

Boston Medical Center/ Boston University School of Medicine

# Department of Medicine Newsletter

## Message from the Chairman

Colleagues,

Welcome to the Department of Medicine's electronic newsletter. A special welcome as well to our new residents, fellows, and faculty!!!

This edition of our newsletter highlights a remarkable series of achievements and awards to our faculty and trainees. Drs. Felson, Center, Walley, Perls, Farwell, Mostoslavsky and Spira each received highly prestigious awards from their respective professional organizations. These awards highlight their important impact on their fields and generous support of other faculty. We also celebrate the receipt of pilot awards and teaching awards to individuals in the department. The faculty and residents just distributed a series of awards to outstanding graduating residents and fellows in a number of categories. Each of these awards is described in detail. The achievements of our faculty and trainees continuously serve our profession and our patients, and also bring great recognition to them and our department. We are very fortunate to work among such extraordinary colleagues.

The new Single Cell Sequencing Core based in the Section of Computational Biomedicine and led by Drs. Evan Johnson and Joshua Campbell will be a valuable resource for our scientific community. Drs. Johnson and Campbell describe in the newsletter how the core will enable detection of genomic changes at the single cell level in abnormal tissues. The core will be very helpful to our investigators in a number of fields, especially including cancer, autoimmune disease, and in chronic inflammatory conditions.

I hope you enjoy this edition of the departmental newsletter and join in celebrating the many achievements of our faculty and trainees!

David Coleman, M.D.



## BU Rheumatologist Receives International Award

This year's Carol Nachman Prize for Rheumatology was awarded to **David T. Felson, MD, PhD**, professor of medicine and epidemiology at Boston University's Schools of Medicine and Public Health (BUSM, BUSPH). The Prize is the most prestigious international award for research in rheumatology—the study of arthritis and other disorders of the joints, muscles and ligaments. Since 1972, the award recognizes outstanding research and innovation achievements, aimed at promoting clinical, therapeutic and experimental research in the field.

Felson's research interests include understanding how to prevent and treat osteoarthritis (OA)—also known as degenerative joint disease or “wear and tear” arthritis. He is studying whether treatments for rheumatic diseases are effective and particularly in osteoarthritis, identifying risk factors for disease, testing treatments and characterizing MRI features of normal knees and knees with pain. He also studies outcome measurement (tests that objectively determine a patients' baseline function at the beginning of treatment) in rheumatic disease and has focused in this work on rheumatoid arthritis trials.

Felson led a series of major studies to identify prevalence, impact and risk factors for knee osteoarthritis (OA). In the Framingham Osteoarthritis Study, his group first documented that obesity increased the risk of OA and that weight loss could lessen that risk. The first to introduce magnetic resonance imaging in large scale studies, his group discovered that meniscal tears and other structural pathology were present in most middle-age and older persons regardless of knee pain. He inaugurated the study of structural correlates of joint pain, identifying for the first time that in OA, synovitis and bone marrow lesions cause pain and these structural findings have now emerged as targets of treatment. Recent work from his group suggests that chronic alterations in the nervous system that enhance pain sensitivity affect most patients with OA pain.

## BU Rheumatologist Receives International Award

Working with the FDA and rheumatology organizations, he also led the effort to standardize clinical trial outcome measurement in rheumatoid arthritis, creating the first core set of outcomes and coming up with the American College of Rheumatology definition of improvement (ACR20). This outcome standardization made it possible for the first time to gauge the relative efficacy of new drugs such as TNF inhibitors.

The recipient of numerous awards, Felson was the first non-basic scientist recipient of the Kunkel Young Investigator Award from the American College of Rheumatology, and from this same organization, he received its inaugural Clinical Research Award.



Felson graduated from Harvard College and received his MD from Johns Hopkins University. After a residency in internal medicine at Case Western Reserve, he trained in rheumatology at Boston University where he also received his MPH in epidemiology. He joined the BU faculty in 1984, became a professor in 1994 and was appointed Chair of Clinical Epidemiology in 2001. He is the Director of Training and Education for the Boston University Clinical Translational Science Institute and the Director of Clinical Epidemiology at Boston Medical Center.

