

# Lab Testing 101

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Colorado Department of Public Health and  
Environment

Laboratory Services Division



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# Testing the CDPHE Laboratory

- Public Health Microbiology Laboratory
  - Focus on patient specimen
  - Bacterial Identification & Characterization
    - Isolation of bacterial species from patient specimen
    - Serotyping/Serogrouping of bacterial isolates
    - Antimicrobial resistance profiling
- Environmental Microbiology Laboratory
  - Focus on food, water & environmental specimens
    - Perform similar analysis as PHM laboratory
- Serology Laboratory
  - Focus on patient and animal specimen
  - Testing looks for evidence of infection (antibodies)
- Molecular Sciences Laboratory
  - Molecular (nucleic acid based) detection of infectious agents

# Culture – where it all begins

- Culture (or isolation) of a bacterial organism from a patient specimen is the first step
- Culture Independent Diagnostic Testing (CIDT):  
Many pathogens can now be directly identified in patient samples through molecular analysis but all currently available characterization methods (strain typing, cluster analysis, antimicrobial resistance characterization, etc) require isolation



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# Culture

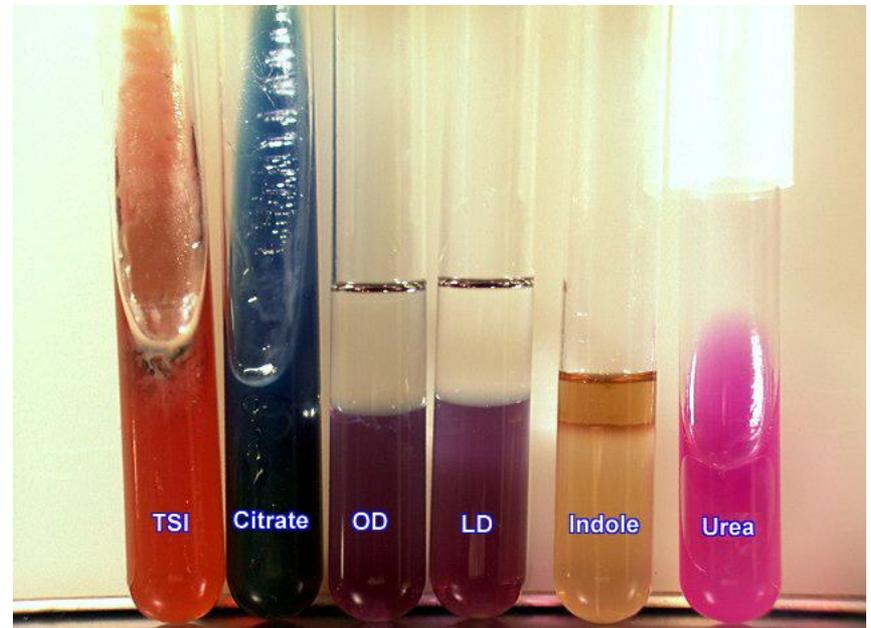
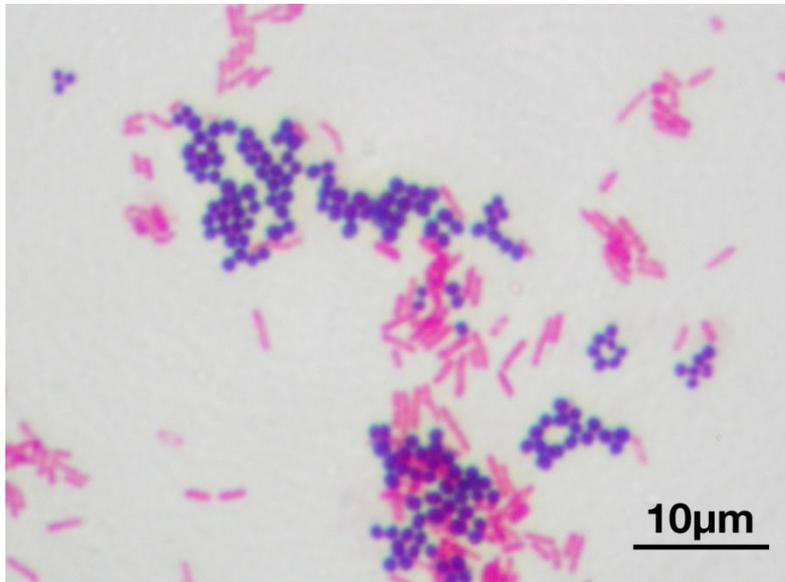


# Characterization of bacterial isolates

- Biochemical analysis
- Serotype or Serogroup analysis
- PCR detection of virulence determinants
- Molecular finger printing
  - Pulse Field Gel Electrophoresis (PFGE)
  - Multi (MLVA)
- Sequencing
  - Bacterial identification by 16S
- Next Generation Sequencing
  - Whole Genome Sequencing

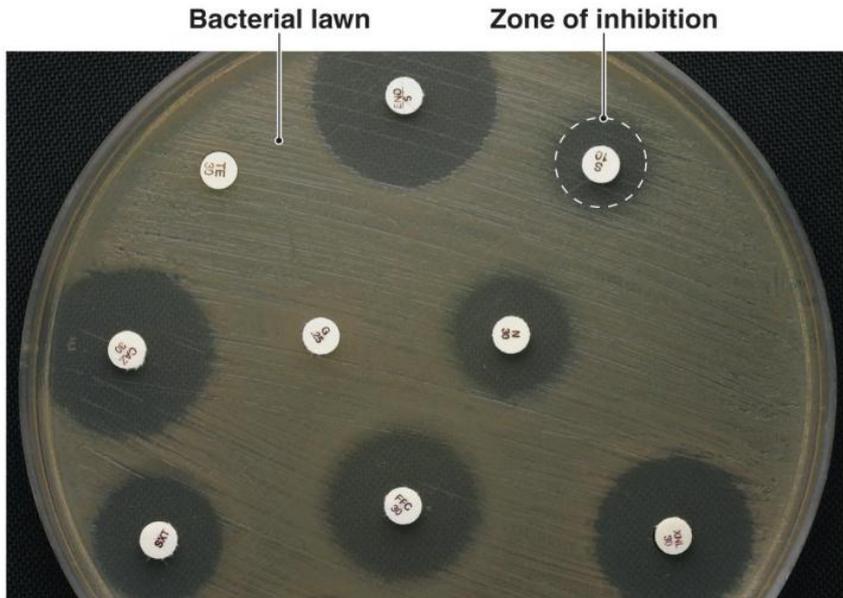
# Traditional Microbiology: Gram Stain and Biochemical analysis

- Individual colonies of pure bacterial isolates from each media type categorized by their gram type, cell shape and biochemical characteristics (such as enzyme production and sugar metabolism)

