

## CLINICAL AND HEALTH AFFAIRS

### 2016 American College of Physicians-Minnesota Poster Competition Winners

The American College of Physicians encourages its state chapters to invite medical students, and internal medicine residents to take part in a scientific poster competition. Residents and students submitted posters for consideration at the Minnesota chapter's annual meeting at the Minneapolis Convention Center on Oct. 28, 2016. One hundred fifty-five abstracts were submitted for competition. Each of the internal medicine training programs (University of Minnesota, Abbott Northwestern, Mayo Clinic, and the Hennepin County Medical Center) were well-represented with submissions in the clinical vignette, quality improvement, research, and medical student categories. Additionally, abstracts were received from medical students and residency programs in Illinois and Wisconsin.

Posters were judged by practicing internal medicine physicians, internists from the state's academic medical centers, chief residents, and peers from each category. "Poster Rounds," were conducted for the peer judging process. Criteria used by judges included clinical relevance, originality, written and visual presentation. Special thanks to Andrew Olson, MD for coordinating the resident and student abstract competition.

The Minnesota chapter provided a travel stipend to the winners in presenting their posters at the 2017 American College of Physicians annual meeting in San Diego, CA . Congratulations to all of the participants on their excellent work. The next competition will be held on Oct. 27, 2017 at the Minneapolis Convention Center. For information, contact [Minnesota.ACP@gmail.com](mailto:Minnesota.ACP@gmail.com)

### Medical Student Research/QI

Winners of the Clinical Vignette, Quality Improvement/Research and Medical Student poster competitions were awarded a \$200 prize and travel scholarship to attend the national ACP meeting in San Diego, CA in Spring 2017 representing Minnesota to compete nationally. Finalists in each category were recognized at the annual meeting and presented with a prize. Winners will have their abstract published in a statewide publication in early 2017. A list of all abstracts submitted is electronically published at [https://www.acponline.org/about\\_acp/chapters/mn/news\\_meet.htm](https://www.acponline.org/about_acp/chapters/mn/news_meet.htm)

### Medical Student Winners

#### **Clinical Vignette- Medical Student winner**

**Frédérique St-Pierre**, *"Psychic Moans: An Unusual Presentation of Hypercalcemia from Multiple Myeloma"* (Mayo)

#### **Medical Student Research and Quality Improvement Winner**

**Lauren Ward**, *"Analysis of the intracellular niche of a phagosomal pathogen in the context of Salmonella enterica infection in mice"* (U of M)

Medical Student Research/QI Finalists:

- **Charlene Gaw**, *"Exploring primary care physicians' readiness for clinical integration of evidence-based health promotion programs in communities"*, (Mayo)
- **Kristin Larson**, *"Increasing Primary Care Physicians' Understanding of Agent Orange Exposure and Type 2 Diabetes Mellitus in Vietnam Veterans"*, (U of M)

## Residents

### **Internal Medicine Resident Research / Quality Improvement Winner -**

**Anthony Prisco, MD**, *“Impact of LVAD Implantation Site on Ventricular Blood Stagnation”* (U of M)  
Resident Research/QI Finalist: **David Flood, MD**, *“Use of control charts to assess for longitudinal diabetes panel improvement: A quality report from a resource-limited setting”*, (U of M)

