



Informatics Today

Autumn 2018

Department of Biomedical Informatics, University of Pittsburgh School of Medicine

Machine Learning Platform Identifies Unknown Genetic Drivers of Cancer to Personalize Treatment Strategies

by Alyssa B. Lypson, MS, Pitt sciVelo

Professors Greg Cooper, MD, PhD and Xinghua Lu, MD, PhD of the University of Pittsburgh Department of Biomedical Informatics (Pitt DBMI) are innovating new methods to improve cancer treatment strategies, starting with melanoma. What's their strategy? Machine learning (artificial intelligence) tools to enable precision oncology.

Drs. Cooper and Lu have pioneered a machine learning platform, called Tumor-specific Driver Identification (TDI) that helps predict the effectiveness of cancer immunotherapies by identifying key genetic mutations that help cancer cells evade the immune system.

Patient outcomes have shown that when immunotherapy works, it works really well and has even resulted in long-term remission for some patients with metastatic cancers. Yet, it is uncertain why almost two thirds of patients respond poorly to these drugs.

With TDI, Drs. Cooper and Lu hope to not only to identify the patients who will respond (or fail to respond) to a given treatment, saving time and money, but also to identify alternative therapeutic strategies that convert non-responders into responders. These alternative treatments can turn the immune system's attack switch back on, allowing the body to fight cancer effectively.

By studying tumors at the individual patient level using genomic sequencing, TDI can elucidate tumor-specific, mechanistic changes, related to molecular recognition and expression patterns. This robust approach will help oncologists to deliver the most effective, personalized therapies for each patient, perhaps identifying therapies that would not have been previously considered or by predicting combination therapies likely to improve outcomes.

Drs. Lu and Cooper have embraced collaboration to advance their translational research by teaming up with Pitt's Center for Commercial Applications of Healthcare Data (CCA) and sciVelo (part of the Innovation Institute). The CCA, through the Pittsburgh Health Data Alliance, funded the technical development and validation of the TDI algorithm and initial commercial software development that was completed in December 2016.

The next phase of the project is being supported by significant follow-on funding from a joint Pitt/UPMC translational research program, the UPMC Immune Transplant and Therapy Center. This funding provides the opportunity to perform prospective clinical validation of TDI's ability to predict melanoma patients' response to immunotherapy.



Gregory Cooper, MD, PhD and Xinghua Lu, MD, PhD
(Alyssa B. Lypson, MS, Pitt sciVelo)

“For the first use case, we are investigating how melanoma tumors that fail to respond to treatment exploit the immune system. We think TDI will provide meaningful data to search for alternative therapeutic strategies and combination therapy opportunities.”

Xinghua Lu, MD, PhD, Pitt DBMI

“Tumors are highly heterogeneous in terms of their genomic drivers and their cell-signaling-pathway mechanisms; the better we can infer the specific mechanisms of a given tumor, the better we will be able to tailor precision therapies to treat that tumor.”

Gregory Cooper, MD, PhD, Pitt DBMI

For the full story, please visit the Pitt sciVelo web site (scivelo.pitt.edu) and under News, see Spotlights.

Research Funding Highlights

Erik S. Wright, PhD

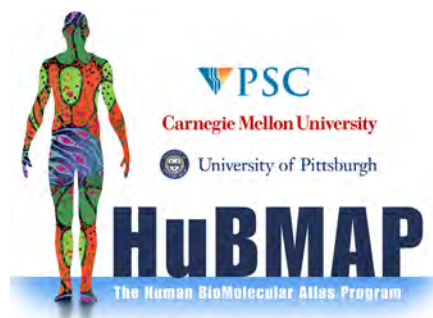
Dr. Wright is a 2018 Awardee of the NIH Director's New Innovator Award for his project entitled "Uncovering Synergistic Antibiotic Cocktails with Comparative Genomics". Dr. Wright's project will develop strategies for mitigating the rise of antimicrobial resistance using comparative genomics. The positive outcomes of this work include discovering new antibiotics for drug development and revealing strategies for combating the rise of antibiotic resistance.

Kayhan Batmanghelich, PhD

Dr. Batmanghelich is the recipient of several grants in 2018. Dr. Batmanghelich is the Principal Investigator (PI) on a grant from the NIH National Heart, Lung and Blood Institute for a project entitled "An Integrative Radiogenomic Approach to Design Genetically-Informed Large Biomarker for Characterizing COPD." He has been awarded a grant in collaboration with SAP Research entitled "Deep Multi-Domain Learning: A Framework to Incorporate Weak Labels to the Attention Models." Dr. Batmanghelich is also working on a collaborative project with Suvrit Sra of MIT which has been awarded a \$600,000 grant from the NSF Division of Mathematical Sciences.

Jonathan C. Silverstein, MD, MS, FACS, FACMI

Dr. Silverstein is the Principal Investigator, Pitt DBMI, on a collaboration of Pittsburgh institutions building a computing infrastructure for a molecular atlas. This project, funded by the NIH, will allow biologists to explore the human body in cellular detail. The Pittsburgh Supercomputing Center (PSC), a program of Carnegie Mellon University and the University of Pittsburgh, and the Department of Biomedical Informatics at the University of Pittsburgh's School of Medicine are undertaking the work as part of \$54 million in funding by the National Institutes of Health (NIH) for the Human BioMolecular Atlas Program (HuBMAP).



"We're pleased to further deepen our close relationship with PSC via this national cyber-infrastructure project. We are especially excited to work with HuBMAP and HIVE collaborators, including NIH, to build HuBMAP's secure and highly flexible research data portal and computational environment."

Jonathan C. Silverstein, MD, MS, FACS, FACMI, Pitt DBMI

For more on HuBMAP, please see the full story by Ken Chiacchia of PSC:

<https://www.psc.edu/2910-psc-pitt-build-infrastructure-for-human-tissue-atlas>

Dr. Yalini Senathirajah: Bridging the Gap between Clinicians and Technology

by Melissa Schwenk, Pitt DBMI

How does technology evolve to meet a clinician's way of thinking, public health emergencies, and ease of use? How do you bridge the gap between biomedical informatics databases and the clinical side of research? How does training to become a veterinarian lead to a doctorate in biomedical informatics with a specialized interest in designing better electronic health records and health IT systems?