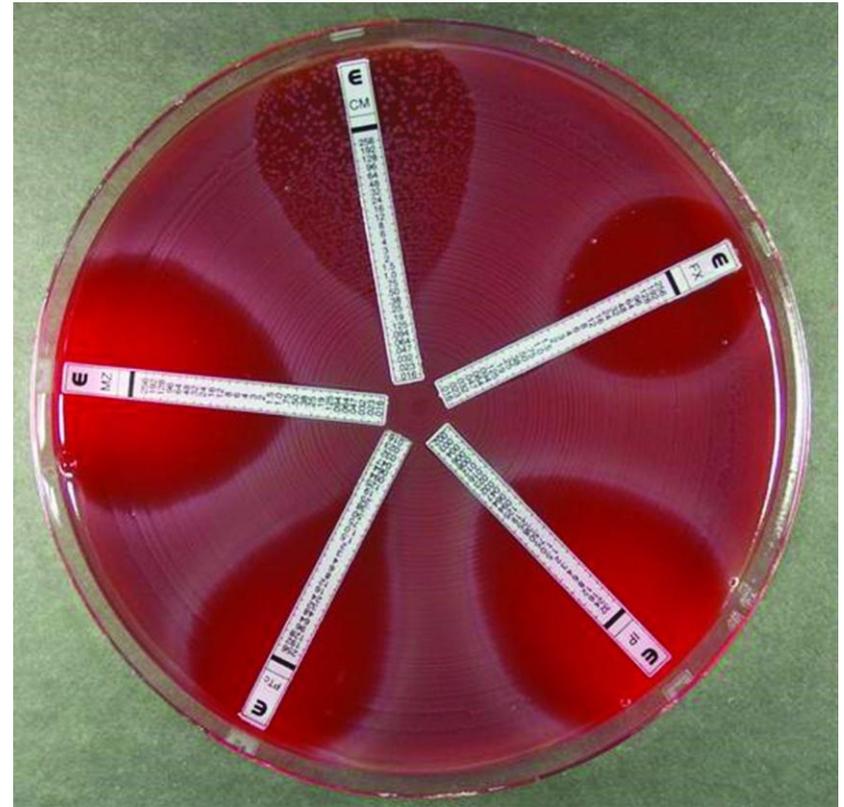


# Antimicrobial Susceptibility Testing

**Disk Diffusion Method:**  
**Zone of inhibition**

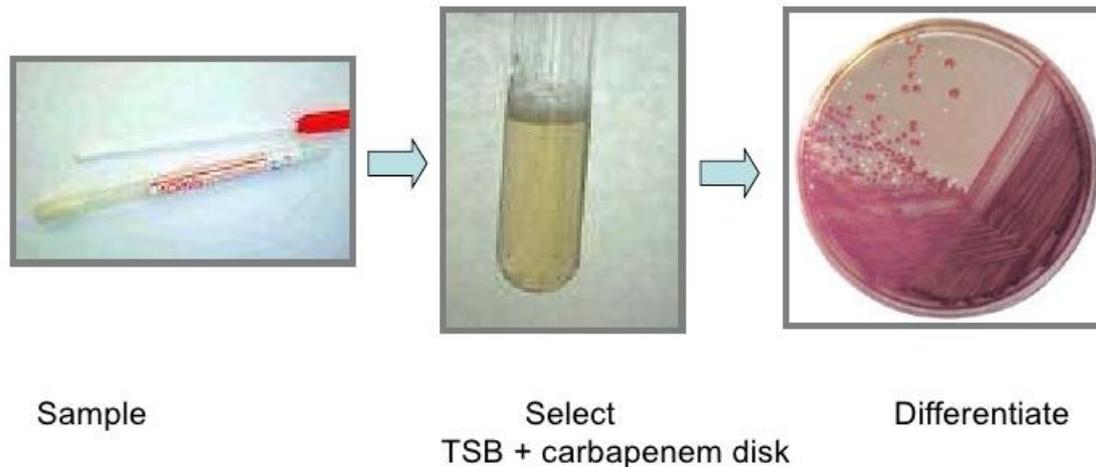


**MIC Method:**  
**Minimum Inhibitory Concentration**



# Carbapenem Resistance (CRE)

## Screening for CRE carriage

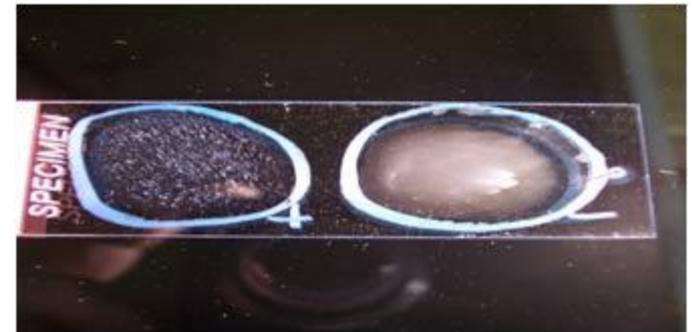
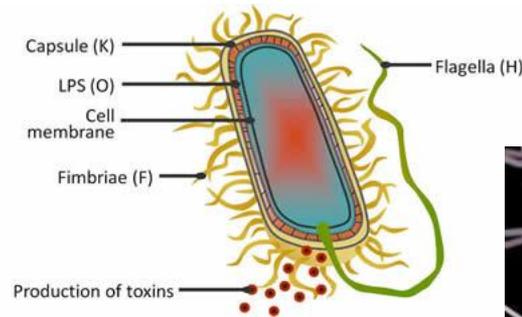


## CRE PCR

- Requires an isolate
- Detects the presence of the genes for bacterial enzymes that break down antibiotics
  - KPC
  - NDM-1

# Serotyping

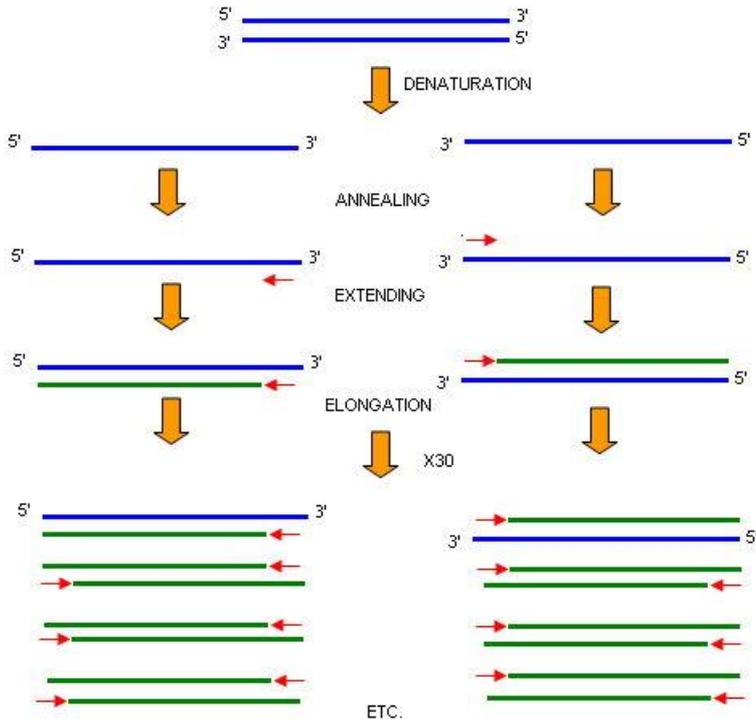
- Bacterial organisms can be grouped based on type of molecules they express on their surface
- Traditional Serotyping: looks for a reaction (agglutination) between a suspension of the pure bacterial isolate and an antisera (antibodies directed against a specific bacterial surface molecule)
- Can be performed by molecular analysis for some bacterial species (such as Salmonella)