### **Internal Medicine Resident Clinical Vignette Winner**

**Jonna Maas, MD**, *“HIT in the absence of heparin?”* (U of M)

**Clinical Vignette Finalists:** **Sravya Vinnakota, MD**, *“Linear IgA Bullous Dermatitis: A Rare Manifestation of Vancomycin Hypersensitivity”*, (Mayo); **Breanna Zarmbinski, MD**, *“When Slow Flow Needs Fast Action: A Case of Hyperviscosity Syndrome and Waldenstrom Macroglobulinemia”*, (ANW); **Jordan Gunn, MD**, *“Takotsubo, An Annual Recurrence”* (Mayo); **Guilherme Piovezani Ramos, MD**, *“Binge Correction”*, (Mayo) ; Second Round Resident Vignette Advancement – Mohammad Bashir MD, Justin Brandler MD, Daniel Childs MD, Stephen Groves MD, Justin Grunwald MD, Alexandra Higgins MD, Isabel Hujoel MD, Dam Idossa MD, Daniel Johnsrud MD, Kacia Lee MD, Caroline Lochungvu MD, Melissa Myers MD, Salma Patel MD, Michael Richter MD, Tsi Chung Sang MD, Michelle Schmutge MD, Brooke Settergren MD, and Xin Zhang MD.

## Abstracts:

### **Clinical Vignette- Medical Student winner**

**Frédérique St-Pierre**, (Mayo)

#### ***Psychic Moans: An Unusual Presentation of Hypercalcemia from Multiple Myeloma***

Hallucinations are defined as the perception of an object or event in the absence of an external stimulus. Although visual hallucinations are commonly associated with psychiatric disease, the differential diagnosis is in fact quite broad. It is important for physicians to maintain an adequate level of suspicion for serious and sometimes life-threatening underlying conditions.

A previously healthy 65 year-old woman presented to the hospital with a five-day history of nausea and fatigue. She also had a recent history of visual hallucinations occurring sporadically throughout the day, each lasting for a few minutes. These hallucinations were distressing to her, and consisted of cursive writing on the walls. She had no apparent delusions, agitation, or disorganized speech. Past psychiatric history was negative. Her physical exam was unremarkable; she was fully alert, attentive and oriented. Laboratory investigations were significant for hypercalcemia with a total calcium of 14.1 mg/dL, acute kidney injury with a serum creatinine of 2.5 mg/dL, and normocytic anemia with a hemoglobin of 11.5 g/dL. She was treated with IV fluids and furosemide, and her visual hallucinations completely resolved within three days. Her calcium normalized quickly, but her creatinine remained elevated despite fluid administration. Further investigations revealed suppression of parathyroid hormone at 10 pg/mL, as well as elevated serum and urine protein with a serum IgG lambda M-spike of 1.4 g/dL. Renal biopsy showed evidence of cast nephropathy. Bone survey revealed no lytic lesions but did show scattered osteopenia. A bone marrow biopsy was performed and confirmed a diagnosis of an IgG lambda multiple myeloma. Psychosomatic manifestations of multiple myeloma, unrelated to hypercalcemia, have been described in the literature on a few occasions. Some case reports have documented mood disturbances such as depression or mania, and a study has reported four cases presenting with delirium. Isolated visual hallucinations, however, have rarely been described. A recent case report has documented a patient presenting with visual hallucinations three months prior to having overt symptoms of the malignancy. Potential causes for hallucinations in multiple myeloma include hypercalcemia, renal failure and infections. It has also been hypothesized that increased cytokine levels may be contributory. In this vignette, the clinical evolution suggests hypercalcemia as the most likely culprit. Visual hallucinations in patient with hypercalcemia have in fact been described, and are best underscored in the classic “painful bones, renal stones, abdominal groans, and psychic moans” of primary hyperparathyroidism. This case highlights the importance of keeping an elevated level of clinical suspicion for malignant causes of visual

hallucinations, as these may be the first presenting symptom of cancer-associated hypercalcemia. Timely diagnosis and initiation of effective therapy directed at the underlying cause are essential in optimizing patient outcome and in reversing disturbing and anxiety-inducing symptoms of visual hallucinations.