## CReM Stem Cell Researcher, Gustavo Mostoslavsky, Is Innovator of the Year



Those who know ancient history—the first decade of the 21st century—recall that embryonic stem cell research was a combustible issue, with supporters cheering the potential to create new tissues from stem cells and opponents decrying the destruction of human embryos that it required. A breakthrough arrived in 2006, when a Japanese researcher developed induced pluripotent stem cells (iPS), adult cells that behaved like embryonic stem cells and had an amazing ability to develop into muscles, skin, nerves, and almost any other cell type. Two years later, a second breakthrough, this one by **Gustavo Mostoslavsky**, a School of Medicine associate professor of gastroenterology, produced a tool that made it simpler and more efficient to generate iPS. BU patented his tool, called STEMCCA, and he says that it's been adopted by more than 700 laboratories worldwide for making iPS.

That contribution to the field has earned Mostoslavsky this year's University Innovator of the Year award. The Technology Development office presents the award to a faculty member whose research yields inventions or innovations benefiting society. Mostoslavsky will receive award at BU's annual Tech, Drugs, and Rock 'n' Roll networking event connecting BU researchers and Boston entrepreneurs.

One way Mostoslavsky has helped others succeed—the way that makes him most proud, he says—is to have cofounded, in 2010, BU's Center for Regenerative Medicine, which he codirects. The center, which pursues stem cell research with an emphasis on lung, blood, and gastrointestinal tract diseases, practices open source biology: sharing its discoveries with scientists around the world for free rather than patenting them. In 2013, CReM moved into its own physical quarters on Albany Street on the Medical Campus.

*Please join us in congratulating Dr. Mostoslavsky!*

## **Congratulations To All Award Recipients!**

### **Alexander Walley, MD, MSc**

Alexander Walley is the 2017 winner of the W. Anderson Spickard, Jr. Excellence in Mentorship Award. This award is given to an individual who has provided outstanding mentorship to junior faculty and/or trainees, resulting in the faculty members' or trainees' increased scholastic productivity and career advancement in substance use education or research

### **David M. Center, MD**

David M. Center, MD, was honored with the Breathing for Life Award at the Ninth Annual ATS Foundation Research Program Benefit Saturday evening, May 20. Dr. Center is the Gordon and Ruth Snider Professor of Pulmonary Medicine and associate provost for translational research at Boston University, where he has served as chief of pulmonary medicine for 30 years.

The Breathing for Life Award is the highest honor awarded by the Foundation for philanthropy, scientific achievement, and commitment to mentorship

<https://www.youtube.com/watch?v=lnOKq8wjy0>  
<https://www.youtube.com/watch?v=lnOKq8wjy0>

## **Congratulations To All Award Recipients!**

### **Alan P. Farwell, MD**

The online, patient education related publication that Alan developed and serves as editor-in-chief for the American Thyroid Association, *Clinical Thyroidology for the Public*, was recognized with an Outstanding Achievement Award by the Interactive Media Association with an overall score of 466

The Outstanding Achievement award is the second highest honor bestowed by IMA and an extremely challenging award to win

### **Joseph P. Mizgerd, ScD**

Has received an Outstanding Investigator Award from the National Heart, Lung and Blood Institute (NHLBI) at the National Institutes of Health (NIH). He will use this seven-year, \$5.9 million grant to study the biology of pneumonia

### **Recent NIH Awards:**

**Allan J. Walkey, MD, MSc**, received an R01

For project information, click [HERE](#)

**Lee J. Quinton, PhD**, received an R01

For project information, click [HERE](#)

**Jay Mizgerd, ScD, Thomas Kepler, PhD, & Rachel Fearn, PhD**, received an R61

For project information, click [HERE](#)

## **Congratulations To All Award Recipients!**

### **Avi Spira, MD, MSc**

Avrum Spira, MD, MSc, professor of medicine, pathology and bioinformatics at BUSM, is the inaugural recipient of the Research Innovation and Translation Achievement Award from the American Thoracic Society (ATS).

Spira, who also directs the BU-BMC Cancer Center, was recognized for the translational impact his work has had on early detection of lung cancer as well as his development of new drugs for chronic obstructive pulmonary disease (COPD).

After completing his pulmonary and critical care medicine fellowship and receiving a master's degree in bioinformatics at BU, Spira characterized the first human airway transcriptome (a collection of all the gene activity in a cell) to determine the reversible and permanent genomic changes that occur in the airway with smoking. Following the hypothesis that smoking creates a molecular 'field of injury' throughout the airway of patients with lung cancer and COPD, he used bronchoscopic brushings of the large airways to identify an RNA biomarker that can detect the presence of lung cancer deep within the lung, in a test now used clinically called Percepta®. Hypothesizing that the field of injury extends to the entire upper respiratory tract, his lab has recently developed a gene expression signature in nasal brushings that may serve as a noninvasive biomarker for diagnosing lung cancer in lesions found on chest imaging.

