MUSC
MEDICAL UNIVERSITY of SOUTH CAROLINA

THE PATHWAY

March 2018 Volume 9 Issue 1

MUSC Public Radio interview on

Pathology Reports/Cancer Testing

broadcast statewide

the week of February 20, 2018

on SC Public Radio's *Health Focus* series

Bobbi Conner, producer/host for the *Health Focus* public radio series, talks with **Dr. David Lewin** about the role that pathology tests play in cancer diagnosis and in determining treatment. Dr. Lewin is a Professor of Pathology and Laboratory Medicine and Director of Gastrointestinal Pathology at MUSC.

Click the link below for the complete weekly series:

http://southcarolinapublicradio.org/programs/health-focus

Click the link below for Dr. David Lewin's interview:

http://southcarolinapublicradio.org/post/pathology-reports-cancer-diagnosis

Steven L. Carroll, M.D., Ph.D., FASCP, FCAP

Inside this issue:

This newsletter is made possible from the generous contributions of MUSC's Pathology and Laboratory Medicine Faculty and Staff. The success of this publication is dependent upon this support.
Thank you for your interest, time and information. For inquiries, suggestions or submission information please contact Linda McCarson (mccarsli@musc.edu) or Lori Roten (roten@musc.edu).

Welcome!

New Hires

FACULTY

Eric Hamlett, Ph.D. arrived as a Research Assistant Professor on March 19, 2018

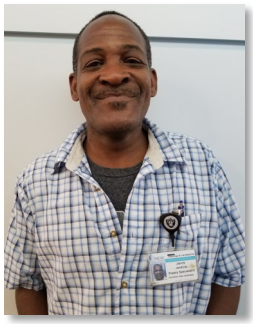
DEPARTURES:

- **Ruosha Lai** (Postdoc Scholar) left Dr. Sha's Lab on 1/24/18
- **Clint Infinger** (Administrative Coordinator II in the Business Office) retired on 2/28/18
- **Carla Parker** (Program Assistant in the Brain Bank) left on 3/16/18

CONGRATULATIONS!!

Nicholas Batalis, M.D.
Promoted to Professor
Effective 1/1/18

Cynthia Schandl, M.D., Ph.D.
Promoted to Professor
Effective 1/1/18



JARVIS JENKINS

Supply Specialist II

Nomination: Thanks

Other Nominees:

Teresa Ankersen, Raymond Edwards, Karen Geroulis, Brent Grimball, Beth Hansell, Dolly Hope, Kennedy, Teresa, Marla Lockhart, LaQuantes Mack, Maxine Robinson, Margaret Romano, Lori Roten, Nancy Smythe and Ashley Wooldridge

Support the 2018 YES Campaign

Find a college, department or program to support
MUSC fund designation list (PDF)

Access my Employee ID number
1. Locate the nine-digit number at the bottom of your ID badge
2. Or log into My Records and select "My Personal Information"

MUSC Physicians employees are eligible for a dollar-for-dollar match on gifts between the amounts of $250 and $500. The match will have a cap of $70,000. This includes outright gifts through check, credit card or payroll deduction through MUSC Physicians. Call 792-1973 for more information.

Click the link below to get more information:
http://academicdepartments.musc.edu/giving/yes/

Certificates given to

Ginny Davis and Maxine Robinson

for 5 years of giving support to the

MUSC Yearly Employee Support Campaign

CONGRATULATIONS!

To: Dr. Rachel Jester and Family

Louella Clay Smith

February 28, 2018

6 lbs., 13 oz.

18.75 inches

To: Lori Roten and Family

Harlyn McKynlee Quallen

January 31, 2018

6 lbs., 9 oz.

19½ inches

College of Medicine Faculty Excellence Awards Ceremony

The College of Medicine's Faculty Excellence Awards Ceremony, sponsored by the COM Student Council, was held on April 4, 2018, to celebrate our faculty who were nominated by our student body and honored for their commitment to medical education.

