

Diagnostics

A publication of diagnostic services for the Geisinger professional staff



Vitamin D Testing: Recommendations of the Lab Utilization Committee

Vitamin D testing has grown tremendously in recent years in the United States, attracting the attention of both payors and professional societies. At Geisinger, the growth of vitamin D testing has been dramatic, and peer data for our health plan (GHP) shows that it is an outlier on the high side, with vitamin D testing costing more than \$2 million annually.

Studies in the United States (and in the Geisinger Health System) have shown that vitamin D levels are insufficient or deficient in about 40% of the population. The high prevalence raises the question of whether the population should be broadly tested or if general dietary supplementation should be recommended. What is cost-effective testing for the population at large?

At Geisinger, billing records show that there is wide variation in ordering vitamin D tests among providers within single specialties. For the reasons above, the Laboratory Utilization Committee (LUC) has engaged a task force from Primary Care, Nephrology, Endocrinology, and Rheumatology to make recommendations to help standardize clinical practice. Statements on the topic from the Endocrine Society, the American Academy of Family Physicians, the US Preventative Task Force, the British Columbia Medical Services Commission and other sources, along with ICD9 codes supporting vitamin D testing, were reviewed. Centers for Medicare & Medicaid Services (CMS) does not pay for vitamin D screening tests, a policy also followed by other payors.

After deliberation by the Vitamin D Task Force, input from other clinical disciplines, and the endorsement of the Lab Utilization Committee, we are providing the following recommendations regarding vitamin D:

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Vitamin D Testing Recommendations

- **Routine vitamin D screening in the population is not recommended.**
- *The most common indications for vitamin D (25-Hydroxy Vitamin D (25OHD)) measurement are:*
 - a. Risk for osteopenia or demonstrated fractures*
 - b. Chronic kidney disease stage III or greater*
 - c. Osteoporosis, osteomalacia, and other bone diseases*
 - d. Individuals with malabsorption and risk of malnutrition (e.g., patients with celiac disease, ulcerative colitis [UC], Crohn's Disease, cirrhosis, cholestatic liver disease, pancreatic insufficiency)*
 - e. Long term anticonvulsant or glucocorticoid therapy*
 - f. Children on proton pump therapy > 6 months*
 - g. Parathyroid or other endocrine or metabolic disorders*
 - h. Prior to initiation of bisphosphonate or any FDA-approved osteoporosis medication*

For further information, contact Dr. Conrad Schuerch at 570-271-6338.

4th Generation Laboratory Testing for the Diagnosis of HIV

In December 2015 the Geisinger Medical Laboratories (GML) converted to the CDC-recommended 4th generation testing protocol for HIV diagnosis. Similar to the current 3rd generation testing, the protocol is a two-step process with an initial screening immunoassay followed by confirmation with an HIV1/HIV2 differentiation assay. The 4th generation first combination antibody and antigen (AB/AG) immunoassay detects HIV-1 and HIV-2 antibodies and HIV-1 p24 antigen to test for both established and acute HIV-1 infection. The HIV-1 p24 antigen becomes detectable at approximately 10 to 12 days post-infection, which is about two weeks earlier than HIV-1 antibody can be detected by the 3rd generation assay. Thus the 4th generation screening assay picks up acute infections earlier and at the stage of greatest viral infectivity.

Serum specimens with a reactive antigen/antibody combination immunoassay result will be followed by a second, confirmatory immunoassay that distinguishes HIV-1 antibody from HIV-2 antibody. If both the screening and confirmatory tests are positive, the test will be reported as positive for HIV infection. If the combination immunoassay is positive but the confirmatory antibody test is negative, the patient may be in the acute, pre-antibody window and should have an HIV RNA test performed. If the HIV RNA test is positive, acute HIV-1 infection is confirmed. If the HIV RNA test is negative, then the first test should be considered a false result.

A link to the CDC algorithm is published in the GML on-line Test Catalog (https://www.geisingermedicalabs.com/catalog/cdc_quick_guide_HIV.pdf), or see the full guideline on the CDC web site (<http://www.cdc.gov/hiv/pdf/hivtestingalgorithmrecommendation-final.pdf>).

HIV screening via the 4th generation protocol is performed daily at the reference laboratory in Danville, thereby eliminating the longer turnaround time of send-out confirmatory testing. The order code for the new HIV testing is HIV4G for the combined antigen/antibody screening and HIV-1/HIV-2 differentiation assay (HIV AG/AB COMBO). The sample requirement is 1 mL serum obtained in a 3.5 mL gold-top Vacutainer tube®. The order code for the HIV RNA assay (HIV-1 RNA QUANT) is HIVRNA; specimen requirement is plasma collected in a 6 mL lavender-top Vacutainer®. For further information contact Customer Support at 570-271-6326 or 800-695-6491. Note that employee exposure testing, e.g., follow-up for needlestick, uses a different test algorithm (details at right).

For further information contact Dr. Harrison (hharrison@geisinger.edu) at 570-271-5899 or Mike Snedman, Analytical Specialist, (mrsnedman@geisinger.edu) at 570-214-9329.

Employee Testing for HIV Exposure

When there is an employee exposure, testing for HIV will be done as follows:

On the source patient, test code RPDHIV (HIV AB 1&2 RAPID) will be ordered in the lab information system (LIS). This test is not orderable in EPIC or Proven, but results will flow to these systems.

On the exposed employee, test code ERDHIV (EXPOSURE RAPID HIV) will be ordered in the LIS. The test is not orderable in EPIC or Proven and results will not flow to these systems.