"Avrum Spira is a visionary in lung genomics," said David Center, MD, associate provost of Translational Research at BUSM. "He is a gifted computational mathematician, educator and active intensivist who has brought science to the clinic and inspired dozens of trainees. There are few whose discoveries have made a greater direct impact on diagnosis and daily care of patients with lung cancer and COPD in the past 20 years."

## **Congratulations To All Award Recipients!**

### **Thomas Perl , MD, MPH, FACP**

The Gerontological Society of America (GSA), the world's oldest and largest interdisciplinary organization devoted to research, education, and practice in the field of aging, awarded Thomas Perl Fellow status through the Health Sciences Section

GSA fellowship — the highest class of membership — is an acknowledgment of your outstanding and continuing work in the field of gerontology

Dr. Tom Perls attained fellowship in both the American Geriatrics Society and the Gerontological Society of America

### **Sarah Kimball, MD**

Received a \$10,000 seed grant to fund the next year of the Citizenship and Immigration Rights Navigator program, BU's AmeriCorps legal services navigator



## **Congratulations To All Award Recipients!**

**Dr. Ilona Kopits** just successfully completed a highly competitive year-long American Geriatrics Society Tideswell Leadership Fellowship and **Dr. Megan Young** has been selected to participate in this upcoming year

### **Honghuang Lin, PhD**

Received a grant from BU main campus (jointed supported by the Institute for Health System Innovation and Policy and the Hariri Institute for Computing and Computational Science & Engineering). The grant aims to develop databases and novel machine learning methods to analyze electronic health data mainly collected from Hong Kong. Rhoda Au is a co-investigator

### **Dr. Tuhina Neogi 's Arthritis Foundation**

Dr. Tuhina Neogi and her research team are using new methods to look at how the long-term effects of using bisphosphonates may be related to the progression of knee osteoarthritis (OA). Dr. Neogi's 2-year Arthritis Foundation-funded project, "Bisphosphonate Effects in Knee Osteoarthritis," is looking at the relationship of bisphosphonate treatment and the structural changes in the knee associated with OA progression. To do this, Dr. Neogi and her team are looking at how knee joint space width, three-dimensional (3D) bone shape, and bone marrow lesions change in OA patients over time.

<http://blog.arthritis.org/news/arthritis-research-tuhina-neogi/>

**The Department of Medicine congratulates the 2017  
Spring Pilot Award Recipients**

**Finn Hawkins, MBBCh**

Assistant Professor

School of Medicine – Pulmonary – CreM

**Steven Borkan, MD**

Associate Professor

School of Medicine – Nephrology

**Shayna Sarosiek, MD**

Assistant Professor

School of Medicine – Hematology & Medical Oncology

**Lucia De Fatima Er Plant, PhD**

Research Associate Professor

School of Medicine – Endocrinology, Diabetes & Nutrition

**Honghuang Lin, PhD**

Assistant Professor

School of Medicine – Computational Biomedicine

**Marc Laroche, MD, MPH**

Assistant Professor

School of Medicine – General Internal Medicine

**William Evan Johnson, PhD**

Associate Professor

School of Medicine – Computational Biomedicine

**Pablo Buitron De La Vega, MD, MSc**

Assistant Professor

School of Medicine – General Internal Medicine

## Excellence in Teaching and Senior Awards 2017

Knight Steel Award

*Debora Afezolli*

Ariel Weismann Teaching Award

*Hugo Carmona*

Patient Advocacy Award – Catherine

*Meaghan Roche*

Humanism Award

*Marianne Bauer*

Citizenship/Morale Award

*David Condon and Raagini Jawa*

Fellow Teaching Award

*Anas Sarhan*

Subspecialty Award

*Eric Awtry*

Community Based

*Daniel Simpson*

Bob Witzburg Award

*Peter Smith*

Hospital Based (Joel Caslowitz Award)