With Dr. Yalini Senathirajah who has begun to find a way to solve all of these complex problems. As a graduate who started to obtain her veterinarian degree from the Ontario Veterinary College in 1981, she quickly learned how complex a medical system could be, especially when learning how to treat up to eight different species at a time.

Her knowledge and interests quickly morphed from animals to the more complicated clinical systems that plague hospitals and healthcare institutions. This led her to decide to go back to school to obtain her PhD in biomedical informatics in 2006. Upon her graduation in 2010, she had already started developing MedWISE – an experimental clinical system, which allows clinician users to create and share the information elements, tools and interfaces they use, via simple (e.g. drag and drop) interfaces, without programmers.

The development of MedWISE led her to receive an AHRQ R01 research grant to continue her research and development on understanding the impact of interactive design in health information technologies on medical cognition, human-computer interaction/efficiency, and system development. Dr. Senathirajah states that the most important aspect to her research is being able to study the "effects of communication and collaboration. Then being able to fit the tasks of the clinicians to a lot of medical specialties."

continued on Page 3

Dr. Yalini Senathirajah, continued from Page 2

The collaborative aspect was one of the biggest draws that led her to the University of Pittsburgh as a new Visiting Associate Professor. She wanted the chance to work with many like-minded individuals and to have an abundance of support for her grant and research, while at the same time still being able to teach a diverse student population.

One of the major motivating factors for Dr. Senathirajah's research comes from wanting there to be more "understanding." She believes civilization should not let "the strong prey on the weak" and wants "all of the talents of an individual to be allowed to come out and benefit society."

In addition, Dr. Senathirajah considers that people are not always "paying attention in detail," and it is important to be able to "breakdown a complex idea into very simple steps." The more people who can understand a complex idea, the more that idea has a chance to grow and reach more people. In this case, MedWISE is still in the beginning stages of growing, but it will continue to mature under Dr. Senathirajah's careful attention.

While Dr. Senathirajah may not have had as many people paying attention to her research before, the Department of Biomedical Informatics is certainly paying attention now. And we are excited to see what she will develop and research next!

Wendy Chapman examines her time at the University of Pittsburgh

by Melissa Schwenk, Pitt DBMI

"Keeping an open mind" has always been Dr. Wendy Chapman's motto as she climbed from a Bachelor's degree in Linguistics to a PhD in Medical Informatics. Dr. Chapman currently leads the University of Utah's Department of Biomedical Informatics, the oldest informatics department in the U.S., and she started her career at Pitt. She came to the University of Pittsburgh in 2000 as an NLM postdoctoral fellow doing natural language processing (NLP) and stayed as an assistant professor until 2010.

Her skills and time spent at the University of Pittsburgh were monumental to her finding her groove in the biomedical informatics world and in natural language processing. She found mentors, colleagues, and sponsors at Pitt with Bruce Buchanan, Greg Cooper, Mike Wagner, Rebecca Jacobson, and Mike Becich. She worked with the RODS Lab on biosurveillance and learned how to develop and evaluate NLP techniques in the context of an exciting application area, creating a synergetic relationship between application and science. In addition, she stated, "I had ideas that I wanted to do that went beyond my funded research, and Dr. Becich was very supportive of those ideas." She participated in department leadership and created NLP resources used across the world while she was here. These opportunities let her reach beyond her local research lab to have broader international impact.

Dr. Chapman maintains that her biggest contribution to the informatics field is in "knowledge representation that's needed for NLP – not in the NLP algorithms themselves." This all began with what became her best-known work: a negation algorithm that she helped develop with Will Bridewell during her time at the University of Pittsburgh.

Collaborations have always been at the forefront of Dr. Chapman's mind. Her collaborative efforts at Pittsburgh spilled over into helping her become a chair of the American Medical Informatics Association (AMIA) Natural Language Processing Working Group and chair of the AMIA Student Paper Awards Committee. She now hopes to use some of her Jon M. Huntsman Presidential Endowed Chair award funding to help start a Leadership Academy for Women in Informatics and to create high school courses to introduce students to informatics.

Ultimately, Dr. Chapman explains that the best moments at the University of Pittsburgh came from the people. "I just loved the faculty, and I had great students who are still friends!" Through her knack for always seeking out new opportunities and her ability to collaborate with a wide variety of people, Dr. Chapman created a legacy at the University of Pittsburgh that has continued to follow her throughout her career.



Wendy Chapman, PhD
(photo provided by Dr. Chapman)

Pitt DBMI Doctoral Student Andy King Uses Eyetracking to Study Navigation of the Electronic Medical Record

by Noreen Doloughty, Pitt DBMI

Andy King is no stranger to remaining calm in stressful situations. He's worked as a whitewater rafting guide throughout his biomedical informatics education at the University of Pittsburgh. "I'm probably not as nervous as I should be," Andy said about his thesis defense a week prior to the event. Asked if he's ever had to pull any rafters from the river, Andy raised his right leg to the conference table, pulled his khakis up to his knee, and revealed a scab that ran the length of his calf. "I had to save some people last weekend," he answered, smiling.



Pitt DBMI students on a group whitewater rafting trip with Andy King (front, far right) as their guide. (*Andy King*)

Andy's academic work involves saving people in a less physical way. It's his role as a whitewater rafting guide that has prepared him for the communications challenges that take place within critical care units in hospitals. That's where physicians from various specialties navigate an electronic medical record built as a catch-all for all patient data. Finding the information physicians need and working as a team to care for a critically ill patient has many communications challenges.

"Communication is very important on the river, both between team members and with the guests," Andy explained. "Yelling across the rapids is useless, so we rely on both predefined and impromptu hand signals. To communicate effectively, you need to consider the other person's understanding of the situation and then use minimal necessary signaling to achieve the desired communication."

Andy's thesis defense, "The Development and Evaluation of a Learning Electronic Medical Record System," involved using machine learning to adapt the display of patient data based on eye-tracking observations of clinician information-seeking behavior. Next up for Andy after a successful defense? Working as a post-doc on an NLM training grant with Pitt Critical Care Medicine.

"Working at a rafting company, I experienced first-hand the mistakes that happen when there is not an explicitly defined process in place," Andy said. "Many mistakes are common between raft guiding and health care: missing equipment, bystander effect if a task isn't explicitly assigned, different team members having different priorities, differences in how different leaders prefer to operate."