### **Medical Student Research and Quality Improvement Winner**

**Lauren Ward, (U of M)**

#### ***Analysis of the intracellular niche of a phagosomal pathogen in the context of Salmonella enterica infection in mice***

Salmonella enterica (Se) is an intracellular pathogen that persists within phagosomes of host antigen presenting cells. Se infection stimulates a strong CD4+ T cell response that activates microbicidal mechanisms within the infected phagocyte. Despite robust immune pressure Se persists in the mesenteric lymph nodes (MLNs) throughout the lifetime of the host. We hypothesize that during Se infection, bacteria reside within mononuclear phagocytes in the MLN that localize to areas rich in circulatory and lymphatic vessels. In order to identify infected cells, a reporter strain of Se serovar Typhimurium SL1344 was developed that expresses the red fluorescent protein dTomato in the Salmonella chromosome behind the endogenous PhoN gene (Se-dTomato). 129x1/svJ mice were inoculated intragastrically with a solution containing 108 CFU of either Se-WT or Se-dTomato and were analyzed at D14 and D30 after infection. Single cell suspensions from MLNs of Se-WT and Se-dTomato infected mice were stained with fluorescent antibodies against myeloid cell markers, including CD11b, Siglec F, Ly6G, CD64, CD11c, and MHCII, and were analyzed by flow cytometry. Sections of fixed/frozen MLN from Se-WT and Se-dTomato infected mice were stained with antibodies against a variety of cellular and anatomical markers, including B220, CD11c, CD169, CXCL9, CXCL10, LYVE-1, F4/80, Siglec F, Ly6G, and iNOS. Images were acquired on an epifluorescent microscope.

Results: Flow cytometry analysis revealed that 77% of Se-dTomato infected cells stained positive for the canonical monocyte/macrophage marker CD64 with the remainder found predominantly in Ly6G+ neutrophils. Further in situ experiments confirmed our flow cytometry-based findings about the identity of infected cell types. Myeloid markers frequently overlapped with Se-dTomato, further demonstrating the active infection of these cells, particularly macrophages, in vivo. We reproducibly found Se-bacteria within or near CD169+ macrophages in the subcapsular sinus and in close proximity to B-cell follicles. Se bacteria also overlapped with cells expressing inducible nitric oxide synthase (iNOS), a marker for an active Th1 response.

Conclusion: Our Se-dTomato strain was successfully used to identify and track infected cells in mice, and were predominantly found in monocytes and macrophages, localized near the subcapsular sinus of the MLN and towards the periphery of B-cell follicles, following intragastric infection of resistant mice. Se-dTomato was also seen within positive staining for an active Th1 response, consistent with infection control.

### **Internal Medicine Resident Research / Quality Improvement Winner -**

**Anthony Prisco, MD, (U of M)**

#### ***Impact of LVAD Implantation Site on Ventricular Blood Stagnation***

Treatment of end-stage heart failure includes cardiac transplantation or ventricular assist device (VAD) therapy. While increasingly prevalent, VAD therapy has many complications, including thrombosis. Studies have demonstrated that VAD implantation disrupts intra-cardiac blood flow, creating areas of stagnation that predispose thrombus formation, referred to as "hot spots." Two surgical configurations exist for VAD implantation: through the apical or diaphragmatic surfaces of the heart. We hypothesized that diaphragmatic implantation causes more stagnation than apical implantation. We also hypothesized that intermittent opening of the aortic valve reduces stagnation of blood inside the ventricle when compared to a closed aortic valve. To test these hypotheses, a human left-ventricle geometry was re-created in silico and a VAD inflow cannula was virtually implanted in each configuration. A computational indicator-dilution study was conducted where "virtually-dyed blood" was washed out of the ventricle by injecting blood with no dye. Simulations demonstrated a substantial reduction in stagnation when the aortic valve opened intermittently vs permanently closed. In addition, virtual dye was cleared slightly faster in the apical configuration vs the diaphragmatic configuration. Our simulations demonstrate the clinical importance of configuring the VAD to allow intermittent opening of the aortic valve to prevent subvalvular stagnation, and also suggests that apical implantation might be more hemodynamically favorable than diaphragmatic implantation. Rather than drawing direct clinical conclusions, the results from this study should be used as an impetus to help design further computational, in-vivo, and clinical studies that will ultimately help further improve VAD therapy.