*Frank Schembri*

Research Mentor Award – Ashish/Marios

*Frederic Ruberg*

## EXCELLENCE IN TEACHING AWARD

### Top 10 BMC Faculty of 2017

*Sabrina Assoumou*

*Eric Awtry*

*Christine Campbell-Reardon*

*Ryan Chippendale*

*Jean Francis*

*James Hudspeth*

*Michael Jeong*

*Gene Kwan*

*Robert Lowe*

*Arthur Theodore*

## SENIOR RESIDENTS ACADEMIC DAY AWARD WINNERS

Senior Talk Award

*Theodoros Karantanos*

SRAD – Oral Presentation Award

*Christopher Schmickl*

SRAD – Research Award

*Zachary Lipkin-Moore*

SRAD – Quality Improvement/Education Award

*Marianne Bauer*

Intern Excellence in Teaching Award

*Herman Carneiro*

Junior Excellence in Teaching Award

*Max Brock and Rena Zheng*

## Hemant Roy Named Franz J. Ingelfinger, MD, Professor in Gastroenterology

We are pleased to announce **Hemant Roy, MD**, will be named the first Franz J. Ingelfinger, MD, Professor in Gastroenterology at an installation ceremony at 3 p.m. Thursday, July 20, in the Wilkins Board Room. The professorship, established by the Evans Medical Foundation in 2016, recognizes the enduring impact of Dr. Ingelfinger (1910-1980) on the field of gastroenterology and the Department of Medicine at Boston University School of Medicine (BUSM).

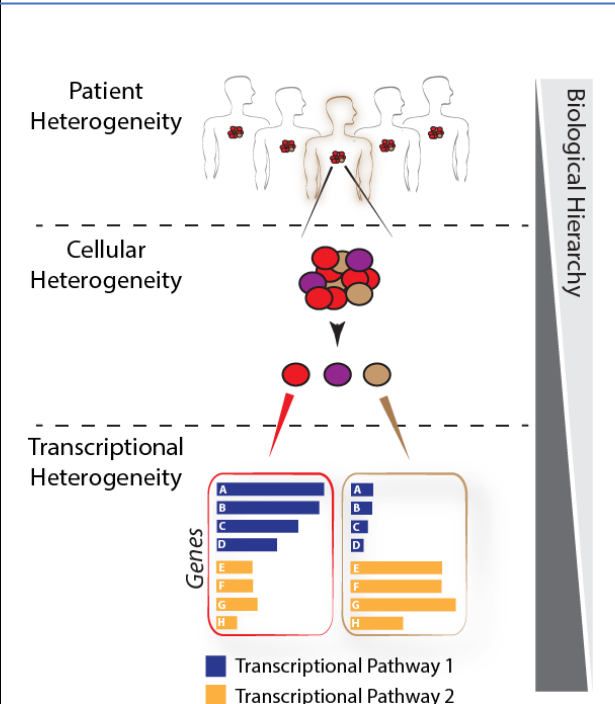
Dr. Roy joined our community in 2013 as professor of medicine and chief of the Section of Gastroenterology at Boston Medical Center and BUSM. Prior to his arrival at BMC/BUSM, he was Duckworth Professor of Cancer Research, Director of Research and Vice Chair of Northshore University Health System and Clinical Associate Professor of Medicine at the University of Chicago Pritzker School of Medicine. He received his undergraduate degree from Vanderbilt University, summa cum laude, in molecular biology, and his MD with distinction from Northwestern University Medical School. He completed his clinical training in internal medicine at Beth Israel Deaconess Medical Center and a gastroenterology fellowship at University of Chicago.

A physician-scientist, Dr. Roy's research interests focus on GI cancer risk stratification via detection of field carcinogenesis focusing on developing and implementing novel imaging technologies. He has more than 10 patents to aid in the commercialization of these fundamental advances. A recognized expert in cancer biomarkers, Dr. Roy is a recipient of numerous NIH grants for colon, pancreas, lung and prostate cancer, has more than 100 publications and serves on the NIH Cancer Biomarker Study Section. His clinical interests surround colon cancer syndromes and the role of gender in colorectal cancer screening.

Installation Ceremony will take place: Thursday, July 20th at 3pm in the Wilkins Board Room

## Summer Spotlight: The New Single Cell Sequencing Core

A major goal of research at BUMC is to understand the molecular underpinnings of disease and developmental processes. Over the past 15 years, many different “omic” technologies have been created that allow researchers to globally measure molecular features of biological and clinical samples. One of the first technologies was the gene-expression microarray, which could measure the expression levels for all protein-coding genes within a sample simultaneously. More recently,



One way in which we try to understand complex biological systems is by organizing them into hierarchies. For example, individual organisms can be thought of as being composed of complex tissues; each complex tissue is composed of different cell types with distinct functions; each cell type contains a unique mixture of transcriptional pathways; and each transcriptional pathway is composed of distinct group of genes that work together to accomplish a particular molecular process. Single-cell RNA-seq allows us to obtain gene expression levels for each cell in a sample. We can then computationally identify each transcriptional pathway, cluster cells into distinct groups, and examine how different groups of cells are associated with development or disease.