For more about Andy's work, visit www.andrewjking.com.

Congratulations to our students who successfully defended doctoral dissertations recently:

Eric Von Strobl, "Causal Discovery Under Non-Stationary Feedback," 6/23/17

Arielle Marie Fisher, "User-centered Design and Evaluation of RxMagic: A Prescription Management and General Inventory Control System for Free Clinic Dispensaries," 7/11/17

Rafael Ceschin, "A Computational Framework for Neonatal Brain MRI Structure Segmentation and Classification," 10/26/17

Andrew King, "The Development and Evaluation of a Learning Electronic Medical Record System," 7/13/18

Jose Posada Aguilar, "Semantics Enhanced Deep Learning Medical Text Classifier," 7/23/18

Joyeeta Dutta-Moscato, "A Bayesian Approach to Learning Decision Trees for Patient Specific Models," 8/9/18

Brian Liu, "Precision Critical Care Management of Blood Pressure in Stroke Patients Using Dynamic Linear Models," 8/17/18

Congratulations to our students who successfully defended master's research projects recently:

Sanghoon Lee, "Modeling miRNA-mRNA Interactions that Cause Phenotypic Abnormality in Breast Cancer Patients," 4/28/17

Chandra Rathnam, "Supervised deep neural network prediction of ubiquitination sites using physicochemical properties of protein sequences," 6/18/17

Sam Rosko, "Should drug compendia editors report drug interactions established using pre-clinical in vitro data? – An empirical evaluation," 6/21/17

Saja Al-Alawneh, "Classification of Radiology and Pathology Findings to Support a Breast Imaging QA/QI System," 12/15/17

Xueer Chen, "Systematic Identification of Somatic Genome Alterations that Intrinsically Regulate Tumor Immune Micro-environment," 12/15/17

Pritika Dasgupta, "You Can Tell by the Way I Use My Walk. Predicting the Presence of Cognitive Load with Gait Measurements," 12/17/17

Jenna Schabdach, "Use of Prealignment for Series Registration to Recover Resting-State Functional Magnetic Resonance Data Degraded by Motion," 3/27/18

Timothy Mtonga, "Standardizing the Representation of Medications for Low-resource Settings," 4/10/18

Menna Abaye, "Reducing Patient Waiting Time: Modeling the Impact of an Intervention on an Outpatient Clinic in Malawi," 4/12/18

Rob Handzel, MD, "Machine Learning in Surgery: Predicting Readmission after Ileostomy," 5/24/18

Yifan Xue, "Learning informative features for predicting outcome through mining tumor-specific causal networks," 6/19/18

University of Pittsburgh Department of Biomedical Informatics at AMIA

November 3-8, 2018

Saturday, November 3

W07: Clinicians on FHIR: Zero Percent Contained

Robert Handzel, MD, MS

Plaza A

8:30 AM – 4:30 PM, Saturday, November 3

W16: Applying Computational Causal Discovery in Biomedicine

Gregory Cooper, MD and Richard Scheines, PhD

Plaza A

1:00 PM – 4:30 PM, Saturday, November 3

Sunday, November 4

S04: Panel – The healthcare Services Platform Consortium: Building a Marketplace for Healthcare Applications

Steve Hasley, MD

Continental 6

3:30 PM – 5:00 PM, Sunday, November 4

Monday, November 5

University of Pittsburgh Department of Biomedical Informatics Alumni and Friends Breakfast

Franciscan A

7:00 AM – 9:00 AM, Monday, November 5

S26: Panel – Data Science in Biomedical Informatics Education: Critical Problems and Innovative Solutions

Harry Hochheiser, PhD

Continental 6

10:30 AM – 12:00 PM, Monday, November 5

Oral Presentation – Adverse Reactions and Drug-Drug Interaction Extraction Tracks at the Text Analysis Conference (TAC)

Dina Demner-Fushman (presenter);

Richard Boyce, PhD (author)

Imperial B

2:03 PM – 2:21 PM, Monday, November 5

Oral Presentation – Project Tycho 2.0 Towards a FAIR Compliant Repository for Global Population Health

Wilbert Van Panhuis, PhD

Continental 1/2/3

2:57 PM – 3:15 PM, Monday, November 5

S47: Panel – Automatic Text De-Identification: How and When is it Acceptable?

Jonathan Silverstein, MD

Continental 5

3:30 PM – 5:00 PM, Monday, November 5

Oral Presentation – Developing User Personas to Aid in the Design of a User-Center Natural Product-Drug Interaction Information Resource for Researchers

Richard Boyce, PhD

Continental 6/7/8

4:42 PM – 5:00 PM, Monday, November 5

Poster: Cognitive Load During Walking Can Be Predicted from Gait Measurements with High Accuracy

Pritika Dasgupta, MS

Grand Ballroom

5:00 PM – 6:30 PM, Monday, November 5

Poster – Design of a Learning Electronic Medical Record: A Qualitative Study of ICU Clinicians' Information Needs and Practices

Luca Calzoni, MD / Harry Hochheiser, PhD

Grand Ballroom

5:00 PM – 6:30 PM, Monday, November 5

Poster: Identification of Data Science Applications to Data Management in a Biomedical Imaging Research Center

Adriana Johnson, BS

Grand Ballroom

5:00 PM – 6:30 PM, Monday, November 5

Poster: Workflow for Developing 12b2 Ontologies from Source Terminologies in ACT

Shyam Visweswaran, MD, PhD

Grand Ballroom

5:00 PM – 6:30 PM, Monday, November 5

New Primary Faculty

Kayhan Batmanghelich, PhD (Assistant Professor)

Douglas Landsittel, PhD (Professor)

Yalini Senathirajah, PhD (Visiting Associate Professor)

Jonathan C. Silverstein, MD, MS, FACS, FACMI (Chief Research Information Officer, Health Sciences and Institute for Precision Medicine/Visiting Professor)

Erik S. Wright, PhD, MS (Assistant Professor)

Faculty Alumni

Rebecca Jacobson, MD, MS (UPMC Enterprises)

Fuchiang (Rich) Tsui, PhD (Affiliated Faculty)

Roger S. Day, ScD (Emeritus Professor)

