OREGON HEALTH AUTHORITY

Types of Laboratory Tests

1

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?

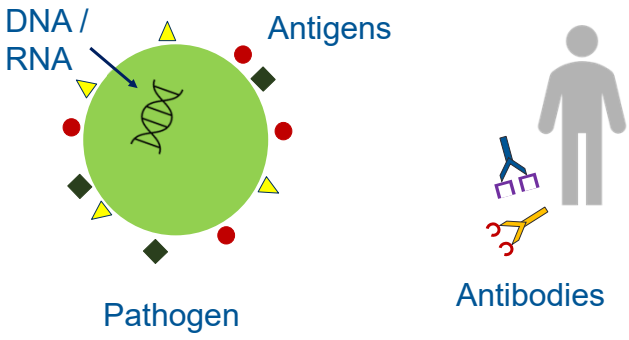
2

Why Test?

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

3

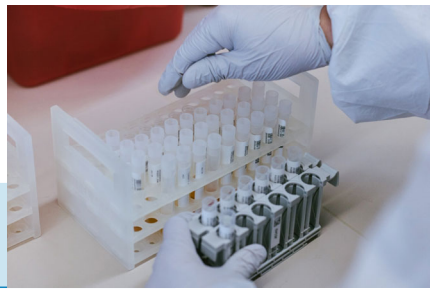
What are we testing?



4

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



5

5

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!

6

6

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

7

7

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

8

8

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

9

9

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

10

10

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

11

11

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

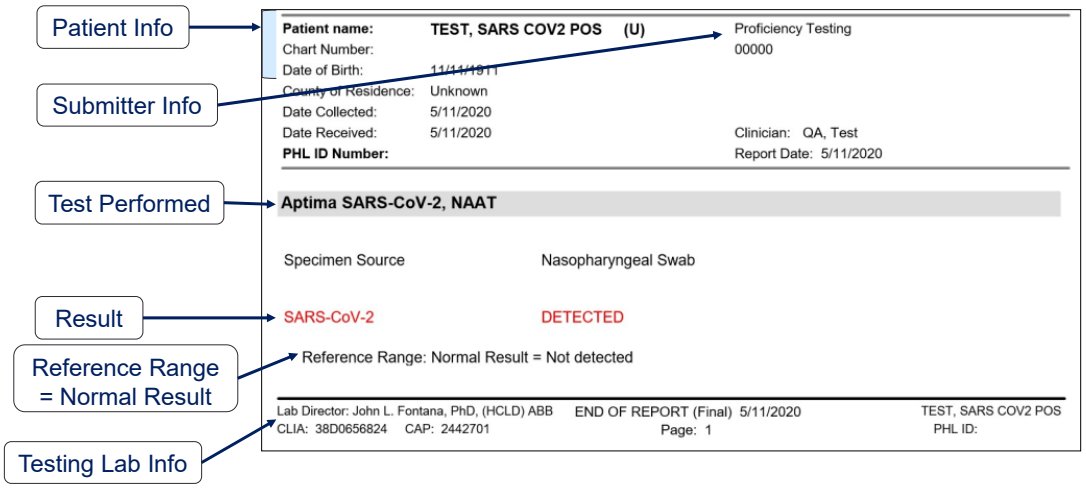
12

12

Result Reports and Results

13

Reading Result Reports



14

14

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.

15

15

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

16

16

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

17

17

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

18

18

Recap

What Are We Testing?	Pros	Cons
Antibodies 	• Can give info about current, chronic, past, and immune status	• 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

19

19

OREGON HEALTH AUTHORITY

Questions?

20

20