Guide to Laboratory Testing and Interpretation

Overall plan for measles testing
Currently, Unified State Laboratories: Public Health (USL:PH) does not perform ANY type of measles testing. Therefore, if a patient has medical insurance, the **best** option is for the patient's clinician to collect samples and submit them to their lab.

If the patient does not have medical insurance and/or refuses to see a physician, public health may need to collect specimens to assure that they are tested. See the sections below to determine which specimens should/can be collected and how and where they should be transported. Because USL:PH is paying ARUP to perform the testing, we prefer that patients use their clinicians to collect specimens and route them to private laboratories.

Specimen collection
Please collect:

- Serum specimen – preferably use serum separator tube.
- Nasopharyngeal or throat swab – use viral specimen collection kit.
    - For more information on nasopharyngeal swab collection procedure go to http://health.utah.gov/epi/diseases/pertussis/nasopharyngealswab_collect.pdf
    - Collect throat swab by carefully avoiding tongue and cheeks and swab the peritonsillar area. Place swab side first into tube with viral transport media. Break off excess shaft and cap the tube. Do not use swabs with wooden shaft or calcium alginate swabs.
- Urine specimen – 10-50 ml in a sterile container.

Sample collection times

- Date of rash onset through 7 days after rash onset. Collect throat, urine, and serum specimens.
- Seven days after rash onset to 28 days after rash onset. Collect serum specimen only.

Sample recollection

- If the serum was collected between the rash onset date and 3 days after the date of rash onset AND the IgM test came back negative, then, to rule out measles, another serum sample should be collected between day 7 and day 28 and retested.

Specimen labeling
Please label specimens with:

- Patient's name
- Date of specimen collection
- Provider (if collected by LHD or UDOH, indicate LHD or UDOH)
- Type of sample (e.g., urine, throat swab, blood)

Specimen transport and storage

- Nasopharyngeal/Throat swab: Place the specimen on wet ice or refrigerate. The specimen should NOT be allowed to freeze, therefore either do not use frozen ice packs or ensure that the samples are not touching any frozen ice packs.
- Urine specimen: Collect specimen into clean urine containers. Place the specimen on wet ice or refrigerate. The specimen should NOT be allowed to freeze.

- Serum: After specimen collection, invert the tube several times to thoroughly mix the contents. Transport the tube at room temperature.

Take all specimens to USL:PH for processing. The serum is for serology, and the urine and throat specimens are for culture and/or nucleic acid amplification. USL:PH will store the urine and throat specimens, and send the serum specimen to ARUP for testing. If the serology indicates that an active measles infection is ongoing, then USL:PH will send the urine and throat specimens to CDC for culture and/or RT-PCR testing.

Test methods
There are three test methods for measles:

- IgM and IgG serology (specimens accepted by local labs – routed to specialty labs)
- Culture (specimens accepted by local labs – routed to specialty labs)
- Nucleic acid amplification (only performed at CDC)

The serology test results can be confusing to interpret. Labs do not directly test for IgM. Instead, they take a serum sample and test it for measles antibody. This will give the amount of combined IgG and IgM in the specimen. The lab then treats the sample to remove the IgG and repeats the testing. This will give the amount of IgM in the sample.

False positive results may occur due to serology cross-reactivity in patients with rubella, human parvovirus B19, human herpes virus 6, dengue, Epstein-Barr virus, cytomegalovirus, mycoplasma, or rheumatoid factor. False positivity may also occur if the laboratory fails to adequately remove the IgG from the specimen prior to testing for IgM. False positive cultures should not occur.

False negative results may occur when serology specimens are collected too early in the infection, or when specimens for viral isolation are collected too late in the infection.

USL:PH has a contract with ARUP to conduct IgM serology testing. This is **ARUP's guideline** for results interpretation:

Value	Interpretation
0.79 AU or less	• Negative - No significant level of IgM antibodies to measles (rubeola) virus detected.
0.80 – 1.20 AU	• Equivocal - Repeat testing in 10-14 days may be helpful.
1.21 AU or greater	• Positive - IgM antibodies to measles (rubeola) virus detected. Suggestive of current or recent infection or immunization. However, low levels of IgM antibodies may occasionally persist for more than 12 months post-infection or immunization.

Note: USL:PH will send serologies to ARUP. IF the IgM is positive, USL:PH will send the remaining samples to CDC for culture and PCR. CDC will not perform culture nor PCR on samples unless the serology is positive and there is a high index of suspicion that it is a measles case. ARUP can perform cultures as well as CDC. If the patient has private insurance, then clinicians should collect and submit specimens for both serology and culture at the same time.