COM 1: In Top 10 Nominees

- **Debra Hazen-Martin, Ph.D.**, Professor and Associate Dean for Curriculum in the Basic Sciences, Pathology and Laboratory Medicine

COM 2: In Top 10 Nominees

- **Jerry E. Squires, M.D., Ph.D**., Professor, Pathology and Laboratory Medicine
- **Nicholas I. Batalis, M.D.,** Professor, Pathology and Laboratory Medicine
- **Sally E. Self, M.D.,** Professor and Associate Dean for Student Progress
- **Steven Carroll, M.D., Ph.D., FASCP, FCAP**, Professor and Chair, Pathology and Laboratory Medicine
- **Evelyn Bruner, M.D.,** Assistant Professor, Pathology and Laboratory Medicine
- **Angie Duong, M.D.,** Assistant Professor, Pathology and Laboratory Medicine
- **Susan E. Presnell, M.D.,** Professor, Pathology and Laboratory Medicine

GRADUATE STUDIES UPDATE

February 21st 2018

Student Update

Ralph Tanios (Dr. Carroll) is Mr. MUSC!!
MS defense dates
- Clare Burton (Dr. Findlay) March 28th @ 8am BSB502
- Jaime Randise (Dr. Turner) April 5th @9am BSB502
- Narges Anbardar (Dr. Turner) April 9th @10am BSB355

PhD student LaShardai Brown (Dr. Lang) successfully defended her PhD thesis
PhD Proposal Dates
- Lauren McLean (Dr. Smits) successfully passed her proposal
- Ralph Tanios and Kenyaria Noble
  - submission of written materials by April 15th
  - proposal by June 1st or fail semester

PhD defense dates for Spring 2018
- Ryan Kelly (Dr. LaRue) March 19th @ 2pm in BSB502
- Alexandria Rutkovsky (Dr. Ethier) - TBA
- Ericka Smith (Dr. Ethier) - TBA

Council News

Next PhD interview weekend is March 8th
- Dr. Lang, Dr. Mehrotra and Dr. LaRue

New elective courses
- Monetary incentive to Faculty lab for development of a new course
- Administrative support from the CGS to pass through curriculum committee

Qualifying exam Summer 2018
- 3 students to take the qualifying exam
  - Laurel Black (Dr. Carroll)
  - Shannon Weber (Dr. Carroll)
  - Bradley Krisanits (Dr. Turner)

RESEARCH DIVISION UPDATE

Statistics for the Division of Research from **January through March**. **Fourteen grant proposals** were submitted requesting **$3,885,994** in total first year costs. Also, during this period **five grants were awarded** totaling **$187,725**. Congratulations and many thanks to everyone involved in obtaining these awards.

Bradley Schulte, Ph.D., Vice Chair of Research

GRANT APPLICATIONS SUBMITTED - 1/1/2018 - 3/31/2018			
Principal Investigator	**Proposed Start Date**	**Title**	**Total 1st YR Dollars**
Spyropoulos, Demetri	1/26/2018	Genomic & Phenotypic Determinants of Endocrine Disruptor Susceptibility Using Advanced Animal Models	$250,000
Fan, Hongkuan	2/2/2018	The Role of Pericytes in the Vascular Dysfunction of Sepsis	$373,750
Carroll, Steven	2/5/2018	Therapeutic Targeting of Receptor Tyrosine Kinase Hierarchies in Schwann Cell Neoplasms	$439,518
Mehrotra, Meenal	2/5/2018	Novel Role of hematopoietic-derived cells from PDL in periodontal regeneration	$369,154
Singh, Avtar	2/5/2018	Development of nitric oxide-based rehabilitation for spinal cord injury	$451,197
Smits, Bart	2/5/2018	Allelic series of rat mutations to model susceptibility to estrogen receptor-positive (ER+) breast cancer	$371,155
Findlay, Victoria	3/1/2018	Examination of Insufficient Milk Supply and the Role of miR-204	$75,000
Spyropoulos, Demetri	3/5/2018	Impact of the Emerging Obesogen DOSS on Breast Milk Composition and Infant Obesity	$491,233
Singh, Avtar - IPA	3/9/2018	Mechanisms of Neuroprotective Therapy in TBI	$71,888
Olar, Adriana	3/14/2018	Genetic Drivers of Meningioma Recurrence	$600,000
Wang, Gavin	3/15/2018	Mitigation of Hematopoietic Radiation Injury by a Combinatorial Approach	$299,000
Turner, David	3/26/2018	The Role of Advanced Glycation End-Products in Breast Cancer Prognosis	$21,374
Litwin, Christine	4/1/2018	Reproducibility Study for the InBios International Zika virus-specific Immuoglobulin M-ELISA antibody test	$13,675
Lazarchick, John	4/2/2018	Safety and Efficacy of turoctocog alfa pegol (N8-GP) in Prophylaxis and Treatment of Bleeds in Previously N8-GP Treated patients with Severe Haemophilia A	$59,050
Total Proposals	**14**		**$3,885,994**