Photopheresis at GMC and GWV

Geisinger Health System's Transfusion Medicine Service is now offering Extracorporeal Photochemotherapy (ECP), commonly known as photopheresis, at both Geisinger Medical Center (GMC) in Danville, PA and Geisinger Wyoming Valley (GWV) in Wilkes Barre, PA.

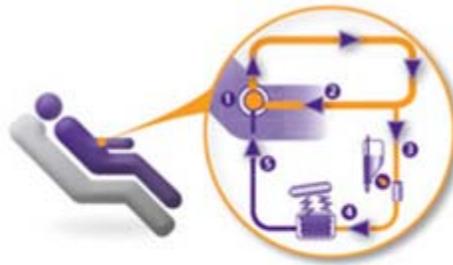
ECP is a process by which peripheral blood mononuclear cells (MNC) are separated from whole blood, combined with a psoralen compound, exposed to ultraviolet A (UVA) light, and then reinfused back to the patient. Responses have been demonstrated in patients with cutaneous T-cell lymphoma (CTCL), graft-vs-host disease (GVHD), solid organ allograft rejection, and a variety of immune-mediated inflammatory diseases.

ECP at Geisinger uses an intermittent flow apheresis device to separate and concentrate the MNCs. The apheresis system uses heparinized saline for priming the instrument and anticoagulation of the patient's extracorporeal whole blood throughout the treatment. During the collection, 1.5 to 2.0 L of whole blood is processed, which can take up to six cycles and last 3.5 to 4.0 hours. During this process most of the patient's red blood cells and plasma are returned to the patient. Each procedure exposes approximately 10% of the total body peripheral blood MNCs to psoralen and UVA light.

The photoactivating agent used for ECP is methoxsalen. It is a naturally occurring substance found in the seeds of the *Ammi majus* (Umbelliferae) plant, commonly called bishop's weed, false bishop's weed, bullwort, greater ammi, lady's lace, false Queen Anne's lace or laceflower, which is a plant originating in the Nile River Valley. This plant belongs to the class of compounds known as psoralens, and its structure permits it to absorb UVA light. Methoxsalen is inert until activated by UVA light. Upon photoactivation, methoxsalen inhibits proliferation of the treated MNCs and subsequent apoptosis of these cells. These cells are then returned to the patient. ECP has complex immunomodulatory effects and, more than 25 years after its initial use, its mechanism of action is not fully understood. Evidence suggests that photopheresis alters the function of immune system cells like lymphocytes, natural killer cells, and antigen presenting cells.

Side effects seen during ECP procedures are mostly hypotension-related due to fluid shifts which occur during treatment involving the extracorporeal circuit. Transient febrile reactions (100-102°F) and increased erythroderma have been seen in some patients. Methoxsalen can make patients more sensitive to sunlight for about 24 hours after treatment, and precautions should be taken to reduce the risk for cataracts or serious sunburns.

To refer a patient to GMC or GWV for an ECP procedure or for further information, call 570-214-8162. This line is monitored 24 hours a day, seven days a week, 365 days a year. If there is no answer, leave a message and your call will be returned as soon as possible based on the urgency of the matter. Physicians with access may also make a referral through EPIC, Geisinger's electronic medical record. At Geisinger, we welcome the opportunity to partner with you in the care of your patients. Referring physicians are kept up-to-date on all procedures and treatment given to patients they refer and continue to maintain all care for the patient outside of the apheresis procedure.



1. Whole blood is drawn and separated via centrifugation; WBC-enriched buffy coat isolated and collected
2. Plasma and RBC immediately returned to patient
3. Methoxsalen added to buffy coat
4. Buffy coat exposed to UVA light
5. Photoactivated buffy coat returned to patient

Photo courtesy of Therakos

Front-End Processing Automation with the Roche 8100

On December 8, 2015, Geisinger Medical Laboratories in Danville went live with the new Roche front-end processing automation, also known as the 8100 system. This automation can handle most aspects of the pre-analytic process, including the order receipt/modification (ORM) process, removing samples from transport batches, sorting samples for off-line testing, centrifuging, aliquoting, and transporting specimens to the analyzers. The automated line also has short-term and long-term storage for specimens. The short-term storage holds specimens at 5 degrees below ambient temperature for quick retrieval for add-on testing; the p701 robotic long-term storage holds specimens at a refrigerated temperature for several days until discard.

The input lanes can handle up to 800 specimens per hour. The three auto-balancing centrifuges can spin up to 36 specimens at a time, with a maximum throughput of 900 specimens per hour. The centrifuges load the next batch while spinning the current batch for added efficiency. The add-on buffers can hold up to 3000 specimens for quick retrieval for add-on testing, while the p701 can hold over 30,000 specimens.

Geisinger Medical Laboratories will continue to increase the utilization of the 8100. Being the first 8100 in the world to be connected to chemistry, hematology, AND coagulation lines has both advantages and challenges. It is great to be on the cutting edge; however the cutting edge also means that extra tweaking is required. This tweaking will continue for the next several months, but we know we will have a much more efficient workflow in the end.

We are working towards a “single touch” workflow in the RAP area. This means that collection-manager and batched specimens will be taken directly from the pneumatic tube system or courier and placed in racks that go directly on the 8100 – with no human “pre-processing” occurring. This will allow our team to focus on difficult specimens and improving quality for everyone.



The New GML Laboratory Automation Line
Photodiagram courtesy of Roche Diagnostics