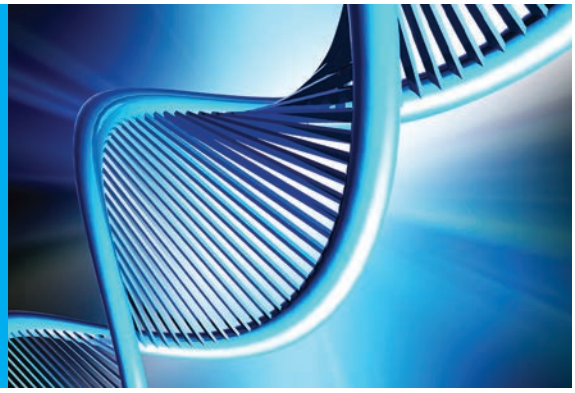
SPRING 2017

# Lab Link

THE NEWSLETTER OF MAIN LINE HEALTH LABORATORIES



## Medical Laboratory Professionals Week April 23–29

### Laboratory Professionals Get Results!

Medical laboratory professionals provide up to 70 percent of the medical data that health care professionals, patients and their families use to make informed decisions about one's diagnosis and treatment plan. Medical laboratory professionals provide answers to life-and-death decisions every day.

Here are just a (very) few of the important types of testing we conduct:

- We type and match blood during emergency and routine surgery.
- We provide life-saving diagnoses regarding healthcare associated infections (HAIs) such as MRSA and *C. difficile*.
- We diagnose and monitor cancer and diabetes results.
- We are pioneering molecular techniques that can detect viral disease, predict cancer and genetic disorders before birth.

April 23–29, 2017 is Medical Laboratory Professionals Week—a time to celebrate the dedicated professionals who work behind the scenes. Although the information we provide is so vital to healthcare, we are largely invisible. Most laboratory professionals work long hours outside the attention and consciousness of the patient, day in and day out, with little public recognition. Nonetheless, we are an integral part of the health care team. ■

## A (Very) Brief History of Laboratory Medicine

*By Jack Galamb, Outreach Manager*

"If I have seen further, it is by standing on the shoulders of giants."

– Sir Isaac Newton, 1676

Molecular genetic testing is just one of the exciting technologies at the forefront of laboratory medicine today. Genetic testing has established utility in many settings: prenatal and pre-implantation diagnosis, risk assessment for familial cancer, the diagnosis of many neurologic disorders and evaluation of malignancies for diagnosis and staging to name a few. Like medicine today, laboratory science is built upon the contributions, successes and failures of medical pioneers. This article sheds some light on a few likely and unlikely giants of the history of laboratory science.

**The Ancient Caregivers:** Long before medical associations, there were accepted practices of patient evaluation. One of the constraints was the fact that invasive procedures were forbidden. It is not surprising that urine became the body fluid of choice for examination. There is evidence that the Sumerians and Babylonians used urine for diagnosis as early as 4000 BCE. A diagnosis of pregnancy was likely made by the ancient Egyptians by using the urine of a woman to germinate seeds. The Hindus noted the sweet taste of urine and the attraction of black ants to this urine if poured on the ground. Hippocrates (460–355 BCE) described the characteristics of urine from his patients. Galen (129–200 AD) wrote and taught that urine was a blood filtrate and, as such, could be used to indicate the type and location of illness. As a result, urinalysis or Uroscopy became the earliest laboratory method and remained virtually unchanged for 9–10 centuries.

continued on page 4 >

# Allergy Season

*By AnneMarie Brewer, Immunology Supervisor*

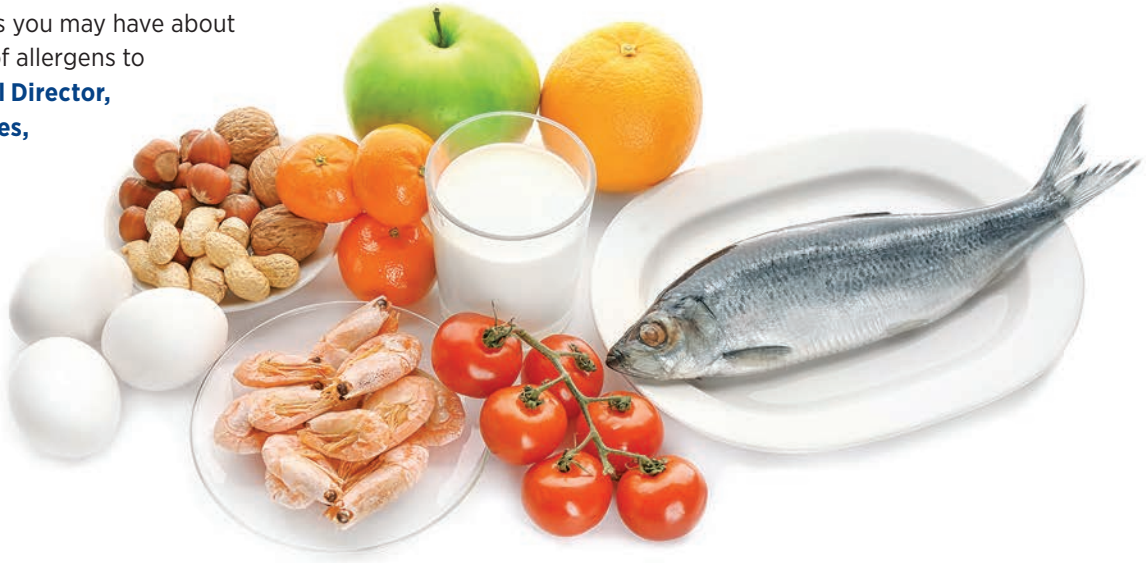
It's spring! It's time to get outside and enjoy the warmer weather. However, there are many who dread this season of new plant growth due to the excessive sneezing, nasal congestion, coughing, and itchy, watery eyes brought on by high pollen counts. This season can also be particularly trying for patients with asthma whose symptoms are exacerbated by allergies.