DNA and RNA sequencing-based approaches have been developed that can identify all genetic variants or RNA transcripts within a sample in an unbiased fashion. While new technologies are being rapidly developed, not every technology will be transformative. Now more than ever, much consideration is needed to discern which new technologies offer truly revolutionary advancements and should be aggressively implemented versus those that only offer incremental improvements over previous assays.

One such novel and likely transformative technology is **single-cell RNA sequencing**. Previous RNA-seq assays would take a “bulk” biological sample (like a tumor or tissue specimen) that is composed of many different cell types and “grind up” all cells together before measuring gene expression levels. Thus, each gene expression measurement was an average over all cells within a sample. However, the cell is the basic building block of life and losing the information about individual cell populations within a sample greatly reduces the ability to understand the cellular and molecular processes that are at play. In contrast, single-cell RNA sequencing quantifies gene expression levels within each individual cell and therefore profiles the molecular state of each individual building block within a sample. To use an analogy from Aviv Regev of the Broad Institute who is leading the Human Cell Atlas project, standard bulk RNA-seq is like a fruit smoothie: “The colour and taste hint at what is in it, but a single blueberry, or even a dozen, can be easily masked by a carton of strawberries ... By contrast, single-cell-resolved data is like a fruit salad ... You can distinguish your blueberries from your blackberries from your raspberries from your pineapples and so on” (News Feature, *Nature*, 2017).

## Summer Spotlight: The New Single Cell Sequencing Core

Of course, the focus on individual cells and the characterization of distinct cellular populations is not new for many fields. Immunology, for example, has prominently utilized methods such as flow cytometry to identify different types of immune cells and characterize their roles in the body's normal defense or in disease. To perform fluorescence-activated cell sorting (FACS), cells must be stained with fluorescent dyes or antibodies. Often, the major limiting factor to isolate and study different cell types from different samples is finding cell-surface proteins that can be appropriately stained. Additionally, only a handful of markers can be simultaneously measured on each cell. Single-cell RNA-seq can circumvent these limitations by quantifying the expression of thousands of genes within a cell without the need to select predetermined markers. Each cell's gene expression profile can reveal what type of cell it is and what it is doing in the sample. In fact, FACS and single-cell RNA-seq can be used together to gain complementary proteomic and transcriptomic views of each cell's molecular characteristics. Single cell RNA-seq studies have already begun to elucidate novel immune cell types (Villani et al, *Science*, 2017) and characterize the immune tumor microenvironment in melanoma (Tirosh et al, *Science*, 2016). At BUMC, Darrell Kotton's groups in the Center for Regenerative Medicine (CRoM) used single-cell RNA-seq identify a novel cell surface marker on primordial human lung progenitors (Hawkins et al, *JCI*, 2017).

To facilitate single cell research at BUMC, the DOM has initiated the development of a Single Cell core, which will provide services and assays to researchers seeking to characterize cellular heterogeneity in complex biological samples. The core will be directed by Dr. Yuriy Alekseyev, who is also the director of the BUMC Microarray and Sequencing Core, and co-directed by Drs. Evan Johnson and Joshua Campbell in the section of Computational Biomedicine. Overall, there are four major steps to a single cell RNA-sequencing experiment, all of which will be streamlined by the core to greatly reduce the amount of work for each investigator:



Yuriy Alekseyev, PhD  
Director



Evan Johnson, PhD  
Co-director



Josh Campbell, PhD  
Co-director



## Summer Spotlight: The New Single Cell Sequencing Core

**1.) Sample dissociation.** Complex tissue needs to undergo dissociation using a combination of mechanical and enzymatic digestion to efficiently release individual cells in solution. This procedure needs to occur immediately after the sample has been isolated as the cell's molecular profiles will begin to change after being removed from their native environment. By having this core available at BUMC, the time between sample acquisition and single cell processing will be dramatically reduced, thus resulting in higher quality data. Every type of sample is different and protocols will likely need to be optimized for each individual project. The core will provide a research scientist to work with individual investigators to optimize and apply protocols to their samples.