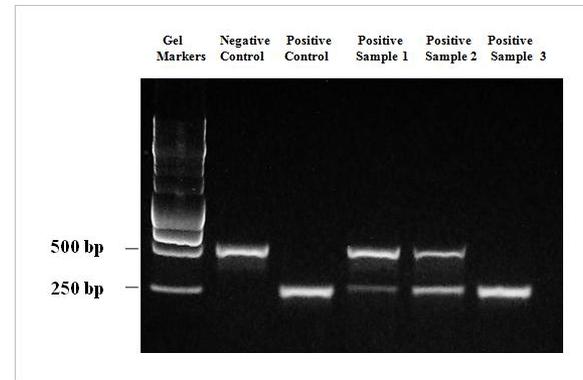
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# Polymerase Chain Reaction (PCR): The sequence specific amplification of a target nucleic acid

## Traditional PCR

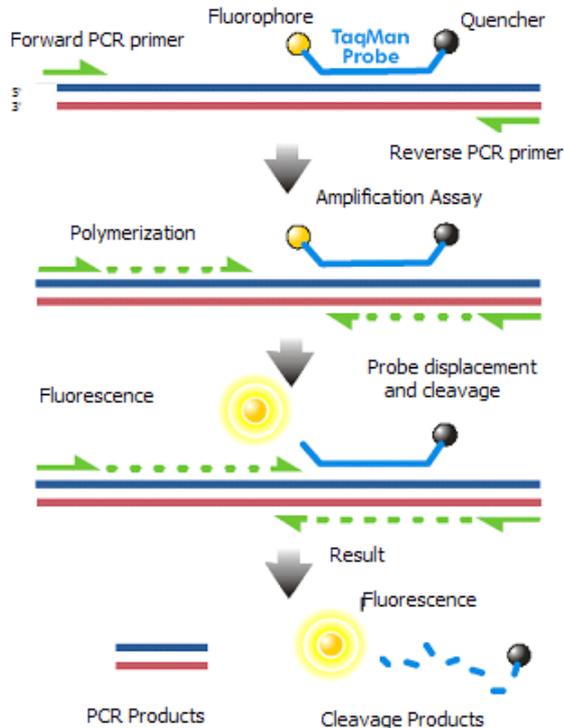


Products can be visualized by gel electrophoresis and are used as input for downstream analysis including sequencing

