



June 2012  
Issue #119

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Hematology: A McFarlane,  
K Moffat

### Editorial Office:

Dr Cheryl Main, Editor  
Email: mainc@hhsc.ca  
Michelina Bozzo, Editorial Assistant  
Email: bozzom@hhsc.ca

## The ABC's of Galactomannan Testing:

### Aspergillus spp.

*Aspergillus* spp. are hyaline, saprophytic molds that are capable of causing opportunistic fungal infections in immunocompromised hosts. They are rapidly growing usually within 3-5 days, demonstrating clear, translucent hyphae with (septate) constrictions.



*Aspergillus* spp. are widely distributed in nature; they are found in soil, on decaying vegetation, and in a wide variety of organic matter. The most commonly encountered species found in clinical laboratories are: *A. fumigatus*, *A. flavus*, *A. niger*, and *A. terreus*. The majority of serious infections are caused by *A. fumigatus* (1).

### What is Invasive Aspergillosis?

EORTC - MSG (European Organization for Research and Treatment of Cancer - Mycoses Study Group) defines Invasive Aspergillosis (IA) as a rapidly progressive, often fatal infection that occurs in patients who are severely immunosuppressed, including those who are profoundly neutropenic, those who have received bone marrow or solid organ transplants, and patients with advanced AIDS or chronic granulomatous disease. This infectious process is characterized by invasion of blood vessels, resulting in multifocal infiltrates, which are often wedge-shaped, pleural-based, and cavitory. Dissemination to other organs, particularly the central nervous system, may occur. The transmission of fungal spores to the human host is via inhalation.

Human host defense against the inhaled spores begins with the mucous layer and the ciliary action in the respiratory tract. Macrophages and neutrophils encompass, engulf, and eradicate the fungus. However, many species of *Aspergillus* produce toxic metabolites that inhibit macrophage and neutrophil phagocytosis. Corticosteroids also impair macrophage and neutrophil function. Underlying immunosuppression (clinical and pharmacologic) also contributes directly to neutrophil dysfunction or decreased numbers of neutrophils. In individuals who are immunosuppressed, vascular invasion is much more common and may lead to infarction, hemorrhage, and necrosis of lung tissue.

Invasive Aspergillosis can be difficult to diagnose clinically as the findings on clinical imaging may be non-specific and the results of routine cultures for *Aspergillus* are of poor yield.

LAB CONNECTIONS

**Your feedback, suggestions and new ideas are welcomed. Submit to the Editorial Office:**

Dr. Cheryl Main, Editor, Email: mainc@hhsc.ca; Michelina Bozzo, Editorial Assistant, Email: bozzom@hhsc.ca

### What is Galactomannan?

Galactomannan is an exo-antigen (polysaccharide fungal cell wall component) released from *Aspergillus* hyphae during tissue invasion (3). Detection of circulating galactomannan in the course of progressive disease in serum and bronchoalveolar lavage can be achieved by ELISA (enzyme-linked immunosorbent assay) that is currently available at HRLMP using a validated commercial kit (4).

### Clinical Implications

Galactomannan testing represents a major advance in the treatment of patients at risk for IA, particularly those with hematological malignancies in the setting of profound neutropenia and/or hematopoietic stem cell transplantation (2), solid organ transplants, AIDS, and pulmonary diseases (5).

Early diagnosis and therapy has shown to improve outcomes, however reaching a definitive diagnosis quickly can be problematic (2). Correlation of galactomannan test results with other clinical data, including radiological findings, greatly improves the clinician's ability to diagnose IA.

Galactomannan antigen testing for serum and bronchoalveolar lavage (BAL) specimens has been available in Microbiology since May 14, 2012.

### References:

1. Murray *et al.* *Manual of Clinical Microbiology* 2007. 9<sup>th</sup> ed., vol. 1, ASM Press, Washington, DC.
2. Hsu *et al.* Galactomannan testing of BAL is useful for diagnosis of invasive pulmonary aspergillosis in hematology patients. *BMC Infectious Disease* 2010; 10:44
3. Wouter *et al.* Galactomannan in BAL fluid, *Am J Respir Crit Care Med* 2008; 177:27-34
4. Kwak *et al.* Efficacy of Galactomannan Antigen in the Platelia *Aspergillus* Enzyme Immunoassay for Diagnosis of Invasive Aspergillosis in Liver Transplant Recipients, *Journal of Clinical Microbiology* Jan. 2004, p. 435-438
5. Patterson *et al.* Invasive aspergillosis. Disease spectrum, treatment practices, and outcomes. *13 Aspergillus Study Group. Medicine* 2000; 79(4):250-60



