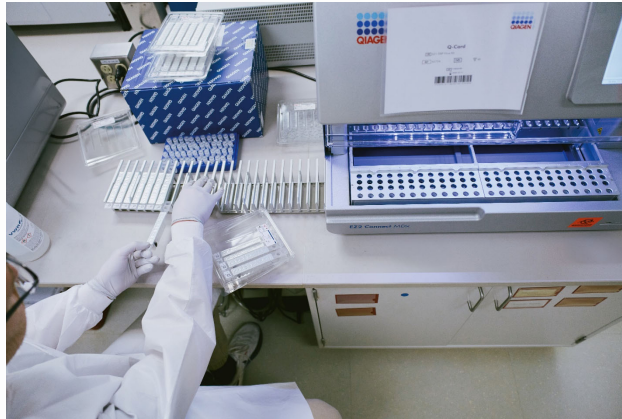


Laboratory Tests



Questions to Explore

- What do we want to know from lab tests?
- Which lab tests can give us that information?
- What do the test results really mean?

Why Test?

- Infection status
- Immune status
- History of infection
- Linkages between cases
- Population level data

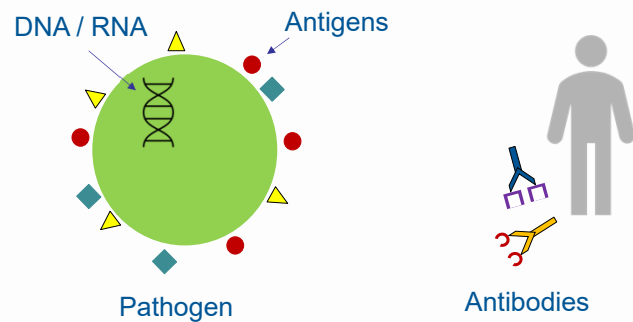
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What are we testing?



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Antibody Tests

What does it test for	<ul style="list-style-type: none"> • Presence of antibodies in a patient sample • Has the patient been exposed to this pathogen?
When would you use this test	<ul style="list-style-type: none"> • May be actively infected • May have been infected in the past • Check for immunity
Examples	<ul style="list-style-type: none"> • Hepatitis • HIV



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Antibody Tests – More to Consider

- IgM tests
 - Detects IgM antibodies made **earlier** in infection
 - General defense
 - Less specific binding
 - Shorter term protection
- IgG tests
 - Detects IgG antibodies made **later** in infection
 - Specific defense
 - More specific binding
 - Longer term protection



Want to learn more? Check the OHA Investigative Guidelines!

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An Example: Hepatitis B

Test name	What are we testing	When might we use it
Hep B Surface Antibody	Reaction to antigens on the surface	Vaccine / immune check
Hep B Core Antibody, IgM	Reaction to antigens within Hep B	Infection check IgM – Recent
Hep B Core Antibody, Total (IgM & IgG)	Reaction to antigens within Hep B	Infection check IgM – Recent IgG – Historical
Hep B Surface Antigen	Presence of infectious particles	Infection check *Remains present in chronic carriers

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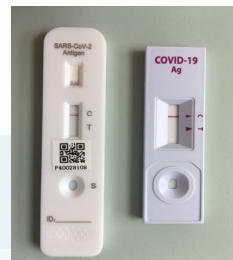


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Antigen Tests

What does it test for	<ul style="list-style-type: none"> • Presence of antigens in a patient sample or isolate
When would you use this test	<ul style="list-style-type: none"> • Patient may be actively infected (symptomatic, close contact with a case)
Examples	<ul style="list-style-type: none"> • Rapid HIV • Rapid SARS-CoV-2 • Salmonella serotyping



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Culture Tests



What does it test for	<ul style="list-style-type: none"> • Viable pathogen growth and isolation/identification of pathogen
When would you use this test	<ul style="list-style-type: none"> • Pathogen hasn't been identified yet • Want to study it further (subtyping) • Need to know if it is an active infection
Examples	<ul style="list-style-type: none"> • B. pertussis • Enteric pathogen cultures • Tuberculosis

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Molecular Tests

What does it test for	<ul style="list-style-type: none"> • Presence of genetic material in a patient sample • Bacterial or viral • Active/live or inactive/dead
When would you use this test	<ul style="list-style-type: none"> • Test for something specific • High levels of sensitivity • Need a faster result than culture
Examples	<ul style="list-style-type: none"> • Norovirus • Influenza • Pertussis • Chlamydia



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PCR vs NAAT in Public Health Response