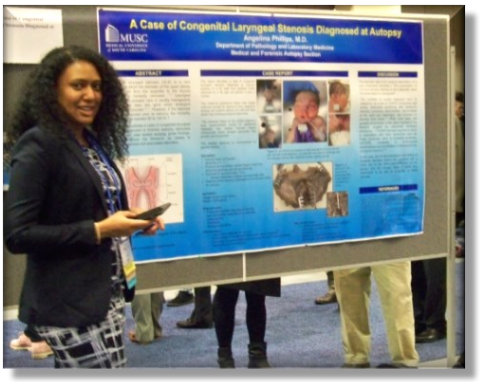
GRANTS AWARDED - 1/1/2018 - 3/31/2018			
Wang, Gavin	4/1/2018	HCC Core Mass Cytometer Pilot Grant	$5,000
Olar, Adriana	2/1/2018	CGM Pilot Study	$50,000
Litwin, Christine	4/1/2018	Reproducibility Study for the InBios International Zika virus-specific Immuoglobulin M-ELISA antibody test	$13,675
Lazarchick, John	4/2/2018	Safety and Efficacy of turoctocog alfa pegol (N8-GP) in Prophylaxis and Treatment of Bleeds in Previously N8-GP Treated patients with Severe Haemophilia A	$59,050
Krisanits, Bradley	7/1/2018	HCC Graduate Fellowship	$60,000
Totals Awarded	**5**		**$187,725**

FACULTY FOCUS

Angelina Phillips, M.D.

I have worked at MUSC in the Department of Pathology and Laboratory Medicine for almost three years, one as a fellow in forensic pathology and currently as faculty in the Medical and Forensic autopsy Division. Prior to this, I completed my undergraduate education in anthropology at New York University, graduate education in Human Nutrition at Columbia University and earned my medical degree at SUNY Upstate Medical University in Syracuse NY before completing residency in anatomic and clinical pathology at Baystate Medical Center in Springfield, MA. Each year the autopsy division has performed over 900 autopsies covering a wide breadth of cause and manner of death; with this comes many opportunities to be involved in public health discussions, the education of learners at every level of medical training and national forensic conferences. Autopsy pathology is a fascinating field of work requiring the knowledge of all my years of medical education as well as the all the skills I gained during residency and fellowship.

Many of my most notable cases are in the pediatric age range and highlight not only the benefit of autopsy services but the contribution of pathologists to patient care and management. Medical autopsy of perinatal fetal demise of unknown etiology in a young mother who had suffered multiple prior pregnancy losses helped to uncover a previously undiagnosed case of glycogen storage disease type 4. Glycogen storage disease type 4 is a rare disorder which unless suspected is not screened for prenatally; this disorder in certain circumstances can present as intrauterine fetal demise and so called "floppy baby" syndrome at delivery. This mother now has a diagnosis which may explain her obstetric history and allow for future management for successful pregnancy. In another case, a 6 month old male infant presented after sudden death in his crib with only a history of respiratory congestion and questionable poor sleep conditions; the autopsy revealed an acute asthma related death. Acute asthma in an undiagnosed 6 month old was an urgent and timely answer for a struggling family because this infant was one of twins where the surviving sibling was experiencing similar respiratory symptoms; our work ensured early treatment for the other child. Most recently I represented our department at the AAFS 2018 (American Academy of Forensic Sciences) Conference in Seattle, WA, where I presented a poster on a case of congenital laryngeal stenosis diagnosed at autopsy. Other cases that have been put into poster presentations include "the use of unmanned aerial vehicles (UVAs) for documenting the forensic scene and body retrieval in a case of mid-air collision between aircraft" and "a rare snake bite related fatality".



In addition to the multiple daily interesting cases which I enjoy sharing with residents and students; medical education and continuing medical education is integrated into my work. Working with the 3rd and 4th year medical students in their elective/selective rotations in autopsy pathology is one way to give them a better understanding of the benefits of autopsy as future clinicians and encourage interdepartmental interaction for the benefit of our continuing education and patient care; the opportunity to encourage others into the field of pathology is also exciting. In recent months, I have been assessing the 1st and 2nd year College of Medicine nutrition curriculum with the goal of creating an interesting and useful nutrition experience. Many medical schools continue to struggle to integrate appropriate nutrition discussions and baseline knowledge into their curriculums with an average of only 19 hours of dedicated time for nutrition education during the non-clinical and clinical years. The National Academy of Sciences has determined from a survey of nutrition educators that the amount of nutrition education that medical students receive is inadequate. MUSC provides up to 25 hours of nutrition course work during the first two years which is the minimum recommended; the challenge is in making the best use of these hours and preparing our students for not only their clerkships but also their future clinical practices.