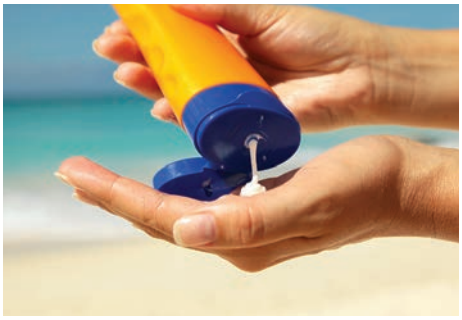
For well over two years, MLHL has been successfully performing allergy testing to help physicians treat their patients. Our menu of over 200 allergens encompasses the most common seasonal culprits in our region (North East Respiratory Panel) as well as several less common trees, grasses, and weeds. Our menu of testing is not limited to the outdoors. It also includes perennial allergens for molds, mites, and animal dander, as well as foods. The following profiles have been developed for your use:

| NAME OF PROFILE | TEST COMPONENTS |
|---|---|
| Cereal Allergy Profile | Rye, Barley, Rice, Buckwheat, Gluten |
| Food Allergy Profile | Egg White, Cow Milk, Peanut, Soybean, Wheat, Gluten, Sesame Seed, Hazelnut, Almond, Cashew, Walnut, Codfish, Tuna, Salmon, Shrimp, Clam, Scallop |
| Northeast/Respiratory Profile | *Pen.notatum, Cl. Herbarum, A. Fumigatus, Alt Alternata*, Bermuda Grass, Timothy Grass, *D. Pteronyssinus*, *D. Farinae*, Cat Dander, Dog Dander, Mouse Urine Protein, Mugwort, Rough Pigweed, Ragweed (Short), Sheep Sorrel, Elm, Mountain Cedar, Maple, Cottonwood, Oak, Birch, Sycamore, White Ash, Walnut Tree, White Mulberry, Cockroach |
| Pediatric Allergy Profile | Peanut, Soybean, Egg White, Cow Milk, Shrimp, Walnut, Wheat, Codfish, *Alt. Alternata, Cl Herbarum, D. Pteronyssinus, D. Farinae*, Dog Dander, Cat Dander, Mouse Urine, Cockroach |
| Stinging Insects Allergy Profile | Honey Bee, Paper Wasp, White Faced Hornet, Yellow Hornet, Yellow Jacket |
| Seafood Group Allergy Profile | Codfish, Crab, Lobster, Shrimp, Tuna |
| Nut Mix Allergy Panel | Coconut, Peanut, Almond, Pecan Nut, Sesame Seed |
| Mold Group Allergy Panel | *Alt. Alternata* (m6), *A. Fumigatus* (m3), *Cl. Herbarum* (m2), *Candida Albicans* (m5), *Mucor Racemosus* (m4) |

MLHL utilizes ImmunoCAP, a highly accurate and sensitive assay for measuring the amounts of IgE antibodies to specific allergens in the patient's blood. Because the test measures IgE, it can be performed without regard to the patient's age, skin condition, use of medicine, symptoms, disease activity, or pregnancy.

Please forward any questions you may have about allergy testing or our menu of allergens to **Dr. Pradeep Bhagat, Medical Director, Main Line Health Laboratories, at 484.476.6321**, or **Annemarie Brewer, Immunology Supervisor, at 484.476.8408**. ■





# Sun and Skin Cancer

*By Walter M. Klein MD*
*Board certified dermatopathologist*
*Main Line Pathology Associates*

Family barbeques, baseball games, pool days, and weekend trips to the beach…all of these are fun-filled activities we enjoy as the warmer weather months are now here. However, one important thing we often forget about is proper sun protection.