PCR	Automated NAAT
Individual components measured and mixed together at the lab	Pre-made kits from manufacturers
Manual processing	Automated platforms
Lower volume throughput	High volume throughput
Highly flexible – test/instrument can be modified	Less flexible – test/instrument is not easily modified
First to be deployed for emerging pathogen response	Distributed later in emerging pathogen response

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Testing Takeaways

- Some tests tell you about active infections:
 - Antigen, some antibody, culture, molecular
- Some tests tell you about past infections:
 - Some antibody
- How do you know?
 - Check the lab results
 - Look at the Lab Test Menu
 - Visit the Investigative Guidelines

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Test Reports and Results

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How to Read Reports

Patient Info	Patient name: TEST, SARS COV2 POS (U)	Proficiency Testing
	Chart Number:	00000
	Date of Birth: 11/11/1911	
	County of Residence: Unknown	
Submitter Info	Date Collected: 5/11/2020	Clinician: QA, Test
	Date Received: 5/11/2020	Report Date: 5/11/2020
	PHL ID Number:	
Test Performed	Aptima SARS-CoV-2, NAAT	
	Specimen Source	Nasopharyngeal Swab
Result	SARS-CoV-2 DETECTED	
Reference Range = Normal Result	Reference Range: Normal Result = Not detected	
Testing Lab Info	Lab Director: John L. Fontana, PhD, (HCCLD) ABB CLIA: 38D0656824 CAP: 2442701	
	END OF REPORT (Final) 5/11/2020 Page: 1	TEST, SARS COV2 POS PHL ID:



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Influenza Reports from the OSPHL

MOLECULAR TESTING

Specimen Source: Nasopharyngeal Swab

RT-PCR for Influenza A: DETECTED

RT-PCR for Influenza A/H3: Undetected

RT-PCR for Influenza A/2009 H1N1: DETECTED

RT-PCR for Influenza B: Undetected

Reference Range: Normal result = Undetected

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Influenza Reports from the OSPHL

Influenza A/H5, RT-PCR

Specimen Source: Nasopharyngeal Swab

RT-PCR for Influenza A/H5a: **DETECTED**

10/25/24 3:00 PM

Specimen PRESUMPTIVE POSITIVE for Influenza A (H5) avian virus. The specimen is being forwarded to CDC for additional evaluation.

10/25/24 2:53 PM

Reference Range: Normal Result = Undetected

This assay is a modification of the FDA cleared real-time RT-PCR assay for influenza virus detection and subtyping. It was developed by the Centers for Disease Control and Prevention (CDC) and its performance

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What Can Results Mean?

Example: Enteric Pathogen Culture

Shigella Culture

Final Report

Specimen Source
Stool

RESULT
Shigella flexneri serotype 3b

- Patient's illness was caused by that pathogen
- Patient is colonized with that pathogen, but their illness isn't caused by it.
- Specimen was contaminated.

Campylobacter Identification

Final Report

Specimen Source
Stool

Submitted Media
Solid Media

Campylobacter Final Result
Campylobacter spp. not identified

- Patient's illness not caused by that pathogen
- Specimen was collected too late in illness or after antibiotics were started.
- Specimen was handled improperly

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What Can Results Mean?

Example: Chlamydia/Gonorrhea NAAT

Gonorrhea Screen Final

Positive for rRNA

Reference Range: Normal Result = Negative for rRNA

- Patient's illness was caused by that pathogen
- Patient had gonorrhea, was treated, and inactive bacteria was detected
- Specimen was contaminated

Gonorrhea Screen Final

Negative for rRNA

Reference Range: Normal Result = Negative for rRNA

- Patient's illness was not caused by that pathogen
- Insufficient or incorrect sample collected (not enough or no bacteria in specimen collection)
- Specimen was handled improperly





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Recap

What Are We Testing?	Pros	Cons
Antibodies 	<ul style="list-style-type: none"> Can give info about current, chronic, past, and immune status 	<ul style="list-style-type: none"> Check what antibody was tested – all mean different things
Antigens 	<ul style="list-style-type: none"> Tests for presence of pathogen 	<ul style="list-style-type: none"> Applicable use varies based on test – read the instructions!
Molecular 	<ul style="list-style-type: none"> Very specific Flexible/adaptable technology 	<ul style="list-style-type: none"> Can detect “dead” material
Pathogen 	<ul style="list-style-type: none"> Detects “live” material 	<ul style="list-style-type: none"> Can be fragile – make sure you handle specimens carefully

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Questions?

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