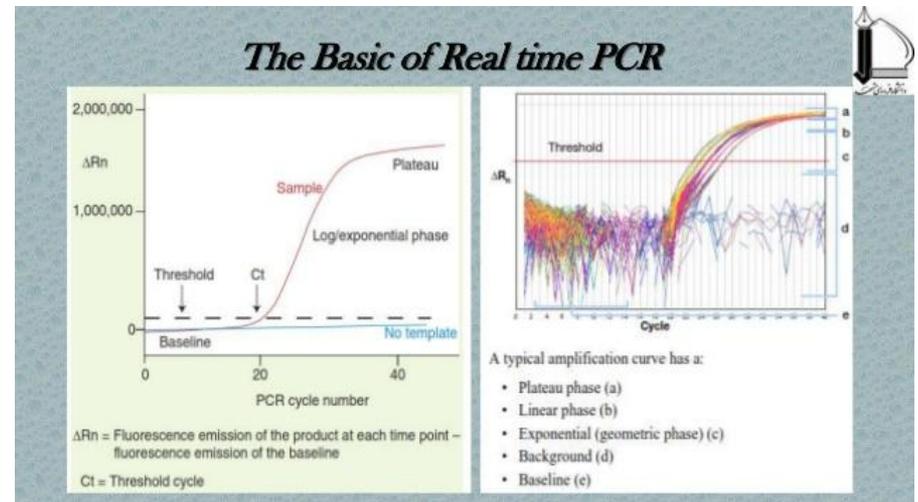


# Polymerase Chain Reaction (PCR): The sequence specific amplification of a target nucleic acid

## Real-Time PCR

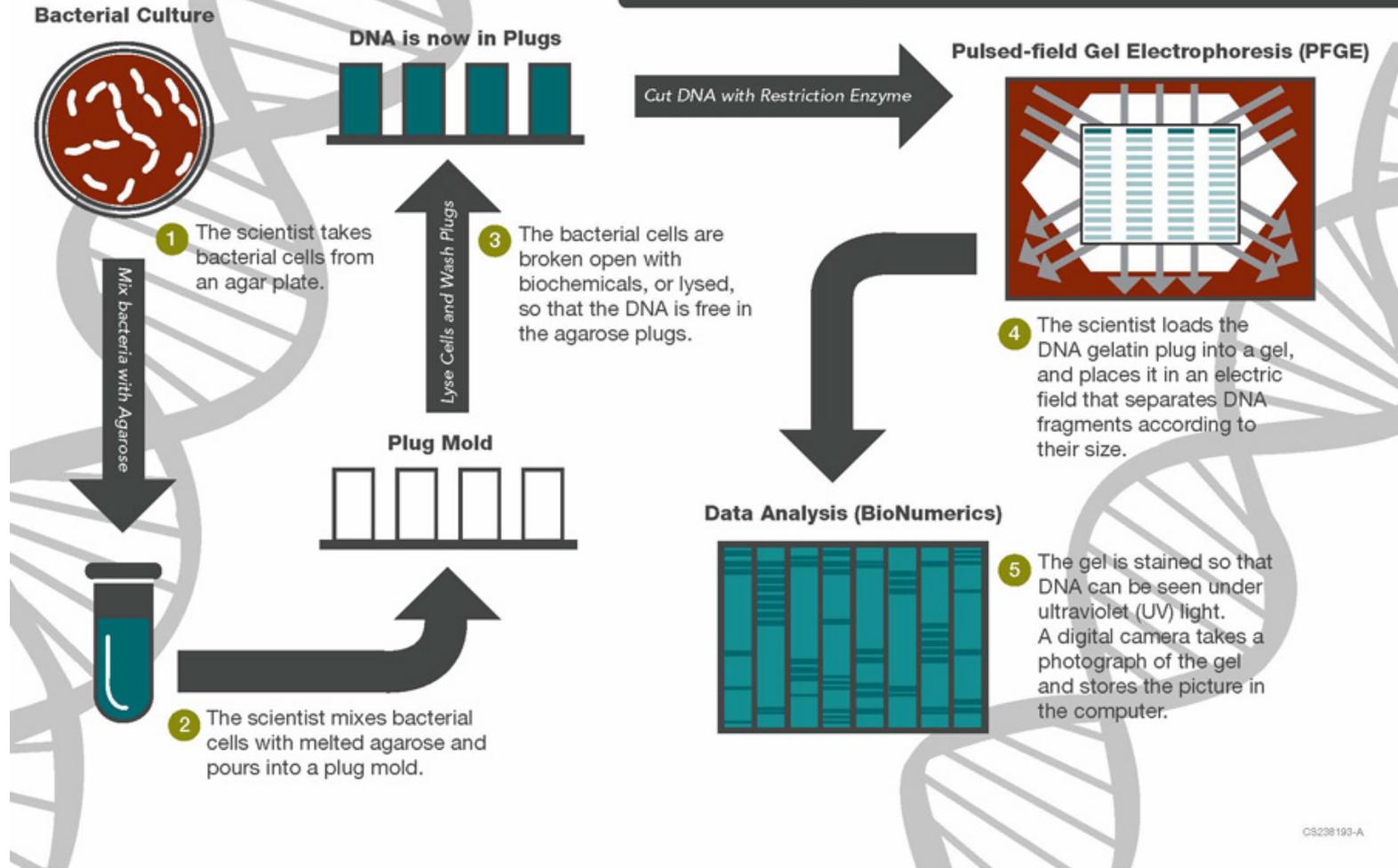


Products are visualized as an increase in fluorescence that is proportional to the amount of target sequence in the specimen



- Advantages over traditional PCR include decreased contamination and increased throughput
- Examples of real-time PCR assays at CDPHE lab: norovirus, influenza, STEC (stx1/stx2), CRE detection (KPC/NDM-1), detection & typing of vaccine preventable bacterial diseases (H. flu, S. pneumoniae, N. meningitidis)

# The Pulsed-field Gel Electrophoresis Process

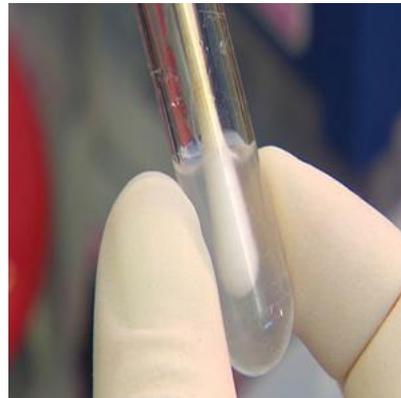


# PFGE process



The scientist takes bacterial cells from an agar plate.

*\*requires isolation of a pure bacterial culture from a patient specimen*



The scientist mixes bacterial cells with melted agarose (which is like gelatin) before DNA is extracted from them. The extracted DNA is cut with special enzymes that recognize specific DNA sequences.



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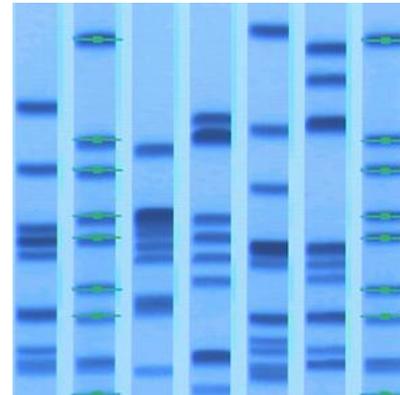
# PFGE continued



The scientist loads the DNA gelatin plug into a gel, and places it in an electric field that separates DNA fragments according to their size.

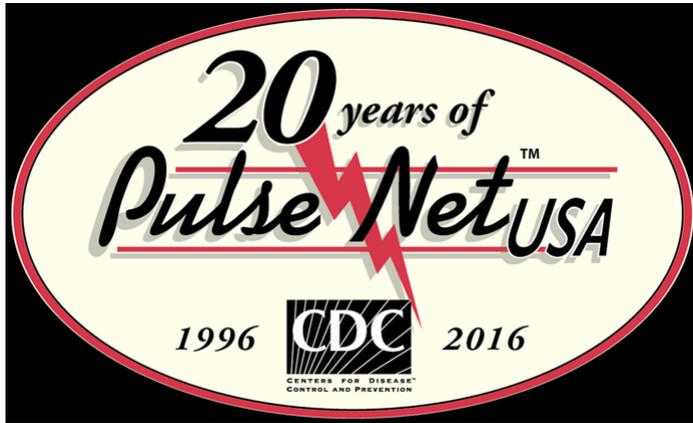


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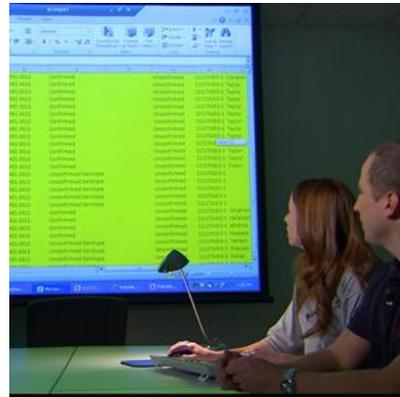


The gel is stained so that DNA can be seen under ultraviolet (UV) light. A digital camera takes a photograph of the gel and stores the picture in the computer.

# PFGE Data Analysis



PulseNet uses computer software to compare this DNA fingerprint picture with others. The computer software compares DNA fingerprints from many samples in the database.



Scientists at state or local public health departments enter patterns of DNA fingerprints into an electronic database.

These patterns are transmitted to CDC and filed in CDC's main PulseNet computer.

If patterns from different labs match, the PulseNet team will alert all involved PulseNet labs of a possible foodborne outbreak.



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# MLVA Process

(Multiple Locus Variable-Number Tandem Repeat Analysis)

## Bacterial Culture



Boil bacteria to release DNA

- 1 Scientists take bacterial cells from an agar plate and boil the cells to release DNA.



- 2 Scientists have to detect the DNA region needed for this type of fingerprinting, called the variable-number tandem repeat arrays (VNTR). To do this, they use polymerase chain reaction (PCR), which combines the DNA with chemicals to amplify the VNTR.

