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## Enhancing Clinical Support Through Improved Diagnostic Testing Services in Clinical Chemistry and Immunology

An ever present HRLMP objective is to provide the best possible diagnostic support for clinical services within our program and to the surrounding community through the Laboratory Reference Centre (LRC). At the core of this objective is the on-going interaction between laboratory staff, clinical departments and researchers, both within the hospital and through McMaster University. The Clinical Chemistry and Immunology (CCI) Laboratory, located at the Hamilton General Hospital, provides the perfect environment to foster, develop and implement some of the initiatives evolving from such collaboration. As a specialty laboratory, many of the tests performed in CCI are esoteric or novel diagnostic assays. We have recently evaluated several new CCI tests (Tryptase and Calprotectin) and have greatly expanded our allergy test menu.

### **Tryptase in Anaphylaxis and Mastocytosis**

Abundantly produced by mast cells, the tryptase level measured in serum is a specific indicator of the involvement of these cells in physiological processes. Heightened tryptase levels are observed both acutely, in systemic anaphylaxis, and chronically, as in systemic mastocytosis. The total tryptase quantified by fluoroimmunoassay on CCI's Phadia platform is suitable for both of these applications.

Elevation of serum tryptase in subjects with systemic anaphylaxis resulting in hypotension is due to the release of mature tryptase from mast cell granules. Although released in parallel with histamine, the diffusion of tryptase through tissues is much slower than histamine. In an insect-sting anaphylactic event for example, the histamine level will peak in circulation within approximately 5 minutes and returns to baseline by 15 to 30 minutes. In contrast, the tryptase level reaches its peak within 15 to 120 minutes and remains elevated for many hours after the onset of anaphylaxis. As recommended in the HRLMP Lab Test Information Guide, for use in this application, serum samples must be collected 15 to 180 minutes following the suspected anaphylactic event as a measure to gauge its severity. Additional uses of this type of tryptase measurement include investigation of hypotensive events during surgery, reaction to diagnostic or therapeutic agents, exposure to latex, as well as other environmental stimuli.

Baseline serum tryptase levels of 3.8 - 11.4 µg/L is the result of

LAB  
CONNECTIONS

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

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constitutive release of pro-tryptase from mast cells. In mastocytosis, however, total serum tryptase is elevated as a result of an increased burden of mast cells associated with hyperplasia in skin lesions, the liver, the spleen, lymph nodes, and bone marrow. If measured early in an emerging systemic mastocytosis, total tryptase levels may still be normal. The subsequent rise in tryptase level over the next several months, as the steady-state burden of mast cells is established, is a useful measure of disease progression. Elevated tryptase in established mastocytosis also provides some assessment of the risk of future severe systemic anaphylactic events. Furthermore, responsiveness to mast cell reductive therapy can also be monitored by measuring declining tryptase levels over time.

### Specific IgE Measurement in Allergy Assessment

Reliable diagnosis of patients with suspected allergy is aided by the availability of specific IgE antibody measurement in serum. The Phadia ImmunoCAP specific IgEs platform at the CCI has facilitated the expansion of our IgE library from only a limited number of selected allergens to now encompass over 650 allergens and 90 allergen components. These include specific grass, weed and tree pollens, microorganisms, mites, insect venoms, and animal proteins, occupational exposures, and a plethora of food antigens. This breadth of testing options is valuable for pinpointing the factors responsible for allergic reaction in a rapid, quantitative, and relatively non-invasive method.

Both the identity and quantity of specific IgE antibody levels in serum have utility in confirming suspected allergy and advising on target allergen exposure reduction. Questions of sensitization and cross-reactivity can be addressed to stratify risk of severe reactions. Monitoring IgE levels over time allows for assessment of the “allergy march”, that is the progression from skin symptoms to respiratory symptoms, exacerbation of mild symptoms to more severe symptoms, and progression from recurrent symptoms to more chronic and persistent symptoms. Furthermore, the decline in specific IgEs can also be monitored to determine development of tolerance, responsiveness to therapy, and to further tailor future and ongoing therapy. Finally, Phadia is the world leader in the development of component testing for specific allergies. This new generation of allergy tests greatly increases clinical specificity by measuring

multiple proteins within a specific allergen. This enhances the ability of the allergist to confirm a patient is sensitive to a specific allergen (i.e. peanut) and not merely reacting to proteins present in many allergens.

### Fecal Calprotectin in Inflammatory Bowel Disease

Inflammatory bowel diseases (IBD) include two relapsing gastrointestinal (GI) inflammatory diseases of complex pathogenesis, namely Ulcerative Colitis (UC) and Crohn’s Disease (CD). Reported in 2012, Canada shows the highest prevalence (number of people with IBD) and incidence rates (number of new cases) in the world. The prevalence of IBD in Canada is about 0.7%, equating to an average of 1 in every 150 Canadians<sup>1</sup>.

The current gold standard for assessing intestinal inflammation with suspected cases of IBD is endoscopy with biopsies. However, many patients consider endoscopy and the required bowel preparation to be uncomfortable. In addition, this is an expensive procedure and hinders frequent assessment of IBD disease activity. Currently used laboratory tests such as hemoglobin, total leukocyte count, ESR and CRP are objective markers; however, they are non-specific. In contrast, fecal calprotectin is an objective, non-invasive, and specific marker of intestinal mucosal inflammation. Fecal calprotectin has received considerable attention during recent years due to research demonstrating the correlation of calprotectin levels in the stool with histopathological and endoscopic findings of IBD disease activity. Calprotectin is an abundant calcium-binding protein found in blood neutrophils. Inflammatory damage of the intestinal mucosa causes an influx of neutrophils into the intestinal lumen, after which increased calprotectin can be measured in stools.