University of Pittsburgh Department of Biomedical Informatics at AMIA
November 3-8, 2018

Tuesday, November 6

Oral Presentation – Early Prediction of Catastrophic Events in Pediatric Critical Care for Patients with Single Ventricle Physiology

Victor Ruiz, MS

Continental 7/8/9

11:24 AM – 11:42 AM, Tuesday, November 6

Poster: Classification of Radiology and Pathology Findings to Support a Breast Imaging QA/QI System

Harry Hochheiser, PhD / Saja Al-Alawneh, MS

Grand Ballroom

5:00 PM – 6:30 PM, Tuesday, November 6

Poster: A Computable Phenotype Library Plugin for i2b2

Yu Louisa Zhang, MS

Grand Ballroom

5:00 PM – 6:30 PM, Tuesday, November 6

Poster: Social Context Sentence Classification from Psychiatric Reports using Positive and Unlabeled Learning

Jose Posada, PhD / Rich Tsui, PhD

Grand Ballroom

5:00 PM – 6:30 PM, Tuesday, November 6

Poster: Software Package to Load Data from REDCap to PCORnet CDM 4.0

Shyam Visweswaran, MD, PhD

Grand Ballroom

5:00 PM – 6:30 PM, Tuesday, November 6

Poster: Using Prealignment in Global Volume Registration to Decrease Motion in Neonatal Resting-State fMRI

Jenna Schabdach, MS

Grand Ballroom

5:00 PM – 6:30 PM, Tuesday, November 6

Wednesday, November 7

Oral Presentation – Using Machine Learning to Predict the Information Seeking Behavior of Clinicians Using an Electronic Medical Record System

Andrew King, PhD

Plaza A

8:30 AM – 8:48 AM, Wednesday, November 7

AMIA High School Scholars

Talks

Aria Eppinger

Mentor: Dr. Alison Morris

Serum Marker of Glyphosate Exposure Associated with Changes in Oral and Gut Microbiome Composition

4:00 PM–4:15 PM Nov. 5 Yosemite C

Posters

Yasser Morsy

Mentors: Dr. Murat Akcakaya and Busra Tugce Susam

Poster 172 - Objective Pain Assessment Using Electrodermal Activity and Facial Mapping

5:00 PM–6:30 PM Nov. 5 Grand Ballroom

Vinay Pedapati

Mentors: Dr. Natasa Miskov-Zivanov and Kara Bocan

Poster 176 - Investigating Function Changes Within a Logic Circuit Model (DiSH Simulator) and Simulation to Establish the Effects of RAF and MEK Inhibitors Along S6 Pathway

5:00 PM–6:30 PM Nov. 5 Grand Ballroom

Recent Featured Department Grant Support						
Faculty PI	Title	Program Start	Program End	Total Period Direct	Total Period Indirect	Total Award
Waqas Amin, MD	Provider Targeted Behavioral Interventions to Prevent Unsafe Opioid Prescribing for Acute Non-Cancer Pain in Primary Care	2/1/18	2/28/23	\$3,200,566	\$772,250	\$3,972,816
Nematollah (Kayhan) Batmanghelich, PhD	An Integrative Radiogenomic Approach to Design Genetically-Informed Image Biomarker for Characterizing COPD	5/1/18	4/30/23	\$1,807,925	\$1,020,869	\$2,828,794
Nematollah (Kayhan) Batmanghelich, PhD	Deep Multi-Domain Learning: A Framework to Incorporate Weak Labels to the Attention Models	4/26/18	4/30/21	\$241,844	\$148,734	\$390,578
Richard Boyce, PhD	Meaningful Drug Interaction Alerts	5/1/18	4/30/22	\$372,192	\$176,240	\$548,432
Uma Chandran, PhD, MSIS	Aurora Data Coordinating Center	2/1/18	1/31/19	\$200,430	\$40,086	\$240,516
Vanathi Gopalakrishnan, PhD	CADidME	4/1/18	3/31/19	\$337,607	\$194,098	\$531,705
Harry Hochheiser, PhD	The internship in Biomedical Research, Informatics, and Computer Science (iBRIC): Biomedical Informatics and Data Science research experiences for students from Minority Serving Institutions	9/1/18	6/30/19	\$92,593	\$7,407	\$100,000
Harry Hochheiser, PhD	Data science curriculum enhancements for graduate health and biomedical sciences at Minority Serving Institutions	9/1/18	6/30/19	\$69,444	\$5,556	\$75,000
Xinghua Lu, MD, PhD, MS	Translation Addiction and Targeting in Colon Cancer	1/1/18	3/31/22	\$58,847	\$29,828	\$88,675
Xinghua Lu, MD, PhD, MS	TDI CCA	1/1/18	3/31/19	\$2,221,759	-	\$2,221,759
Shyam Visweswaran, MD, PhD	All of Us Pennsylvania	2/8/18	1/31/23	\$5,772,905**	\$3,227,095**	\$9,000,000**
Shyam Visweswaran, MD, PhD	Leveraging Twitter to Understand Drug Use	3/1/18	2/28/22	\$1,292,018	\$632,493	\$1,924,511
Erik Wright, PhD	Uncovering Synergistic Antibiotic Cocktails with Comparative Genomics	9/30/18	6/30/23	\$1,500,000	\$847,500	\$2,347,500

**First-year funding of award

Recent Publications

Nematollah (Kayhan) Batmanghelich, PhD

Fu H, Gong M, Wang Ch, **Batmanghelich K**, Tao D. **Deep Ordinal Regression Network for Monocular Depth Estimation**. *Conference on Computer Vision and Pattern Recognition*, to appear in CVPR 2018.

Yu X, Liu T, Gong M, Wang Ch, **Batmanghelich K**, Tao D. **An Efficient and Provable Approach for Mixture Proportion Estimation Using Independent Assumption**. *Conference on Computer Vision and Pattern Recognition*, to appear in CVPR 2018.

Michael Becich, MD, PhD

Luthra S, Chandran U, Diergaarde B, **Becich M**, Lee AV, Neumann CA. **Expression of reactive species related genes is associated with patient survival in luminal B breast cancer**. *Free Radic Biol Med*. 2018 Mar 12. pii: S0891-5849(18)30114-X. doi: 10.1016/j.freeradbiomed.2018.03.011. Epub 2018 Mar 12. PMID: 2954507.