PCR amplification



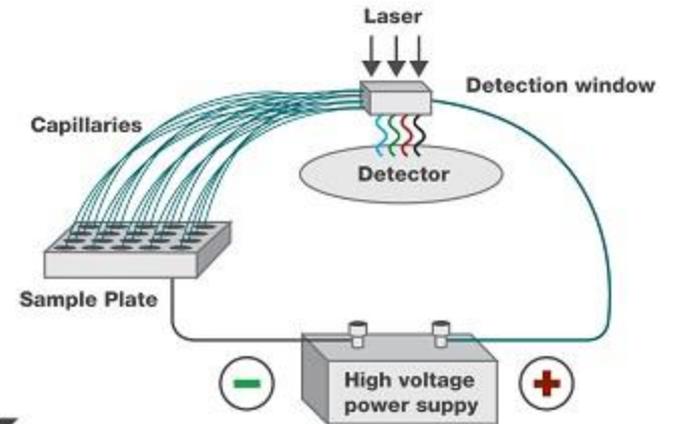
PCR product analysis

- 3 After PCR, scientists must determine the size of the PCR products. The different sizes will tell scientists how related the bacterial strains are to each other.

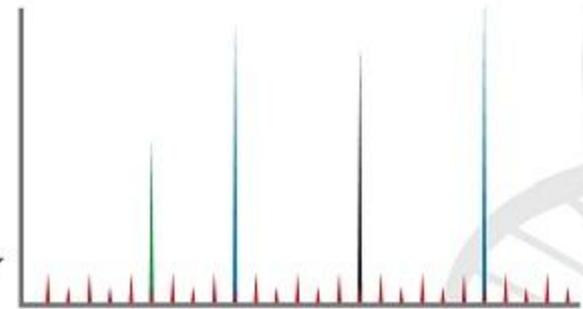


Load plate into device

- 4 Scientists load the PCR products into a sample analysis plate and mix them with chemicals that help them determine the size of the product.



- 5 Using capillary electrophoresis, the fragment analysis solution is run through a gel matrix in an electric field to determine the sizes of the DNA fragments.



- 6 The data output of the MLVA process is called an electropherogram. It shows the DNA standards of known size in red, and the sizes of the PCR products in blue, green, and black. The PCR products sizes are converted into allele types using special software, which lets scientists determine how closely they are related.

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## What is MLVA?

- MLVA, an abbreviation for **multiple locus variable** number of tandem repeats **analysis**, is another technique used by microbiologists to generate a DNA fingerprint or a bacterial isolate. Microbiologists usually perform MLVA after they have performed [Pulsed-Field Gel Electrophoresis \(PFGE\)](#) so they can get more details about the type of bacteria that may be causing an outbreak.

## Advantages of MLVA

- MLVA may be able to differentiate suspected, fast-evolving bacterial strains from an outbreak even though those strains might look the same using other methods of DNA fingerprinting, such as PFGE.
- Public health labs use MLVA as a complementary technique to PFGE, allowing microbiologists to see more detailed differences between bacteria that have similar PFGE patterns.

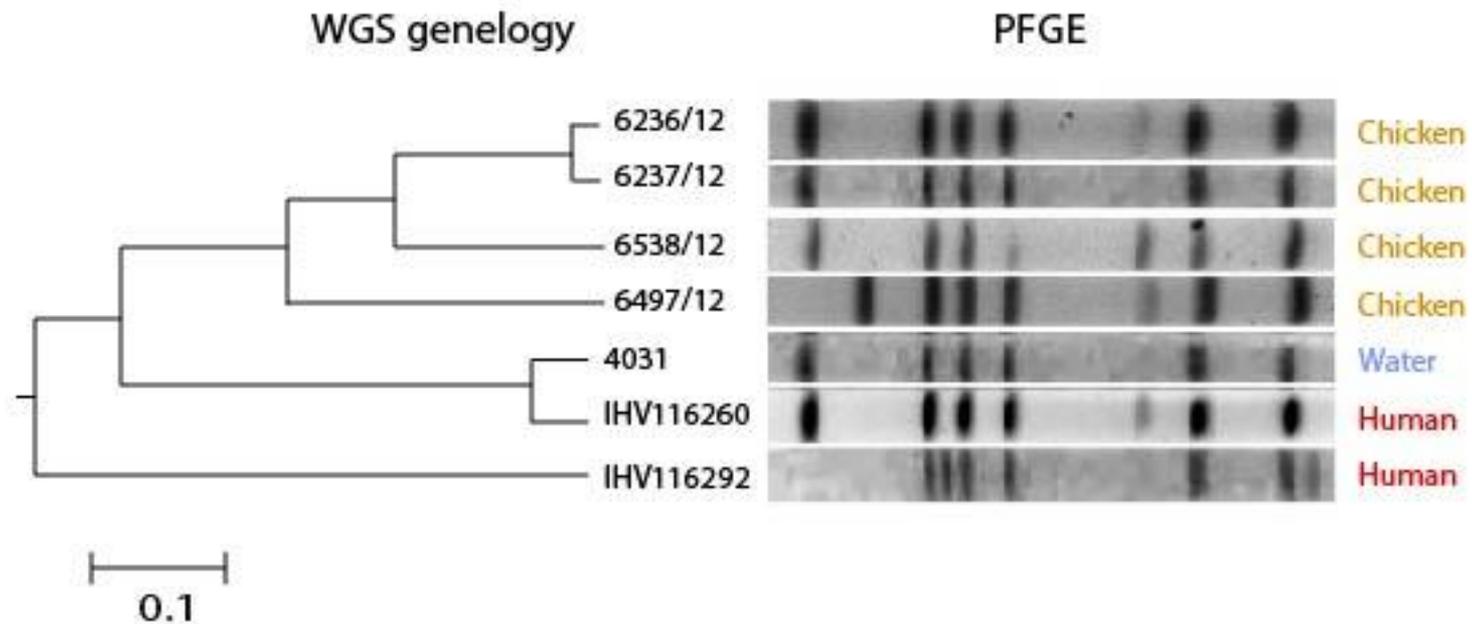
## Limitations of MLVA

- Requires a trained and skilled technician
- Is not a practical routine subtyping method because a specific protocol must be used for each pathogen
- A few standardized protocols are available, but only the most common pathogens are subtyped by this method



# Whole Genome Sequencing (WGS)

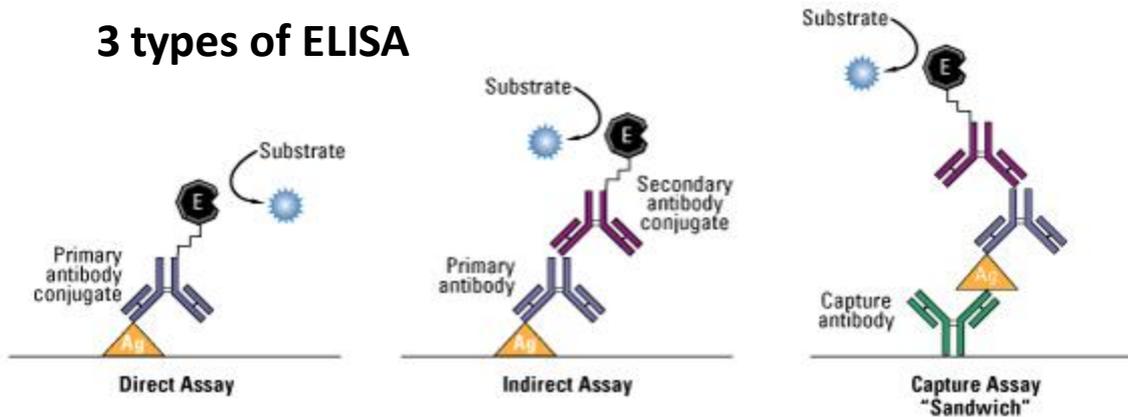
- Sequence of the entire genome of each isolate
- Computational analysis of multiple genome loci allow comparison of isolates



