, has worked with training and education for scientists, integration of new equipment, systems and algorithms into R&D environments, and has designed and implemented complex pipelines to contribute to discovery. Expert on high performance computing applications to genetics sequence assembly and analysis.

Deborah M. Thompson, Ph.D., Science and Technology Development Program Analyst, NC Biotechnology Center



Deborah Thompson is a research grant Program Analyst at the North Carolina Biotechnology Center. [NCBiotech grants](#) strengthen the research infrastructure at North Carolina's academic and not-for-profit research institutions. Deborah supports the research grant programs through program outreach, reviewer recruitment, and investigator consultations.

Deborah also leads the [NCBiotech Jobs Network](#), a monthly program designed to help job seekers develop contacts and relationships that will help them network to their next job. NCBiotech Jobs Network events support the efforts of biotech and life science professionals seeking employment opportunities in the state. The Jobs Network provides monthly structured networking sessions, and participants include hiring managers, human resources professionals, placement services, and recruiters. Job seekers range from new graduates to postdocs to life scientists with 20+ years of experience.

Deborah holds a Ph.D. in genetics from The University of Georgia. She did post-doctoral research at North Carolina State University in the Botany and Entomology departments. She has more than 15 years of research and development experience in molecular biology, genetics, cell culture, botany, and entomology in academic, government, and industry laboratories. Deborah has authored peer-reviewed publications in subjects ranging from plant and insect gene regulation to protein expression, biopesticides, and bioremediation. She has a strong interest in agricultural biotechnology and plant gene expression and enjoys educational outreach to non-scientists and to K-12 students and teachers.

Jack Thornquest, Senior Research Scientist Mass Spectrometrist, Scynexis, Inc.



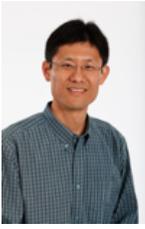
Jack is a senior research scientist mass spectrometrist specialized in structure elucidation and purification techniques to support discovery and the development of pharmaceutical therapeutics. He has been at SCYNEXIS nearly eight years now and previously spent seven years at GSK in the Structural Chemistry group in Development. Day-to-day, he solves problems in support of both Discovery and Development R&D, primarily through structure elucidation and impurity/degradant ID. Jack also develops LC chromatographic methods and works intensely with the purification group on isolating challenging impurities.

Hongwei Xie, Ph.D., Director, KBI Biopharma



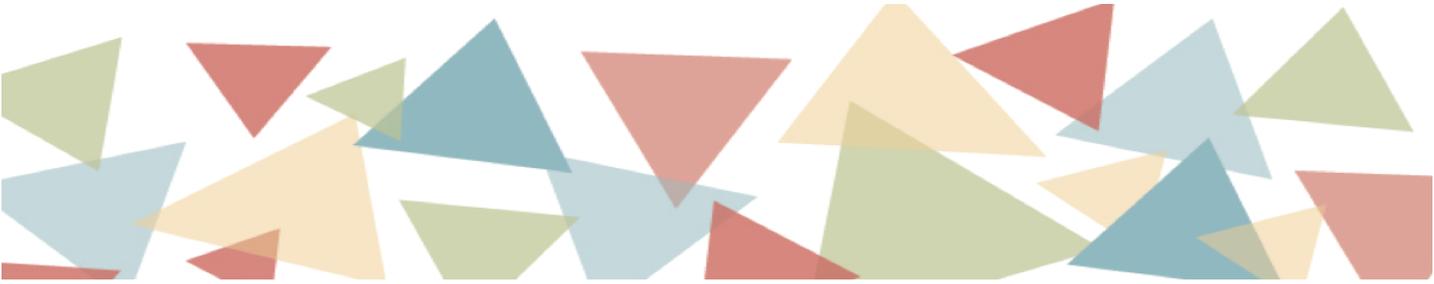
Hongwei has 20 years of experience in LC/MS based characterization and separation. He is specialized in analysis of protein and peptide therapeutics with different LC and MS tools, and advanced methods development/transfer/qualification. He had hands on with different LC-MS and GC-MS systems, and experienced with different types (RP, IEX, HILIC, SEC, affinity, CE) of LC coupled with optical (UV or FLD) and/or mass spectral detectors. Hongwei also has extensive experience on protein purification, digestion and peptide sample preparation. He has over 45 peer-reviewed journal articles, including 25 on separation and characterization of protein/peptide therapeutics and vaccines, and discovery of protein biomarkers. Prior to joining KBI in 2011, he worked for Waters Corporation on development of LC and MS applications for protein and peptide therapeutics (such as antibodies, vaccines and biosimilars). Hongwei had a MSc. of Mass Spectrometry and a Ph.D. of Analytical Chemistry.

Yan Yang, Ph.D., Business Unit Manager, The Jackson Laboratory



Yan Yang joined JAX Mice and Services in 2006 and has held positions of increasing responsibility, currently as the Business Unit Manager of In Vivo Services. In such capacity, he oversees the In Vivo Services business unit where drug efficacy testing and model characterizations are performed at clients' request and is held accountable for top line and bottom line performance of the business unit.

Yan received his medical degree from Beijing Medical University in 1996 and in the same year entered the University of Rochester graduate program. He received his Ph.D. in Pathology in 2001 and conducted postdoctoral research on mouse genetics and neuroscience at The Jackson Laboratory from 2001 to 2006. Yan's research work is summarized in 18 peer-reviewed publications and 2 US patents.



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