David Boone, PhD

Chen J, Nagle AM, Wang YF, **Boone DN**, Lee AV. **Controlled dimerization of insulin-like growth factor-1 and insulin receptors reveal shared and distinct activities of holo and hybrid receptors**. *J Biol Chem*. 2018 Jan 12. pii: jbc.M117.789503. doi: 10.1074/jbc.M117.789503. Epub 2018 Jan 12. PMID: 29330302.

Nagle AM, Levine KM, Tasdemir N, Scott JA, Burlbaugh K, Kehm JW, Katz TA, **Boone DN**, Jacobsen BM, Atkinson JM, Oesterreich S, Lee AV. **Loss of E-cadherin enhances IGF1-IGF1R pathway activation and sensitizes breast cancers to anti-IGF1R/InsR inhibitors**. *Clin Cancer Res*. 2018 Jun 25. pii: clincanres.0279.2018. doi: 10.1158/1078-0432.CCR-18-0279. [Epub ahead of print]. PMID: 29941485.

Richard Boyce, PhD

Romagnoli KM, **Boyce RD**, Empey PE, Ning Y, Adams S, Hochheiser H. **Design and evaluation of a pharmacogenomics information resource for pharmacists**. *J Am Med Inform Assoc*. 2017 Jul 1;24(4):822-831. doi: 10.1093/jamia/ocx007. PMID: 28339805.

Le K, Chou E, **Boyce RD**, Albert SM. **Potentially Harmful Medication Use and Decline in Health-Related Quality of Life among Community-Dwelling Older Adults**. *Drugs Real World Outcomes*. 2017 Dec;4(4):257-264. doi: 10.1007/s40801-017-0123-8. PMID: 29119486.

Utecht J, Brochhausen M, Judkins J, Schneider J, **Boyce RD**. **Formalizing Evidence Type Definitions for Drug-Drug Interaction Studies to Improve Evidence Base Curation**. *Stud Health Technol Inform*. 2017;245:960-964. PMID: 29295242. PMCID: PMC5765984.

Judkins J, Tay-Sontheimer J, **Boyce RD**, Brochhausen M. **Extending the DIDEO ontology to include entities from the natural product drug interaction domain of discourse**. *J Biomed Semantics*. 2018 May 9;9(1):15. doi: 10.1186/s13326-018-0183-z. PMID: 29743102. PMCID: PMC59444177.

Natsiavas P, **Boyce RD**, Jaulent MC, Koutkias V. **OpenPVSIGNAL: Advancing Information Search, Sharing and Resuse on Pharmacovigilance Signals via FAIR Principles and Semantic Web Technologies**. *Front Pharmacol*. 2018 Jun 26;9:609. doi: 10.3389/fphar.2018.00609. eCollection 2018. PMID: 29997499.

Camacho J, Medina Ch. AM, Landis-Lewis Z, Douglas G, **Boyce R**. **Comparing a Mobile Decision Support System Versus the Use of Printed Materials for the Implementation of an Evidence-Based Recommendation: Protocol for Qualitative Evaluation**. *JMIR Res Protoc* 2018;7(4):e104. doi: 10.2196/resprot.9827. PMID: 29653921.

Uma Chandran, PhD, MSIS

Ramaswamy S, Walker WH, Aliberti P, Sethi R, Marshall GR, Smith A, Nourashrafeddin S, Belgorosky A, **Chandran UR**, Hedger MP, Plant TM. **The testicular transcriptome associated with spermatogonia differentiation initiated by gonadotrophin stimulation in the juvenile rhesus monkey (Macaca mulatta)**. *Hum Reprod*. 2017 Oct 1;32(10):2088-2100. doi: 10.1093/humrep/dex270. PMID: 28938749.

Pascal LE, Masoodi KZ, Liu J, Qiu X, Song Q, Wang Y, Zang Y, Yang T, Wang Y, Rigatti LH, **Chandran U**, Colli LM, Vencio RZN, Lu Y, Zhang J, Wang Z. **Conditional deletion of ELL2 induces murine prostate intraepithelial neoplasia.** *J Endocrinol.* 2017 Nov;235(2):123-136. doi: 10.1530/JOE-17-0112. PMID: 28870994.

Pascal LE, Wang Y, Zhong M, Wang D, Chakka AB, Yang Z, Li F, Song Q, Rigatti LH, Chaparala S, **Chandran U**, Parwani AV, Wang Z. **EAF2 and p53 Co-Regulate STAT3 Activation in Prostate Cancer.** *Neoplasia.* 2018 Mar 5;20(4):351-363. doi: 10.1016/j.neo.2018.01.011. Epub 2018 Mar 6. PMID: 29518696.

Luthra S, **Chandran U**, Diergaarde B, Becich M, Lee AV, Neumann CA. **Expression of reactive species related genes is associated with patient survival in luminal B breast cancer.** *Free Radic Biol Med.* 2018 Mar 12. pii: S0891-5849(18)30114-X. doi: 10.1016/j.freeradbiomed.2018.03.011. Epub 2018 Mar 12. PMID: 2954507.

Cao C, Wu H, Vasilatos SN, **Chandran U**, Qin Y, Wan Y, Oesterrich S, Davidson NE, Huang Y. **HDAC5-LSD1 Axis Regulates Antineoplastic Effect of Natural HDAC Inhibitor Sulforaphane in Human Breast Cancer Cells.** *Int J Cancer.* 2018 Apr 6. Doi: 10.1005/ijc.31419. Epub 2018 Apr 20. PMID 29633255.

Carson RA, Rudine AC, Tally SJ, Franks AL, Frahm KA, Waldman JK, Silswal N, Burale S, Phan JV, **Chandran UR**, Monaghan AP, DeFranco DB. **Statins impact primary embryonic mouse neural stem cell survival, cell death, and fate through distinct mechanisms.** *PLoS One.* 2018 May 8;13(5):e0196387. doi: 10.1371/journal.pone.0196387. eCollection 2018.

Gregory Cooper, MD, PhD

Aronis JM, Millett NE, Wagner MM, Tsui F, Ye Y, Ferraro JP, Haug PJ, Gesteland PH, **Cooper GF.** **A Bayesian system to detect and characterize overlapping outbreaks.** *J Biomed Inform.* 2017 Sep;73:171-181. doi: 10.1016/j.jbi.2017.08.003. Epub 2017 Aug 7. PMID: 28797710.