Overall, the field of pathology and the subspecialty of autopsy pathology is ideally suited to my personality and professional goals. The study of an understanding of disease, its diagnosis and the determination of the cause of death is endlessly fascinating to me and as a pathologist I have involvement in medical education at varying levels allowing me to teach, to encourage and impart my passion for medicine to learners and students I meet.

Reducing Blood Culture Contamination: a novel initial specimen diversion device (ISDD) promises better blood cultures and better patient care

by Lisa Steed, Ph.D.

It is always difficult for clinicians to know what to do with a single positive blood culture for coagulase negative staphylococci and other common skin or environmental contaminants. True pathogen or contaminant (aka false positive)? Treat or don't treat? The problem magnifies when one considers that about 30 million blood cultures are obtained annually across the USA and false positive blood cultures (FPBC) comprise up to half of all positive cultures. According to a 2009 study (1), FPBC lead to incorrect clinical interpretation that cost $8720 apiece due to additional blood cultures and other lab tests; inappropriate/unnecessary antibiotics; unnecessary radiology tests; increased likelihood of antibiotic-associated diarrhea; and increased length of stay.

Why are blood cultures so frequently contaminated? Even with appropriate skin antisepsis, up to 20% of skin flora remains viable on the surface of the skin and deep within hair follicles in the keratin layer of the skin. Skin plugs are often produced during insertion of the needle during venipuncture. These plugs will always enter the blood culture bottle, carrying their resident flora with them. Preventing a skin plug from entering a blood culture bottle would minimize numbers of FPBCs.

A variety of devices have been used that could divert, sequester and isolate the initial few mL of blood that would contain the skin plug and its contaminating flora, then allow collection of the blood culture specimen that is hypothetically contamination-free. The simplest example is filling a simple blood drawing tube drawn before blood culture bottles then discarding it. A more elaborate commercial version of this is the Clean Collect® blood culture system (Stone Medical Corp., Davenport, IA). The Kurin Lock™ (Kurin®, Inc., San Diego, CA) initial specimen diversion device (ISDD) and the SteriPath® ISDD (Magnolia Medical Technologies, Seattle, WA) divert 0.15 ml and 1.5-2.0 ml of blood, respectively, and have an independent second sterile pathway through which the blood flows into the bottles.

FPBC rates can be especially high in emergency departments (EDs). Rapid staff turnover, limited staff to handle high patient volumes, critically ill patients, and multiple distractions may impact FPBC rates. At MUSC, the adult ED collects an average of 4,000 blood cultures per year (range 3,125–4,673 for FY2015–FY2018 to date), more than any other single patient care unit.

The University of Nebraska performed a single center, prospective, controlled, open label trial of the SteriPath® ISDD (1). Use of this ISDD by phlebotomists in the adult ED and trauma center resulted in a significant decrease in their already low FPBC rate from 1.78% to 0.22% without affecting the detection of true bacteremia. Using a conservative estimate of $4850 per FPBC and not counting the device's cost, $1.8 million in additional cost could have been avoided if the ISDD was used hospital-wide. Impressively, 97% of positive cultures drawn with the ISDD represented true positives in comparison to 81% of positive cultures drawn without the device.

Beginning in November, 2015, MUSC's adult ED has incorporated the SteriPath® ISDD into their workflow. Efforts to reduce FPBC in the ED began in FY2009 when FPBC rates were above 7%. A traditional program of multidisciplinary education and semi-real-time feedback was instituted that reduced FPBC from 7.1% in FY2009 to 4.0% in FY2012 (see Figure 1). FPBC rates climbed slowly to 4.6% by FY2015. In November, 2015, Stephanie Michael, an ED nurse, spearheaded trial of the SteriPath® ISDD in hopes that further reductions could be gained.

Continued . . .

Methods

Nurses dedicated to the Adult ED were trained by ISDD company trainers for one month on how to use the device. This was accompanied by renewed training on the institutional blood culture collection policy. Some Adult ED nurses were also trained to be trainers for new ED staff. Nurses temporarily assigned to the Adult ED and other non-RN personnel assigned to the ED were not trained to use the ISDD, providing an ongoing internal control. In addition to our usual role of performing microbiology testing on blood cultures, Diagnostic Microbiology assisted in the very labor intensive manual data collection and analysis.

Once trained, ED nurses performed BC collections, using their best judgment as to whether to use the ISDD with given patients. Because some patients were uncooperative or "difficult to stick," the average compliance rate for ISDD use in our ED has averaged 68% over the 28 months it's been used (range 52-81%).