Here are the facts:

- Exposure to UV light from the sun is the most preventable risk factor for skin cancer.
- One in five Americans will develop skin cancer in their lifetime. Over 5 million skin cancers are diagnosed each year in the US.
- The majority of these cancers are basal cell carcinomas and squamous cell carcinomas which are highly curable if detected early and treated properly.
- Melanoma, which accounts for about 3% of all skin cancers, is the more feared skin cancer. While it can be curable if detected early, when detected in an advanced stage the survival rates are much lower.

So what can you do to minimize your risk for skin cancer and the chronic aging effects from UV light? The American Academy of Dermatology encourages everyone to protect their skin from the sun's harmful UV rays by seeking shade, wearing protective clothing, and using a water resistant, broad spectrum sunscreen.

continued on page 4 >

# Celiac Testing Update

*By AnneMarie Brewer, Immunology Supervisor*

Effective April 25, 2017, Main Line Health Laboratories will offer Fluoro-enzymatic-immunoassay (EliA) direct measurement of tissue transglutaminase IgA and IgG antibody tests, and gliadin (deamidated peptide) IgA and IgG antibody tests. These assays replace the current method of screening for tTG and Gliadin DP Antibodies by Enzyme-Linked Immunosorbent Assay (ELISA). As a consequence, the reference range for these analytes will change for the following 4 antibody assays: tTG IgA, tTG IgG, Gliadin (DP) IgA, and Gliadin (DP) IgG.

| INTERPRETATION | NEW RANGE | OLD RANGE |
|---|---|---|
| Negative | <7 EliA U/ml | <20 Units |
| Equivocal/Weak Pos | Equivocal: 7–10 EliA U/ml | Weak Positive: 20–30 Units |
| Positive | >10 EliA U/ml | >30 Units |

Specimen requirements are unchanged; a gold top serum separator tube is required.

In order to ensure that the most appropriate testing is performed for each patient, MLHL offers a sequence of serologic testing for celiac disease. This sequence of tests is orderable as "Celiac Antibody w/Reflex," and is comprised of Tissue Transglutaminase IgA Ab, total IgA level and Tissue Transglutaminase IgG Ab when appropriate. (This testing algorithm was developed in cooperation with the department of Gastroenterology and the Paoli Hospital Celiac Center.)

tTG IgA is the single best serologic test for celiac disease, with a reported sensitivity >95% and specificity >90%. However, a small percentage of patients with celiac disease may be IgA deficient and give a false-negative result. In this population of patients, the appropriate test for celiac disease is tTG IgG. When ordered as "Celiac Antibody w/ Reflex," a negative tTG IgA result (defined as <7 EliA U/mL) will prompt measurement of total IgA levels. If total IgA is low (defined as <85 mg/dL), then testing for tTG IgG will be performed.

Alternatively, if tTG IgA is positive, no further testing will be performed. If total IgA levels are normal, following a negative tTG IgA, testing for tTG IgG will not be initiated.

Celiac Disease, also called gluten-sensitive enteropathy or non-tropical sprue, is a disorder primarily affecting the gastrointestinal tract that is characterized by chronic inflammation of the mucosa. This leads to atrophy of intestinal villi, malabsorption, and protean clinical manifestations which may begin either in childhood or adult life. Symptoms can include abdominal cramping, bloating, and distention, and untreated celiac disease may lead to vitamin and mineral deficiencies, osteoporosis and other problems.

The disease is also strongly associated with the skin disorder, dermatitis herpetiformis. Celiac disease's major genetic risk factors (HLA-DQ2 and HLA-DQ8), and environmental triggers (specific peptides present in wheat, rye and barley) have been identified and most patients experience complete remission after exclusion of these grains from the diet. There has been considerable scientific progress in understanding this complex disease and in preventing or curing its manifestations by dietary interventions.

Please forward any questions you may have to **Dr. Pradeep Bhagat, Medical Director, Main Line Health Laboratories, at 484.476.3521, or BhagatP@mlhs.org**.

Thank you for your support of Main Line Health Laboratories.

## History

continued from page 1

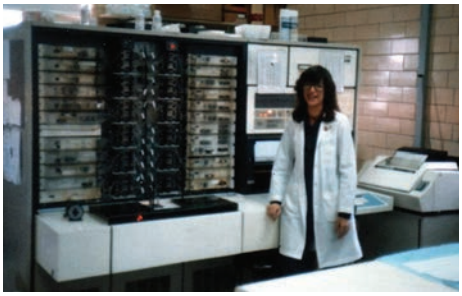
Although **Johann Guttenberg** (c.1398–1468) is not usually credited with advances in medicine, his movable type and printing press provided the potential to make information available to large numbers of scholars. Experiments and data could be verified or refuted and groundless claims would become less common. In the environment of the Age of Enlightenment, the old restrictions and regimentations gave way to freedom to individuals of education, intelligence and creativity. One such person was **Andreas Vesalius** (1398–1468), a Flemish physician and anatomist who wrote *De humani corporis fabrica*. Vesalius is often referred to as the founder of modern human anatomy. A successor to Vesalius was **Giovanni Battista Morgagni** (1682–1771), an Italian physician who combined anatomic dissection and clinical history and is generally regarded as the father of modern anatomic pathology.