Tsui F, Ye Y, Ruiz V, **Cooper GF**, Wagner MM. **Automated influenza case detection for public health surveillance and clinical diagnosis using dynamic influenza prevalence method.** *J Public Health (Oxf).* 2017 Oct 20:1-8. doi: 10.1093/pubmed/fdx141. [Epub ahead of print]. PMID: 29059331.

Ding MQ, Chen L, **Cooper GF**, Young JD, Lu X. **Precision Oncology Beyond Targeted Therapy: Combining Omics Data with Machine Learning Matches the Majority of Cancer Cells to Effective Therapeutics.** *Mol Cancer Res.* 2017 Nov 13. pii: molcanres.0378.2017. doi: 10.1158/1541-7786.MCR-17-0378. Epub 2017 Nov 13. PMID: 29133589.

Naeni MP, **Cooper GF.** **Binary Classifier Calibration Using an Ensemble of Piecewise Linear Regression Models.** *Knowl Inf Syst.* 2018 Jan;54(1):151-170. doi: 10.1007/s10115-017-1133-2. Epub 2017 Nov 17. PMID: 29606784.

Andrews B, Ramsey J, Cooper GF. **Scoring Bayesian Networks of Mixed Variables.** *Int J Data Sci Anal.* 2018 Aug;6(1):3-18. Doi: 10.1007/s41060-017-0085-7. Epub 2018 Jan 11. PMID: 30140730.

Gerald Douglas, PhD

Gadabu OJ, Ben-Smith A, **Douglas GP**, Chirwa-Nasasara K, Manjomo RC, Harries AD, Dambula I, Kang'oma S, Chiumia T, Chinsinga FB. **Scaling up electronic village registers for measuring vital statistics in rural villages in Malawi.** *Public Health Action.* 2018 Jun 21;8(2):79-84. doi: 10.5588/pha.17.0116. PMID: 29946524.

Fisher AM, Mtonga TM, Espino JU, Jonkman LJ, Connor SE, Cappella NK, **Douglas GP.** **User-centered design and usability testing of RxMAGIC: a prescription management and general inventory control system for free clinic dispensaries.** *BMC Health Serv Res.* 2018 Sep 10;18(1):703. doi: 10.1186/s12913-018-3517-8. PMID: 30200939.

Camacho J, Medina Ch. AM, Landis-Lewis Z, Douglas G, Boyce R. **Comparing a Mobile Decision Support System Versus the Use of Printed Materials for the Implementation of an Evidence-Based Recommendation: Protocol for Qualitative Evaluation.** *JMIR Res Protoc* 2018;7(4):e104. doi: 10.2196/resprot.9827. PMID: 29653921.

Vanathi Gopalakrishnan, PhD

Ceschin R, Zahner A, Reynolds W, Gaesser J, Zuccoli G, Lo CW, **Gopalakrishnan V**, Panigrahy A. **A computational framework for the detection of subcortical brain dysmaturation in neonatal MRI using 3D Convolutional Neural Networks.** *Neuroimage.* 2018 Sep;178:183-197. doi: 10.1016/j.neuroimage.2018.05.049. Epub 2018 May 21. PMID: 29793060.

Balasubramanian JB, Gopalakrishnan V. **Tunable structure priors for Bayesian rule learning for knowledge integrated biomarker discovery.** World J Clin Oncol. 2018 Sep 14; 9(5): 98-109. doi: 10.5306/wjco.v9.i5.98.

Harry Hochheiser, PhD

Romagnoli KM, Boyce RD, Empey PE, Ning Y, Adams S, Hochheiser H. **Design and evaluation of a pharmacogenomics information resource for pharmacists.** J Am Med Inform Assoc. 2017 Jul 1;24(4):822-831. doi: 10.1093/jamia/ocx007. PMID: 28339805.

Savova GK, Tseytlin E, Finan S, Castine M, Miller T, Medvedeva O, Harris D, Hochheiser H, Lin C, Chavan G, Jacobson RS. **DeepPhe: A Natural Language Processing System for Extracting Cancer Phenotypes from Clinical Records.** Cancer Res. 2017 Nov 1;77(21):e115-e118. doi: 10.1158/0008-5472.CAN-17-0615. PMID: 29092954.

Markham H, Hochheiser H, Kuntoro K, Notobroto HB. **Exploring Midwives' Need and Intention to Adopt Electronic Integrated Antenatal Care.** Perspect Health Inf Manag. 2018 Jan 1; 15(Winter):1e. eCollection 2018 Winter. PMID: 29618961. PMCID: PMC5869442.

Trivedi G, Pham P, Chapman WW, Hwa R, Wiebe J, Hochheiser H. **NLPReViz: an interactive tool for natural language processing on clinical text.** J Am Med Inform Assoc. 2018 Jan 1;25(1):87-87. doi: 10.1093/jamia/ocx070. PMID: 29016825.

Xia Jiang, PhD

Rathnam C, Lee S, Jiang X. **An algorithm for direct causal learning of influences on patient outcomes.** Artif Intell Med. 2017 Jan;75:1-15. doi: 10.1016/j.artmed.2016.10.003. Epub 2016 Nov 5. PMID: 28363452.

Neapolitan RE, Jiang X. **Artificial Intelligence: With an Introduction to Machine Learning. 2nd ed.** Boca Raton, FL: Chapman and Hall/CRC, 2018.

Zeng Z, Jiang X, Li X, Wells A, Luo Y, Neapolitan RE. **Conjugated equine estrogen and medroxyprogesterone acetate are associated with decreased risk of breast cancer relative to bioidentical hormone therapy and controls.** PLoS One. 2018 May 16;13(5):e0197064. doi: 10.1371/journal.pone.0197064. eCollection 2018. PMID: 29768475.

Douglas Landsittel, PhD

Landsittel DP, Kessler L, Schmid CH, Marantz P, Suarez-Almazor ME. **Training in patient-centered outcomes research for specific researcher communities.** J Clin Transl Sci. 2017 Oct;1(5):278-284. doi: 10.1017/cts.2017.307. PMID: 29707248. PMCID: PMC5915813.