**2.) Cell isolation, sorting, and biobanking.** Cells in solution can be isolated by flow cytometry after staining for surface or intracellular markers via fluorescence-activated cell sorting (FACS), or cells can be processed by commercial microfluidics devices:

**FACS.** After staining with fluorescent dyes or antibodies, investigators can utilize the cell sorting instruments at the BUMC Flow Cytometry Core (led by Drs. Jennifer Snyder-Cappione and Anna Belkina) to isolate single cells and deposit them into 96-well plates. Cells can then be frozen and stored for profiling at a later date. This method is the most useful approach for studies that require biobanking because the initial processing of cells is relatively inexpensive, cells can be stored for long periods of time, and selected subsets of samples can later be profiled once clinical outcome information has been obtained.

**Microfluidics.** Commercial microfluidic devices will take cells in solution, perform cell isolation, and prepare libraries for each individual cell automatically. These devices include the Fluidigm C1 and Fluidigm Polaris (hosted by the CReM), the 10x Genomics Chromium (hosted by the Single Cell core), and the Illumina/BioRad ddSeq (hosted by Tarik Haydar). The advantage of microfluidic systems is that they generate sequencing-ready libraries from cells in solution with very little “hands-on” time. Therefore, they are more suited for profiling of experimental systems and for rapid precision medicine applications.

**3.) Library preparation and sequencing.** Final libraries will be prepared by a technician in the Single Cell core and sequenced in the Microarray and Sequencing core.

**4.) Data analysis and interpretation.** The added complexity of single cell data introduces several challenges in the analysis. Single cell RNA-seq data is extremely complex as each sample will now have thousands of cells, each of which has expression levels for thousands of genes. This type of data is also noisy due to the challenges inherent in amplifying small amounts of RNA and other technical challenges. The Single Cell core will have a dedicated data analyst to aid researchers without a computational background in quality control and cell type identification.

Overall, the goal of this core is to spur research in molecular medicine at BUMC by allowing investigators to gain more detailed insights into the cellular heterogeneity in complex clinical and experimental samples.



**EVANS DEPARTMENT OF MEDICINE RESEARCH DAYS**

October 12 – 13, 2017

**We are pleased to announce the 2017 Wilkins and Ingelfinger Visiting Professors**



*Wilkins Visiting Professor*

**Dr. Nancy J. Cox, PhD**

Mary Phillips Edmonds Gray Chair

Professor of Medicine

Vanderbilt University Medical Center



*Ingelfinger Visiting Professor*

**Dr. Katrina Armstrong, MD**

Physician-in-Chief

Massachusetts General Hospital

Harvard Medical School

## EVANS DEPARTMENT OF MEDICINE RESEARCH DAYS

October 12 – 13, 2017

### Schedule of Events:

#### **Thursday, October 12, 2017**

Research Poster Session \*

9:00 – 12 noon, Hiebert  
Lounge

Wilkins Visiting Professor Lecture

3:30 pm, Keefer  
Auditorium

Evans Days Gala - 2017 Awards Dinner

6:00 pm, Colonnade Hotel

#### **Friday, October 13, 2017**

Ingelfinger Visiting Professor – GRAND Rounds

12:00 noon, Keefer  
Auditorium

*\*Abstracts may be submitted Tuesday, August 1, 2017 and will not be accepted after Friday, September 1, 2017*

## DOM Happenings

### Boston March for Science

[BUMC Community Spreads Message of Inclusivity at Boston March for Science](#)



BU graduate student **Alicia Wooten** participated prominently in the March for Science in Boston. See Video [HERE](#).

### BU Hosts AIM Northeast Regional Conference

We hosted the AIM (Administrators of Internal Medicine) Northeast Regional Conference at BU on Friday, June 2nd. 25 administrators from 8 academic Institutions attended the inaugural event. Dr. Coleman and Dr. Zeidel spoke at the conference about the challenges and roles of administrators. It was a great networking event to share administrative experiences and expertise.

## DOM Happenings

### BUMC Residency Program Alumni Committee

The newly formed BUMC Residency Program Alumni Committee held its first networking event on May 26. Attendees included members of the class of 2003, 2004, 2014 and 2015. The committee is now gearing up for a family friendly summer event on 7/23 at Franklin Park. The goal of the committee is to enhance alumni relations and eventually offer a number of resources including an annual newsletter, regular networking events, and strong social media presence (check us out on LinkedIn), among many other initiatives. If you are a BUMC alum and interested in getting involved, we would love to hear from you! To RSVP for the BBQ on 7/23 or to find out more ways in which you can contribute, please contact Vanessa Duguerre ([vanessa.duguerre@bmc.org](mailto:vanessa.duguerre@bmc.org)) and/or Laurie Dubois ([laurie.dubois@bmc.org](mailto:laurie.dubois@bmc.org)).