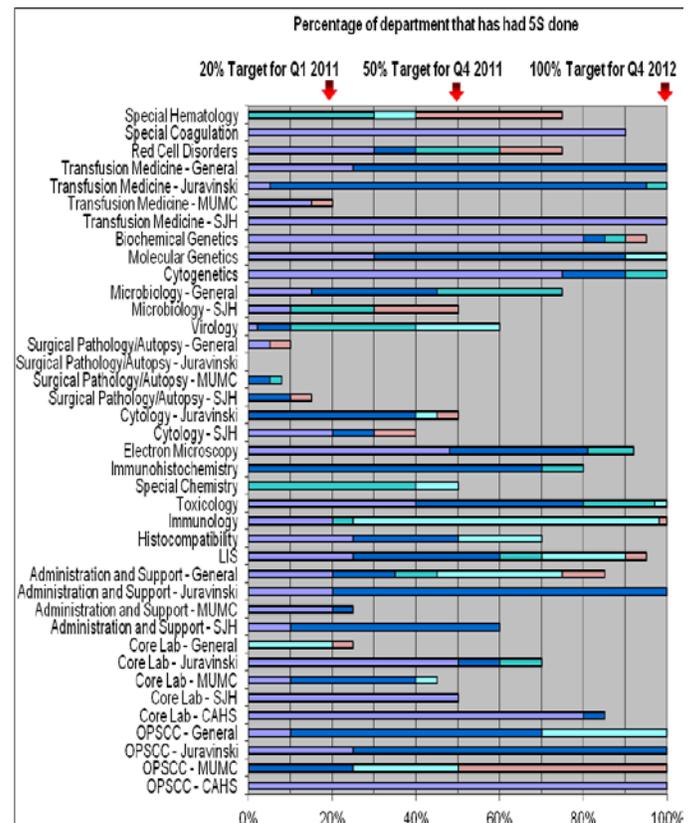
**Michael J. McConnell**  
BSc., BEd., MMedSc. (c), MLT  
Technical Specialist - Microbiology

## 5S in the HRLMP

(Sort, Straighten, Shine, Standardize, Sustain)

We began our 5S journey in the HRLMP two years ago. We identified champions in each department who would be responsible for performing 5S, training others within their departments, and conducting quarterly audits. The champion training consisted of a lecture on what 5S is, how it can help with space and time issues in a department, and how to perform it. After the lecture, a hands-on experience actually performing the 5S helped to enforce this education.

5S is a Lean tool that can be used by anyone to organize a work or personal space. It starts like spring cleaning, but the big difference is the standardize and sustain steps. This is what enables us to keep it clean and organized so we don't have it falling back into a mess as the year wears on. Each champion conducts a quarterly audit with a partner so that we can track our progress and ensure we are maintaining the gains we have achieved so far.





## Education News

The Laboratory Medicine Residency Training programs are proud to announce the success of our residents at the Royal College this year. Congratulations to:

### Anatomical Pathology:

Lori Edwards  
Ashwyn Rajagopalan

### General Pathology

Hetal Talati

### Medical Biochemistry

Abir Nawara

### Medical Microbiology

Jocelyn Srigley

**Congratulations** to Medical Biochemistry Resident, **Dr. John L. Sievenpiper** on having 5 publications and a CIHR Knowledge Synthesis grant application!

Ann Intern Med 2012; 156(4): 291-304

Nature 2012; 482: 470

Hypertension 2012 Feb 13 [Epub ahead of print]

Br J Nutr 2012 Feb 21 [Epub ahead of print]

Diabetes Res Clin Pract 2012 Feb 18 [Epub ahead of print]

**Clinical Chemistry** is pleased to announce that **Kristin Hauff** and **Kika Veljkovic** are completing their training this month and both have been offered positions with Life Labs. Their certification exams will take place this November.

**Kika Veljkovic** won a Canadian Society of Clinical Chemists travel award to attend the meeting in Quebec this month.

**Kristin Hauff, Angela Rutledge, Li Wang, Maged Mansour and John Sievenpiper** all won OSCC travel awards this year.

Welcome to **Saranya Kittanakom** who will be starting as a Clinical Biochemistry fellow in July.

The **General Pathology Program** is pleased to announce that Kitchener Waterloo is now officially recognized as a community elective rotation. They are hopeful that Niagara Health and Brantford will join the list of recognized elective sites.

General Pathology organized a Hematopathology seminar series by **Dr. Adnan Mansoor** on May 14 and 15. The event was well attended.

The Medical Microbiology program is pleased to announce that **Jocelyn Srigley** has been awarded an AMMI fellowship for next year. Jocelyn will be completing this fellowship in Toronto.