**Robert Boyle** (1667–1691) was a natural philosopher, physicist and chemist born in County Lismore, Ireland. He is considered one of the founders of modern chemistry. Boyle's was an active rather than passive philosophy and his investigations led him to chemically analyze urine and blood. Although Boyle was not a physician (and did not have the opportunity to examine the blood of sick patients) he did have the insight to propose that knowing the results from healthy individuals could aid in evaluation of the sick. He was an early proponent of normal reference ranges.

**Gregor Mendel** (1822–1884) was an Austrian teacher, scientist and Augustinian friar of St. Thomas Abbey in Brno, (now) Czechoslovakia. At St. Thomas Abbey Mendel began research in 1854 on the transmission of hereditary traits among pea plants. His research spanned eight years and involved tens of thousands of individual plants. He crossed plants with obviously different characteristics and, after analyzing the results, developed two very important conclusions: (1) That dominant and recessive traits were randomly passed on—the Law of Segregation; and (2) that traits were passed on independent of other traits from parent to offspring—the Law of Independent Assortment. He published the results of his work; however it went essentially unrecognized for another 35 years. He is considered the father of modern genetics.

**Rosalind Franklin** (1920–1958) was born in England and earned a PhD in physical chemistry from Cambridge University. She became an expert at crystallography and X-Ray diffraction. In 1950, at King's College under the direction of John T. Randall, she began to take increasingly clear crystallographs of deoxyribonucleic acid—DNA. By 1953 she came very close to discovering its double-helix structure. The clearest crystallographic portrait of DNA was photo 51, acquired through 100 hours of X-ray exposure from a machine Franklin herself had refined.

At the time, **Francis Crick** and **James Watson** were also working on a theoretical model of DNA at Cambridge, independently of Franklin. In January 1953 they gleaned crucial insights about DNA's structure from Photo 51. The photo was shown to Watson and Crick, without Franklin's permission, by **Maurice Wilkins**, Franklin's colleague with whom she had a strained relationship. Crick, Watson, and Wilkins shared the 1962 Nobel Prize for Physiology or Medicine in 1962. None



By the 1970s, clinical lab testing had moved well beyond individual manual procedures. This 1982 photo shows Clinical Lab Scientist Donna Frick in front of a SMAC (Simultaneous Multi-Channel Analyzer and Computer) at the Bryn Mawr Hospital lab. The SMAC could efficiently perform 20 different blood chemistry tests from a single patient specimen.

gave Franklin credit for her contributions at that time. Before succumbing to ovarian cancer in 1956, Franklin was also credited with other significant scientific achievements, most notably her work with Tobacco Mosaic Virus.

Subsequent biographies have shed light on Rosalind Franklin's role in the discovery of the structure of DNA, most notably *The Dark Lady of DNA* by Brenda Maddox (Harper Perennial, 2003). ■

Sources: Moore, Robert E., An Historic Perspective on Clinical Laboratory Testing. Springer.com The Rosalind Franklin Papers, NIH.gov.

## Sun and Skin Cancer

continued from page 3

Sunscreens with SPFs around 30 are preferred as those that are above 50 often contain chemicals that may pose health risks when they are absorbed through the skin. Sunscreens should be used every day you are outside, even on a cloudy day as 80% of the UV light can still reach your skin. Remember to put on your sunscreen 15 minutes before you go outside and reapply every two hours or after swimming. So go ahead and put on that bathing suit but don't forget the shades, hat, and sunscreen too! ■

**Main Line Health Laboratories Contact Information**
**Client Services** 484.580.4200
**Main Line Health Laboratories Billing** 484.829.6060
**Main Line Pathology Associates Billing** 610.459.3113
**Pradeep Bhagat, MD, Medical Director, Main Line Health Laboratories** 484.476.3521
**Judyann Gilbert, System Director, Main Line Health Laboratories** 484.476.2630
**Rowena Burrows, Division Manager, Core Laboratories, Lankenau** 484.476.2610
**Liz Hallinan, Rapid Response Lab Manager, Paoli** 484.565.1412
**Judy Smith, Rapid Response Lab Manager, Riddle** 484.227.3221
**Erin Tretter, Rapid Response Lab Manager, Bryn Mawr** 484.337.3545
**Jack Galamb, Manager, Outreach** 484.580.4006

Main Line Health®
Well ahead.®

**mainlinehealth.org/labs**

MLH.4/17AS