# ELISA

- ELISA = Enzyme Linked Immunosorbant Assay (also called EIA)
- Detects infection by looking for antibodies or antigen in a patient serum specimen
  - Antibodies are produced by the patient's immune system in response to infection and can be detected during and after infection (IgM/IgG)
  - Antigens are part of the infectious agent and can only be detected during an active infection
- Examples of ELISA tests: HIV, Measles, Rubella, WNV, Hantavirus, Zika

## 3 types of ELISA



# What else does the state lab do?

- Mycobacterium tuberculosis and NTM testing
- STI testing (Syphilis, Chlamydia, Gonorrhea, Trichomonas)
- Rabies testing (DFA)
- Water, Environmental and Food testing (testing for bacterial, chemical and radiologic contamination)
- Newborn Screening

# How soon can I expect a result?

- Culture – a few days
- PCR – a few hours
- ELISA – next day
- PFGE – 2 days after culture
- MLVA/WGS – variable
  
- For fastest results – please submit all requested information!



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Collection No:

REQUEST FOR ANALYTICAL SERVICES #270/71  
Human Specimens and Cultures Isolates Only

CUSTOMER INFORMATION	PATIENT INFORMATION	COMMENTS/HISTORY	
<b>Customer ID:</b> Name: Address: City/State/Zip: Contact Name: Contact Phone: Contact E-mail: Secure Fax: Doctor's Name: Doctor's Phone:	<b>Patient ID:</b> Last Name: First Name: Address: City/State/Zip: County: Phone: Date of Birth: <u>    </u> <u>    </u> <u>    </u> Gender:	<b>Race (mark one or more)</b> <input type="checkbox"/> Asian <input type="checkbox"/> American Indian/ Alaskan Native <input type="checkbox"/> Black/ African American <input type="checkbox"/> Native Hawaiian/ Other Pacific <input type="checkbox"/> White <input type="checkbox"/> Other <input type="checkbox"/> Unknown <b>Reason for Visit (mark all that apply)</b> <input type="checkbox"/> Symptomatic <input type="checkbox"/> Exposed to STD in past 60 days <input type="checkbox"/> IUD Insertion <input type="checkbox"/> Patient Request <input type="checkbox"/> Pregnancy test only visit <input type="checkbox"/> Client meets screening criteria <input type="checkbox"/> Positive CT - 3 months rescreen <b>Risk History</b> <input type="checkbox"/> More than one partner in past 60 days <input type="checkbox"/> New partner in past 60 days <input type="checkbox"/> No risk <input type="checkbox"/> Positive for CT in past 12 months <b>HIV Rapid Test Result (For HIV testing submissions)</b> <input type="checkbox"/> Reactive <input type="checkbox"/> Non-Reactive	<b>Ethnicity</b> <input type="checkbox"/> Hispanic <input type="checkbox"/> Non-Hispanic <input type="checkbox"/> Unknown <b>Clinical Signs</b> <input type="checkbox"/> Cervical friability <input type="checkbox"/> Mucopus <input type="checkbox"/> PID <input type="checkbox"/> Urethritis <input type="checkbox"/> None <b>Treatment</b> Patient presumptively treated for Chlamydia <input type="checkbox"/> Yes <input type="checkbox"/> No <b>Pregnancy Test</b> <input type="checkbox"/> POS <input type="checkbox"/> NEG <input type="checkbox"/> Not Done
OUTBREAK INFORMATION			
Outbreak ID# or Outbreak Name: Date of Onset:			
CRIMINAL CASE INFORMATION			
Criminal Case Number:                      Division:                      _____ Number of Victims:                      Court Room Number:                      _____ Judge's Name:                      _____			
SPECIMEN INFORMATION			
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CHAIN OF CUSTODY			
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Temperature at recie			

\* Specimens requiring testing performed at the state laboratory will be sent to the CDC. Please include onset date and clinical history. Results may take 3 months

## Customer Information

- Customer ID
- Name
- Address
- Phone #
- FAX
  - This should be a secure HIPPA compliant FAX number
  - Results will be sent to this FAX number



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## Patient Information

- Patient ID
- Name
- Address
- Date of Birth
- Gender
- **Two (2) unique identifiers are required for every patient specimen**
  - Name & D.O.B



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MOLECULAR SCIENCE- MICROBIOLOGY	TEST ORDER	SEROLOGY	
<b>Test Method</b> <input type="checkbox"/> CONFIRMATION Isolate <input type="checkbox"/> Culture <input type="checkbox"/> EIP <input type="checkbox"/> DNA Sequencing <input type="checkbox"/> PCR <input type="checkbox"/> PFGE	<input type="checkbox"/> Brucella abortus (total Ig) <input type="checkbox"/> Hantavirus (IgM/IgG) <input type="checkbox"/> Measles (IgM)	<input type="checkbox"/> Rubella (IgM) <input type="checkbox"/> West Nile Virus (IgM/IgG) <input type="checkbox"/> Other	
<input type="checkbox"/> Bordetella pertussis <input type="checkbox"/> Campylobacter <input type="checkbox"/> Chlamydia Only TMA <input type="checkbox"/> Chlamydia/Gonorrhoeae TMA <input type="checkbox"/> Corynebacteria diphtheriae <input type="checkbox"/> Cryptosporidium/Giardia <input type="checkbox"/> E. coli O157/non-O157 STEC <input type="checkbox"/> Francisella tularensis (tularemia) <input type="checkbox"/> Haemophilus influenzae <input type="checkbox"/> Influenza virus <input type="checkbox"/> Listeria <input type="checkbox"/> Mycobacterium tuberculosis <input type="checkbox"/> Neisseria meningitidis	<input type="checkbox"/> Norovirus <input type="checkbox"/> Parasitology <input type="checkbox"/> Salmonella <input type="checkbox"/> Shigella <input type="checkbox"/> Strep Group A <input type="checkbox"/> Strep Group B <input type="checkbox"/> Strep pneumoniae <input type="checkbox"/> Vibrio sp. <input type="checkbox"/> West Nile Virus <input type="checkbox"/> Yersinia sp. <input type="checkbox"/> Yersinia pestis (Plague) <input type="checkbox"/> CDC Sendout: <input type="checkbox"/> Other	<input type="checkbox"/> Hepatitis A (IgM) <input type="checkbox"/> HIV-1/HIV-2 EIA <input type="checkbox"/> RPR (serum/plasma) <input type="checkbox"/> Hepatitis B (anti HBs) <input type="checkbox"/> HIV-1 Western Blot <input type="checkbox"/> TP-PA (serum/plasm <input type="checkbox"/> Hepatitis B (HBsAg) <input type="checkbox"/> HIV-1 Oral fluid EIA <input type="checkbox"/> VDRL (CSF) <input type="checkbox"/> Hepatitis C (total Ig)	
<b>CHAIN OF CUSTODY</b>			
Relinquished by: _____		Date/Time: _____	Received by: _____
Relinquished by: _____		Date/Time: _____	Received by: _____
Relinquished by: _____		Date/Time: _____	Received by: _____
Temperature at recie _____			