Taira DA, Shen C, King M, Landsittel D, Mays MH, Sentell T, Southerland J. **Access to medications for medicare enrollees related to race/ethnicity: Results from the 2013 Medicare Current Beneficiary Survey.** Res Social Adm Pharm. 2017 Nov;13(6):1208-1213. doi: 10.1016/j.sapharm.2016.10.021. Epub 2016 Nov 23. PMID: 27914950. PMCID: PMC5500432.

Taira DA, Seto BK, Davis JW, Seto TB, Landsittel D, Sumida WK. **Examining Factors Associated With Nonadherence And Identifying Providers Caring For Nonadherent Subgroups.** J Pharm Health Serv Res. 2017 Dec;8(4):247-253. doi: 10.1111/jphs.12193. Epub 2017 Aug 7. PMID: 29151900.

Yu ASL, Shen C, Landsittel DP, Harris PC, Torres VE, Mrug M, Bae KT, Grantham JJ, Rahbari-Oskoui FF, Flessner MF, Bennett WM, Chapman AB; Consortium for Radiologic Imaging Studies of Polycystic Kidney Disease (CRISP). **Baseline total kidney volume and the rate of kidney growth are associated with chronic kidney disease progression in Autosomal Dominant Polycystic Kidney Disease.** Kidney Int. 2018 Mar;93(3):691-699. pii: S0085-2538(17)30785-8. doi: 10.1016/j.kint.2017.09.027. Epub 2017 Dec 28. PMID: 29290310.

Shaikh N, Hoberman A, Hum SW, Alberty A, Muniz G, Kurs-Lasky M, Landsittel D, Shope T. **Development and Validation of a Calculator for Estimating the Probability of Urinary Tract Infection in Young Febrile Children.** JAMA Pediatr. 2018 Jun 1;172(6):550-556. doi: 10.1001/jamapediatrics.2018.0217. PMID: 29710324.

Petrov AA, Traister RS, Crespo MM, Silveira FP, Xie M, Coffey K, Ensor CR, Landsittel D, Pilewski JM. **A Prospective Observational Study of Hypogammaglobulinemia in the First Year After Lung Transplantation.** Transplant Direct. 2018 Jul 12;4(8):e372. doi: 10.1097/TXD.0000000000000811. eCollection 2018 Aug. PMID: 30255132.

Puttarajappa CM, Hariharan S, Humar A, Paliwal Y, Gao X, Cruz RJ, Ganoza AJ, **Landsittel D**, Bhattarai M, Sogawa H. **Outcomes of Adult Intestinal Transplant Recipients Requiring Dialysis and Renal Transplantation.** *Transplant Direct.* 2018 Jul 20;4(8):e377. doi: 10.1097/TXD.0000000000000815. eCollection 2018 Aug. PMID: 30255137.

Sonjian Lu, PhD

Yan G, Chen V, Lu X, **Lu S.** **A signal-based method for finding driver modules of breast cancer metastasis to the lung.** *Sci Rep.* 2017 Aug 30;7(1):10023. doi: 10.1038/s41598-017-09951-2. PMID: 28855549.

Huang T, Kim CK, Alvarez AA, Pangeni RP, Wan X, Song X, Shi T, Yang Y, Sastry N, Horbinski CM, **Lu S**, Stupp R, Kessler JA, Nishikawa R, Nakano I, Sulman EP, Lu X, James CD, Yin XM, Hu B, Cheng SY. **MST4 Phosphorylation of ATG4B Regulates Autophagic Activity, Tumorigenicity, and Radioresistance in Glioblastoma.** *Cancer Cell.* 2017 Dec 11;32(6):840-855.e8. doi: 10.1016/j.ccell.2017.11.005. PMID: 29232556.

Sadahiro H, Kang K, Gibson J, Minata M, Yu H, Shi J, Chhipa R, Chen Z, **Lu S**, Simoni Y, Furuta T, Sabit H, Zhang S, Bastola S, Yamaguchi S, Alsheikh H, Komarova S, Wang J, Kim S, Hambarzumyan D, Lu X, Newell E, Dasgupta B, Nakada M, Lee L, Nabors B, Norian L, Nakano I. **Activation of the receptor tyrosine kinase AXL mediates the immune microenvironment in glioblastoma.** *Cancer Res.* 2018 Jun 1;78(11):3002-3013. doi: 10.1158/0008-5472.CAN-17-2433. Epub 2018 Mar 12. PMID: 29531161.

Pangeni RP, Zhang Z, Alvarez AA, Wan X, Sastry N, **Lu S**, Shi T, Huang T, Lei CX, James CD, Kessler JA, Brennan CW, Nakano I, Lu X, Hu B, Zhang W, Cheng SY. **Genome-wide methylomic and transcriptomic analyses identify subtype-specific epigenetic signatures commonly dysregulated in glioma stem cells and glioblastoma.** *Epigenetics.* 2018 Jun 21. doi: 10.1080/15592294.2018.1469892. [Epub ahead of print]. PMID: 29927689.

Lu S, Fan X, Chen L, Lu X. **A novel method of using Deep Belief Networks and genetic perturbation data to search for yeast signaling pathways.** *PLoS One.* 2018 Sep 12;13(9):e0203871. doi: 10.1371/journal.pone.0203871. eCollection 2018. PMID: 30208101.

Xinghua Lu, MD, PhD, MS

Yan G, Chen V, **Lu X**, Lu S. **A signal-based method for finding driver modules of breast cancer metastasis to the lung.** *Sci Rep.* 2017 Aug 30;7(1):10023. doi: 10.1038/s41598-017-09951-2. PMID: 28855549.

Young JD, Cai C, **Lu X.** **Unsupervised deep learning reveals prognostically relevant subtypes of glioblastoma.** *BMC Bioinformatics.* 2017 Oct 3;18(Suppl 11):381. doi: 10.1186/s12859-017-1798-2. PMID:28984190. PMCID: PMC28984190.

Ding MQ, Chen L, Cooper GF, Young JD, **Lu X.** **Precision Oncology Beyond Targeted Therapy: Combining Omics Data with Machine Learning Matches the Majority of Cancer Cells to Effective Therapeutics.** *Mol Cancer Res.* 2017 Nov 13. pii: molcanres.0378.2017. doi: 10.1158/1541-7786.MCR-17-0378. Epub 2017 Nov 13. PMID: 29133589.