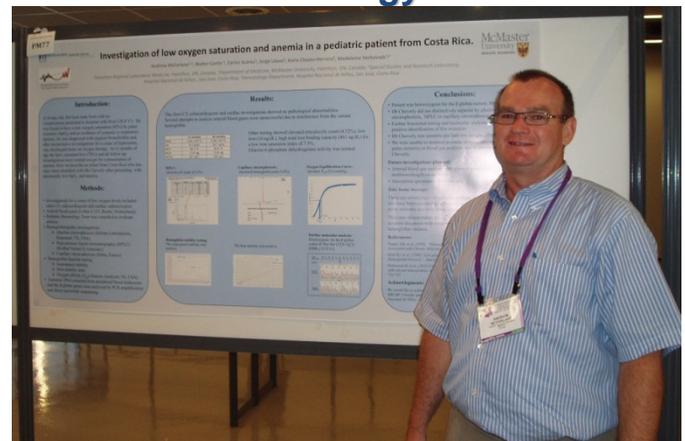
The 2012 Laboratory Medicine Resident Research Day was a great success again this year! Congratulations to all of the residents who won awards and a big "thank you" to **Laura McCarthy** and **Laura Diskin** for all of their work in organizing it.

For information and the latest news on our residency training programs follow the link: <http://fhs.mcmaster.ca/pathres/news/index.html>

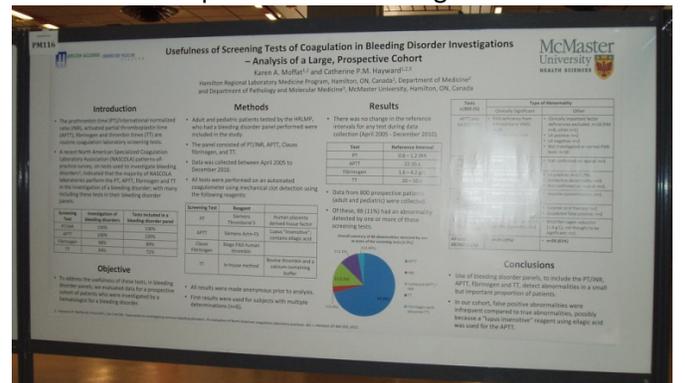
Information on the postdoctoral fellowship:

<http://fhs.mcmaster.ca/pathology/education/postdoctoralfellowshiptraining.html>

## News from Hematology



The HRLMP was well represented at the recent XXVth **International Symposium on Technological Innovations in Laboratory Hematology** held May 21 - 24, 2012 in Nice, France. Special Hematology submitted 5 abstracts and all were accepted for presentation - 4 as posters and 1 as an oral presentation. Congratulations!!



## News from Microbiology

Have you ever struggled with “which tube” to use when collecting blood for laboratory testing? Then check out our new educational tool <http://www.ltig.hrlmp.ca/>

### Staffing changes within Transfusion Medicine, Special Hematology and Genetics:

- Sandra Fazari will assume a temporary role as acting manager of Transfusion Medicine.
- 2 temporary positions are being posted  
Supervisor – Molecular  
Supervisor – Special Hematology
- Teresa DiFrancesco will assume management responsibilities for Molecular Genetics/ Cytogenetics while maintaining responsibility for Special Hematology



## Celebrating Successes

The HRLMP is proud to announce that we had a very successful OLA Peer Assessment in April with a pending 4 year accreditation status and ISO accreditation. This success is the result of hard work across the HRLMP by all staff. Specific recognition goes to Cathie McCallum and Tom Dorland for their leadership and to all members of the Quality Teams.

On April 3, 2012, the HRLMP Microbiology Lab at the General Hospital encountered a challenge of epic proportions. Due to an emergency in the Grand River Hospital Microbiology Lab, our lab took on their work at

a moment's notice. This included all acute care Microbiology work from Cambridge Memorial, St. Mary's and Grand River Hospitals and amounted to approx. 128 additional samples per day. Receiving work from outside of our geographical area at such short notice provided some unique challenges and opportunities. Details surrounding the timely transportation, registration and accessioning of samples had to be sorted out quickly.

Our truly incredible Laboratory Reference Centre (LRC) and Microbiology staff stepped up to the plate and picked up extra shifts in order to process the additional work. Many of our awesome Microbiology staff members did double shifts in order to help. Of course, in true hospital tradition, all of this started to unfold just before the Easter weekend!! And just three short weeks before our laboratory accreditation visit!! In addition to staffing issues, reagent and media inventory plus capacity in incubators, refrigerators, and automated systems all had to be addressed.

LRC and Micro also met the challenge of ensuring that all results were reported back to Grand River in a timely fashion. Positive critical results were being phoned within just a few hours of receiving the first blood culture shipment. Initially, all preliminary and final reports had to be manually printed and faxed, however, our amazing LIS team was able to set up an automatic electronic transfer of results a couple of weeks into the crisis.

Over the five weeks that HRLMP covered the Microbiology work from Grand River, an excellent working relationship was developed between the two sites. Communication was key to ensuring that problems were identified and solved; with maintaining patient care as the priority.

Many thanks and congratulations go to the professional, hard-working staff in the Microbiology Lab at the General. Just two months after consolidation, they exhibited excellent teamwork and dedication to ensure continuous high quality patient care in the midst of a crisis. Special recognition also goes to Deborah Johnson who was always available to the staff and helped work around every hurdle we encountered.