\* Specimens requiring testing performed at the state laboratory will be sent to the CDC. Please include onset date and clinical history. Results may take 3 months

## Outbreak Information

- Outbreak ID
- Date of Onset



Laboratory Services Division  
 8100 Lowry Boulevard, Denver, CO 80230-6928  
 US Mail: PO Box 17123, Denver, CO 80217  
 (303) 692-3090 fax: (303) 344-9989

LABORATORY USE ONLY

Collection No:

REQUEST FOR ANALYTICAL SERVICES #270/71  
 Human Specimens and Cultures Isolates Only

CUSTOMER INFORMATION	PATIENT INFORMATION	COMMENTS/HISTORY	
<b>Customer ID:</b> Name: Address: City/State/Zip: Contact Name: Contact Phone: Contact E-mail: Secure Fax: Doctor's Name: Doctor's Phone:	<b>Patient ID:</b> Last Name: First Name: Address: City/State/Zip: County: Phone: Date of Birth: <u>    </u> <u>    </u> <u>    </u> Gender:	<b>Race (mark one or more)</b> <input type="checkbox"/> Asian <input type="checkbox"/> American Indian/ Alaskan Native <input type="checkbox"/> Black/ African American <input type="checkbox"/> Native Hawaiian/ Other Pacific <input type="checkbox"/> White <input type="checkbox"/> Other <input type="checkbox"/> Unknown <b>Reason for Visit (mark all that apply)</b> <input type="checkbox"/> Symptomatic <input type="checkbox"/> Exposed to STD in past 60 days <input type="checkbox"/> IUD Insertion <input type="checkbox"/> Patient Request <input type="checkbox"/> Pregnancy test only visit <input type="checkbox"/> Client meets screening criteria <input type="checkbox"/> Positive CT - 3 months rescreen <b>Risk History</b> <input type="checkbox"/> More than one partner in past 60 days <input type="checkbox"/> New partner in past 60 days <input type="checkbox"/> No risk <input type="checkbox"/> Positive for CT in past 12 months <b>HIV Rapid Test Result (For HIV testing submissions)</b> <input type="checkbox"/> Positive <input type="checkbox"/> Non-Positive	<b>Ethnicity</b> <input type="checkbox"/> Hispanic <input type="checkbox"/> Non-Hispanic <input type="checkbox"/> Unknown <b>Clinical Signs</b> <input type="checkbox"/> Cervical friability <input type="checkbox"/> Mucopus <input type="checkbox"/> PID <input type="checkbox"/> Urethritis <input type="checkbox"/> None <b>Treatment</b> Patient presumptively treated for Chlamydia <input type="checkbox"/> Yes <input type="checkbox"/> No <b>Pregnancy Test</b> <input type="checkbox"/> POS <input type="checkbox"/> NEG <input type="checkbox"/> Not Done
<b>OUTBREAK INFORMATION</b>			
Outbreak ID# or Outbreak Name: _____			
Date of Onset: _____			
<b>CRIMINAL CASE INFORMATION</b>			
Criminal Case Number: _____ Division: _____			
Number of Victims: _____ Court Room Number: _____			
Judge's Name: _____			
<b>SPECIMEN INFORMATION</b>			
Collection Date/Time: _____		Collection Type	
Collected by: _____		<input type="checkbox"/> Aspirate <input type="checkbox"/> Culture, broth <input type="checkbox"/> TMA Tube <input type="checkbox"/> O & P Kit <input type="checkbox"/> Culture, tube <input type="checkbox"/> Transport media <input type="checkbox"/> Swab <input type="checkbox"/> Culture, plate <input type="checkbox"/> Other	
<b>SPECIMEN TYPE - SOURCE</b>			
<input type="checkbox"/> Blood <input type="checkbox"/> CSF <input type="checkbox"/> N-P <input type="checkbox"/> Plasma <input type="checkbox"/> Serum <input type="checkbox"/> Stool <input type="checkbox"/> Urethral <input type="checkbox"/> Vaginal <input type="checkbox"/> Cervical <input type="checkbox"/> Lymph Node <input type="checkbox"/> Oral Fluid <input type="checkbox"/> Rectal <input type="checkbox"/> Sputum <input type="checkbox"/> Throat/pharyngeal <input type="checkbox"/> Urine <input type="checkbox"/> Other			
<b>MOLECULAR SCIENCE- MICROBIOLOGY</b>		<b>SEROLOGY</b>	
<b>Test Method</b> <input type="checkbox"/> CONFIRMATION Isolate <input type="checkbox"/> Culture <input type="checkbox"/> EIP <input type="checkbox"/> DNA Sequencing <input type="checkbox"/> PCR <input type="checkbox"/> PFGE		<input type="checkbox"/> Brucella abortus (total Ig) <input type="checkbox"/> Rubella (IgM) <input type="checkbox"/> Hantavirus (IgM/IgG) <input type="checkbox"/> West Nile Virus (IgM/IgG) <input type="checkbox"/> Measles (IgM) <input type="checkbox"/> Other	
<input type="checkbox"/> Bordetella pertussis <input type="checkbox"/> Campylobacter <input type="checkbox"/> Chlamydia Only TMA <input type="checkbox"/> Chlamydia/Gonorrhoeae TMA <input type="checkbox"/> Corynebacteria diphtheriae <input type="checkbox"/> Cryptosporidium/Giardia <input type="checkbox"/> E. coli O157/non-O157 STEC <input type="checkbox"/> Francisella tularensis (tularemia) <input type="checkbox"/> Haemophilus influenzae <input type="checkbox"/> Influenza virus <input type="checkbox"/> Listeria <input type="checkbox"/> Mycobacterium tuberculosis <input type="checkbox"/> Neisseria meningitidis		<input type="checkbox"/> HIV-1/HIV-2 EIA <input type="checkbox"/> RPR (serum/plasma) <input type="checkbox"/> HIV-1 Western Blot <input type="checkbox"/> TP-PA (serum/plasma) <input type="checkbox"/> HIV-1 Oral fluid EIA <input type="checkbox"/> VDRL (CSF) <input type="checkbox"/> Hepatitis A (IgM) <input type="checkbox"/> Hepatitis B (anti HBs) <input type="checkbox"/> Hepatitis B (HBsAg) <input type="checkbox"/> Hepatitis C (total Ig)	
<b>CHAIN OF CUSTODY</b>			
Relinquished by:	Date/Time:	Received by:	Date/Time:
Relinquished by:	Date/Time:	Received by:	Date/Time:
Relinquished by:	Date/Time:	Received by:	Date/Time:
Temperature at recie			