Huang T, Kim CK, Alvarez AA, Pangeni RP, Wan X, Song X, Shi T, Yang Y, Sastry N, Horbinski CM, Lu S, Stupp R, Kessler JA, Nishikawa R, Nakano I, Sulman EP, **Lu X**, James CD, Yin XM, Hu B, Cheng SY. **MST4 Phosphorylation of ATG4B Regulates Autophagic Activity, Tumorigenicity, and Radioresistance in Glioblastoma.** *Cancer Cell.* 2017 Dec 11;32(6):840-855.e8. doi: 10.1016/j.ccell.2017.11.005. PMID: 29232556.

Sadahiro H, Kang K, Gibson J, Minata M, Yu H, Shi J, Chhipa R, Chen Z, Lu S, Simoni Y, Furuta T, Sabit H, Zhang S, Bastola S, Yamaguchi S, Alsheikh H, Komarova S, Wang J, Kim S, Hambarzumyan D, **Lu X**, Newell E, Dasgupta B, Nakada M, Lee L, Nabors B, Norian L, Nakano I. **Activation of the receptor tyrosine kinase AXL mediates the immune microenvironment in glioblastoma.** *Cancer Res.* 2018 Jun 1;78(11):3002-3013. doi: 10.1158/0008-5472.CAN-17-2433. Epub 2018 Mar 12. PMID: 29531161.

Chen L, **Lu X.** **Making deep learning models transparent.** Invited editorial article. *Journal of Medical Artificial Intelligence.* 19 July 2018. doi: 10.21037/jmai.2018.07.01.

Chen L, **Lu X.** Discover functional impact of microRNAs in cancer using a causal deep learning model. *BMC Medical Genomics.* 2018.

Jin Q, Dhingra B, Cohen W, **Lu X.** **AttentionMeSH: Simple, Effective and Interpretable Automatic MeSH Indexer.** *Proceedings of Empirical Methods in Natural Language Processing.* 2018.

Pangeni RP, Zhang Z, Alvarez AA, Wan X, Sastry N, Lu S, Shi T, Huang T, Lei CX, James CD, Kessler JA, Brennan CW, Nakano I, Lu X, Hu B, Zhang W, Cheng SY. **Genome-wide methylomic and transcriptomic analyses identify subtype-specific epigenetic signatures commonly dysregulated in glioma stem cells and glioblastoma.** Epigenetics. 2018;13(4):432-448. doi: 10.1080/15592294.2018.1469892. Epub 2018 Aug 6. PMID: 29927689.

Lu S, Fan X, Chen L, Lu X. **A novel method of using Deep Belief Networks and genetic perturbation data to search for yeast signaling pathways.** PLoS One. 2018 Sep 12;13(9):e0203871. doi: 10.1371/journal.pone.0203871. eCollection 2018. PMID: 30208101.

Yalini Senathirajah, PhD

Robbins R, **Senathirajah Y**, Williams NJ, Hutchinson C, Rapoport DM, Allegrante JP, Cohall A, Rogers A, Ogedegbe O, Jean-Louis G. **Developing a Tailored Website for Promoting Awareness about Obstructive Sleep Apnea (OSA) Among Blacks in Community-Based Settings.** Health Commun. 2018 Jan 17:1-9. doi: 10.1080/10410236.2018.1423865. [Epub ahead of print]. PMID: 29338353.

Shyam Visweswaran, MD, PhD

Tenenbaum JD, Bhuvaneshwar K, Gagliardi JP, Fultz Hollis K, Jia P, Ma L, Nagarajan R, Rakesh G, Subbian V, **Visweswaran S**, Zhao Z, Rozenblit L. **Translational bioinformatics in mental health: open access data sources and computational biomarker discovery.** Brief Bioinform. 2017 Nov 27. doi: 10.1093/bib/bbx157. [Epub ahead of print]. PMID: 29186302.

Tajgardoon M, Wagner MM, **Visweswaran S**, Zimmerman RK. **A Novel Representation of Vaccine Efficacy Trial Datasets for Use in Computer Simulation of Vaccination Policy.** AMIA Jt Summits Transl Sci Proc. 2018 May 18;2017:389-398. eCollection 2018. PMID: 29888097. PMCID: PMC5961808.

Michael M. Wagner, MD, PhD

Aronis JM, Millett NE, **Wagner MM**, Tsui F, Ye Y, Ferraro JP, Haug PJ, Gesteland PH, Cooper GF. **A Bayesian system to detect and characterize overlapping outbreaks.** J Biomed Inform. 2017 Sep;73:171-181. doi: 10.1016/j.jbi.2017.08.003. Epub 2017 Aug 7. PMID: 28797710.

Tsui F, Ye Y, Ruiz V, Cooper GF, **Wagner MM**. **Automated influenza case detection for public health surveillance and clinical diagnosis using dynamic influenza prevalence method.** J Public Health (Oxf). 2017 Oct 20:1-8. doi: 10.1093/pubmed/fox141. [Epub ahead of print]. PMID: 29059331.

Tajgardoon M, **Wagner MM**, Visweswaran S, Zimmerman RK. **A Novel Representation of Vaccine Efficacy Trial Datasets for Use in Computer Simulation of Vaccination Policy.** AMIA Jt Summits Transl Sci Proc. 2018 May 18;2017:389-398. eCollection 2018. PMID: 29888097. PMCID: PMC5961808.

Erik S. Wright, PhD, MS

Murali A, Bhargava A, **Wright ES**. **IDTAXA: a novel approach for accurate taxonomic classification of microbiome sequences.** Microbiome. 2018 Aug 9;6(1):140. doi: 10.1186/s40168-018-0521-5. PMID: 30092815.

Department of Biomedical Informatics, University of Pittsburgh School of Medicine

Michael J. Becich, MD, PhD, Chairman

Newsletter Team: Noreen Doloughty, Melissa Schwenk, Robert Cecchetti,

Barbara Karnbauer, Maria Bond

5607 Baum Boulevard, Suite 500, Pittsburgh, PA 15206

Phone: 412-624-5100

Fax: 412-624-5310

dbmiweb@pitt.edu

www.dbmi.pitt.edu

