

Types of Laboratory Tests

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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?

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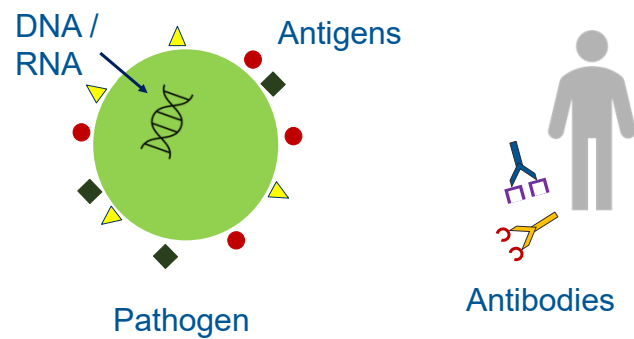
Why Test?

- 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

- Presence of antibodies in a patient sample
- Has the patient been exposed to this pathogen?

When you would use this test

- May be actively infected
- May have been infected in the past
- Check for immunity

Examples

- Hepatitis
- HIV



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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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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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Antigen Tests

What does it test for

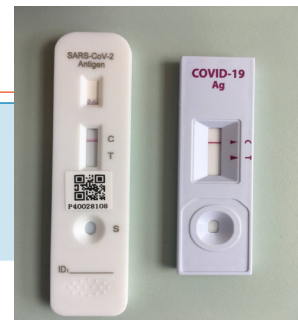
- Presence of antigens in a patient sample or isolate

When you would use this test

- Patient may be actively infected (symptomatic, close contact with a case)

Examples

- Rapid HIV
- Rapid SARS-CoV-2
- Salmonella serotyping



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Culture Tests

What does it test for

- Viable pathogen growth and isolation/identification of pathogen

When you would use this test

- Pathogen hasn't been identified yet
- Want to study it further (subtyping)
- Need to know if it is an active infection

Examples

- B. pertussis
- Enteric pathogen cultures
- Tuberculosis



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Molecular Tests

What does it test for

- Presence of genetic material in a patient sample
- Bacterial or viral
- Active/live or inactive/dead

When you would use this test

- Test for something specific
- High levels of sensitivity
- Need a faster result than culture

Examples

- Norovirus
- Influenza
- 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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Result Reports and Results

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Reading Result Reports

Patient Info	Patient name: TEST, SARS COV2 POS (U)	Proficiency Testing
	Chart Number:	00000
	Date of Birth: 11/11/1911	
Submitter Info	County of Residence: Unknown	
	Date Collected: 5/11/2020	
	Date Received: 5/11/2020	Clinician: QA, Test
	PHL ID Number:	Report Date: 5/11/2020
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, (HCLD) ABB	END OF REPORT (Final) 5/11/2020
	CLIA: 38D0656824 CAP: 2442701	Page: 1
		TEST, SARS COV2 POS PHL ID:

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Example: Influenza Reports from 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

Seasonal Influenza 2009 H1N1 DETECTED

Testing complete =
testing for A/H5a not
done.

If more testing is needed,
contact ACDP or OSPHL.

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Example: Influenza Reports from 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

Negative 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?

Antibodies



Pros

- Can give info about current, chronic, past, and immune status

Cons

- Check what antibody was tested – all mean different things

Antigens



- Tests for presence of pathogen

- Applicable use varies based on test – read the instructions!

Molecular



- Very specific
- Flexible/adaptable technology

- Can detect “dead” material

Pathogen



- Detects “live” material

- Can be fragile –handle specimens carefully

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Questions?

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