FPBC rates for ISDD-obtained blood cultures were compared with rates for non-ISDD-obtained blood cultures. Device usage cost-effectiveness was calculated using $4,850 as additional cost per FPBC per hospitalized patient (2).

Results

SteriPath® ISDD implementation began in November 2015 with Stephanie Michael and continues to be led by Noula Cumins. The FPBC rate dropped precipitously and stayed below 1% each month for the rest of FY2016, with an average FPBC rate of 0.57%. For FY2017, the average FPBC rate with the ISDD was 0.91%, a nearly four-fold reduction from the non-ISDD rate (3.45%) during the same time period. Thus far for FY2018, average FPBC rate with the ISDD was 1.01%, still a nearly four-fold reduction from the non-ISDD rate (3.92%).

Approximately 70% of blood cultures drawn in the adult ED over the 28-month time period were drawn with the ISDD. Due to the greatly reduced FPBC rates for ISDD-drawn cultures, the FPBC rate for all cultures drawn in the ED was within the range of the inpatient units for FY2017 and FY2018 to date (2%).

Use of the SteriPath® ISDD expanded to the Chest Pain Center (CPC) in April, 2016. The FPBC rate did not change significantly for the three months of FY2016. However, for FY2017 and FY2018 to date, the average FPBC rate with the ISDD was 0.75% and 0.70%, respectively, also a nearly four-fold reduction from the non-ISDD rates (2.81% and 3.3%, respectively). The average compliance rate for ISDD use in the CPC has been 52% over the 23 months of use (range 36-69%).

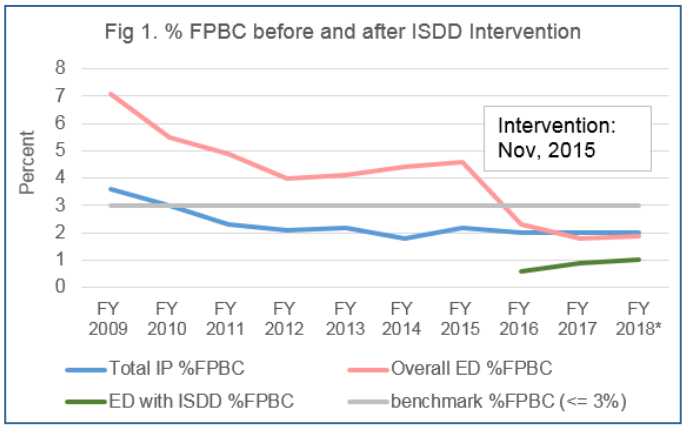
Conclusions and Implications

SteriPath® ISDD use decreased FPBCs to approximately 1% in a busy adult ED and a Chest Pain Center, well below the national benchmark of 3%, and the reduction in FPBC has been sustained for 23-28 months. Reducing FPBCs has led to reduced related costs and more efficient use of staff time, while helping to comply with national/international efforts to improve antibiotic stewardship and patient safety. Nurses reported the ISDD was easy to use once "hand memory" developed.

However, an ISDD should augment, not replace, routinely used techniques to limit FPBC rates including patient and blood culture bottle disinfection, ongoing training on aseptic technique, and feedback on FPBC rates.

Using Rupp's conservative cost estimate for avoided FPBCs and not taking into account the cost of the device, a 1% decrease in the FPBC rate hospital-wide would avoid approximately $1 million per year in additional costs.

While technological advances such as multiplex PCR assays can identify coagulase negative staph as soon as a blood culture is positive so that inappropriate antibiotic use and other costs can be reduced, wouldn't it be even more cost-effective to avoid the false positive blood culture in the first place?



References:

1. Gander et al., J Clin Microbiol, 2009, 47:1021-4.
2. Rupp, et al. Clin Infect Dis., 2017, 65:201-5

UPCOMING MEETINGS

Pathology Spring Symposium

East Beach Conference Center

Kiawah Island

April 17-21, 2018

Experimental Biology Annual Meeting

San Diego, CA

April 21-25, 2018

Association for Pathology Chairs

Coronado, CA

July 16-19, 2018

American Society for Clinical Pathology

Baltimore, MD

October 3-5, 2018

MUSC Department *of* Pathology & Laboratory Medicine Mission Statement:

To serve patients, health care providers, research scientists, scholars, and society by providing excellence and innovation in diagnostic services and educational resources in a respectful, professional and culturally diverse atmosphere.

Vision:

To become a preeminent leader in academic anatomic and clinical pathology while translating basic science discovery to improved clinical care.

www.musc.edu/pathology