Fecal calprotectin is emerging in both the diagnosis and monitoring of IBD. It is also an excellent marker to discriminate between organic (IBD) and non-organic bowel disease (irritable bowel syndrome; IBS). Its primary advantage is the reduction in the number of unnecessary endoscopic procedures endured by patients (very useful/helpful in children). Secondary benefits include more rapid diagnosis of IBD and a reduction in the costs associated with that diagnosis. It is also useful to monitor disease activity and to make therapeutic decisions in IBD. At CCI, the calprotectin assay has been evaluated on high-throughput,

automated systems to quantify calprotectin by enzyme-linked immunosorbent assay (ELISA). CCI will soon offer this simple, rapid, sensitive, specific, inexpensive, and noninvasive marker to detect and monitor intestinal inflammation.

Lori A. Beach, PhD  
Saranya Kittanakom, PhD

1) Rocchi A, et al. *Canadian Journal of Gastroenterology* 2012; 26: 811-817.

## News from The HRLMP



Mark Your Calendars for ....

### HRLMP Open Staff Forums Tuesday, May 27, 2014 (Via Videoconferencing)

**09:15 to 10:15 AM:**

Host Site: Miller Amphitheatre at St. Joseph's Healthcare  
Room A4-4 (Auditorium) at Juravinski Hospital  
Room 4E20 at McMaster Children's Hospital  
Theatre Auditorium at the General Hospital  
Kemp Auditorium at King Street Campus  
Boardroom at West Lincoln Memorial Hospital

**10:45 to 11:45 Hours:**

Host Site: Theatre Auditorium at the General Hospital  
Room 4E20 at McMaster Children's Hospital  
Miller Amphitheatre at St. Joseph's Healthcare  
Room A4-4 (Auditorium) at Juravinski Hospital  
Kemp Auditorium at King Street Campus  
Boardroom at West Lincoln Memorial Hospital

## HRLMP Structure Changes

Effective **April 1, 2014**, the HRLMP will be operating under the following management structure:

1. Duane Boychuk, Director Operations
2. Cathie McCallum, Manager Quality and POCT
3. Andrea Tjahja, Manager Education and Safety
4. Denise Legeard, Lean Six Sigma
5. Karon Taggart, Manager LIS
6. Michelle Somers, Manager Office Operations
7. John Korver, Manager Microbiology and Virology
8. Dan Brooks, Manager Clinical Chemistry/Immunology, BCG and LRC

9. Teresa DiFrancesco, Manager Genetics, Special Hematology, Special Coagulation, Platelet Immunology and FIRH Sputum Lab
10. Sandra Fazari, Manager Transfusion Medicine and HLA Lab
11. Linda Turner-Smith, Manager Pathology
12. Tracy Carrier, Manager CORE Labs (SJH and HGH)
13. Rhonda Birse, Manager CORE Labs (MUMC and JHCC)
14. Bill Craig, Supervisor Special Projects (All sites)
15. WLMH will report directly to Duane Boychuk in the interim

This leadership structure is intended to facilitate a consistent and improved focus on strategy and operations.

Joan Wepler and Trish Szwalek are no longer with the Hamilton Regional Laboratory Medicine Program, effective April 1<sup>st</sup>, 2014. Both Trish and Joan were valued members of the laboratory program. We wish them well and thank them for all of their work in helping to build our program and improve our operations.

## Education News

The **Medical Microbiology** Residency program was well represented at the AMMI Canada – CACMID annual conference in Victoria BC this month, with 4 posters accepted for presentation.

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>

Thank you to **Rhonda Birse** for organizing a tour of the Core Laboratory for the Niigata University Student Tour which took place from March 22-29, 2014. The feedback from this event was very positive and the Global Health Office at McMaster is grateful to her for her involvement.

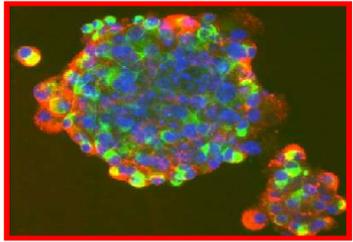
### A Message from Dr. Mark Crowther:

On behalf of the HRLMP administration I would like to take the occasion of **National Medical Laboratory Week**, to thank every member of the HRLMP for their continued support and focus on providing the very best care for the patients of the Hamilton Region and beyond. Laboratory diagnostics underpin almost every hospital-based diagnosis, and the results produced by our laboratories guide the care of thousands of patients, some on a minute-by-minute basis. Every member of the clinical team is dependent on our laboratories. The quality of clinical care that our patients receive is totally dependent on the work of the HRLMP – it is a remarkable accomplishment that we have confidence in the quality of all of our work despite the fact that we produce many millions of results each year. Looking forward, we see a continuance of our challenging times; however, I am certain that the staff of the HRLMP will continue to provide exemplary, high-quality and timely results for our clinical teams.

Thank you!

**National Medical Laboratory Week 2014**  
**"Saving Lives with Stem Cells"**

*featuring*  
*Dr. Ronan Foley, Director Stem Cell Laboratory HHS,*  
*Dr. Kylie Lepic, Hematology and Thromboembolism JHCC,*  
*and a patient's family who will share their experiences*



May 14, 2014 @ 5:30 pm  
MUMC ROOM 1A1 - Lecture Hall

**FREE PIZZA + REFRESHMENTS**

**50/50 DRAW**  
Proceeds to the Cancer Assistance Program

Please register at: <http://tinyurl.com/HRLMP-education>