\* Specimens requiring testing performed at the state laboratory will be sent to the CDC. Please include onset date and clinical history. Results may take 3 months

## Specimen Information

- Collection Date/Time
  - Required field
- Collection Type
  - Swab, Culture, broth, etc
- Specimen Type – Source
  - Blood, stool, etc



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LABORATORY USE ONLY

Collection No:

REQUEST FOR ANALYTICAL SERVICES #270/71  
 Human Specimens and Cultures Isolates Only

CUSTOMER INFORMATION	PATIENT INFORMATION	COMMENTS/HISTORY		
<b>Customer ID:</b> Name: Address: City/State/Zip: Contact Name: Contact Phone: Contact E-mail: Secure Fax: Doctor's Name: Doctor's Phone:	<b>Patient ID:</b> Last Name: First Name: Address: City/State/Zip: County: Phone: Date of Birth: <u>    </u> <u>    </u> <u>    </u> Gender:	<b>Race (mark one or more)</b> <input type="checkbox"/> Asian <input type="checkbox"/> American Indian/ Alaskan Native <input type="checkbox"/> Black/ African American <input type="checkbox"/> Native Hawaiian/ Other Pacific <input type="checkbox"/> White <input type="checkbox"/> Other <input type="checkbox"/> Unknown <b>Reason for Visit (mark all that apply)</b> <input type="checkbox"/> Symptomatic <input type="checkbox"/> Exposed to STD in past 60 days <input type="checkbox"/> IUD Insertion <input type="checkbox"/> Patient Request <input type="checkbox"/> Pregnancy test only visit <input type="checkbox"/> Client meets screening criteria <input type="checkbox"/> Positive CT - 3 months rescreen <b>Risk History</b> <input type="checkbox"/> More than one partner in past 60 days <input type="checkbox"/> New partner in past 60 days <input type="checkbox"/> No risk <input type="checkbox"/> Positive for CT in past 12 months <b>HIV Rapid Test Result (For HIV testing submissions)</b> <input type="checkbox"/> Reactive <input type="checkbox"/> Non-Reactive	<b>Ethnicity</b> <input type="checkbox"/> Hispanic <input type="checkbox"/> Non-Hispanic <input type="checkbox"/> Unknown <b>Clinical Signs</b> <input type="checkbox"/> Cervical friability <input type="checkbox"/> Mucopus <input type="checkbox"/> PID <input type="checkbox"/> Urethritis <input type="checkbox"/> None <b>Treatment</b> Patient presumptively treated for Chlamydi <input type="checkbox"/> Yes <input type="checkbox"/> No <b>Pregnancy Test</b> <input type="checkbox"/> POS <input type="checkbox"/> NEG <input type="checkbox"/> Not Done	
OUTBREAK INFORMATION				
Outbreak ID# or Outbreak Name: Date of Onset:				
CRIMINAL CASE INFORMATION				
Criminal Case Number: <u>                    </u> Division: <u>                    </u> Number of Victims: <u>                    </u> Court Room Number: <u>                    </u> Judge's Name: <u>                                    </u>				
SPECIMEN INFORMATION				
Collection Date/Time: <u>    </u> <u>    </u> <u>    </u> <u>    </u> <u>    </u> <u>    </u> Collected by: <u>                                    </u> <input type="checkbox"/> a.m. <input type="checkbox"/> p.m.		<b>Collection Type</b> <input type="checkbox"/> Aspirate <input type="checkbox"/> Culture, broth <input type="checkbox"/> TMA Tube <input type="checkbox"/> O & P Kit <input type="checkbox"/> Culture, tube <input type="checkbox"/> Transport media <input type="checkbox"/> Swab <input type="checkbox"/> Culture, plate <input type="checkbox"/> Other		
SPECIMEN TYPE - SOURCE				
<input type="checkbox"/> Blood <input type="checkbox"/> CSF <input type="checkbox"/> N-P <input type="checkbox"/> Plasma <input type="checkbox"/> Serum <input type="checkbox"/> Stool <input type="checkbox"/> Urethral <input type="checkbox"/> Vaginal <input type="checkbox"/> Conjugal <input type="checkbox"/> Lymph Node <input type="checkbox"/> Oral Fluid <input type="checkbox"/> Rectal <input type="checkbox"/> Sputum <input type="checkbox"/> Throat/Pharyngeal <input type="checkbox"/> Urine <input type="checkbox"/> Other				
MOLECULAR SCIENCE- MICROBIOLOGY	TEST ORDER	SEROLOGY		
<b>Test Method</b> <input type="checkbox"/> CONFIRMATION Isolate <input type="checkbox"/> Culture <input type="checkbox"/> EIP <input type="checkbox"/> DNA Sequencing <input type="checkbox"/> PCR <input type="checkbox"/> PFGE	<input type="checkbox"/> Brucella abortus (total Ig) <input type="checkbox"/> Hantavirus (IgM/IgG) <input type="checkbox"/> Measles (IgM)	<input type="checkbox"/> Rubella (IgM) <input type="checkbox"/> West Nile Virus (IgM/IgG) <input type="checkbox"/> Other <input type="checkbox"/> Hepatitis A (IgM) <input type="checkbox"/> HIV-1/HIV-2 EIA <input type="checkbox"/> RPR (serum/plasma) <input type="checkbox"/> Hepatitis B (anti HBs) <input type="checkbox"/> HIV-1 Western Blot <input type="checkbox"/> TP-PA (serum/plasm <input type="checkbox"/> Hepatitis B (HBsAg) <input type="checkbox"/> HIV-1 Oral fluid EIA <input type="checkbox"/> VDRL (CSF) <input type="checkbox"/> Hepatitis C (total Ig)		
<b>CHAIN OF CUSTODY</b>				
Relinquished by: <u>                                    </u>		Date/Time: <u>                    </u>	Received by: <u>                                    </u>	Date/Time: <u>                    </u>
Relinquished by: <u>                                    </u>		Date/Time: <u>                    </u>	Received by: <u>                                    </u>	Date/Time: <u>                    </u>
Relinquished by: <u>                                    </u>		Date/Time: <u>                    </u>	Received by: <u>                                    </u>	Date/Time: <u>                    </u>
Temperature at recie: <u>                    </u>				

\* Specimens requiring testing performed at the state laboratory will be sent to the CDC. Please include onset date and clinical history. Results may take 3 months

# Test Order:

- Select test to be run
- More than one test can be selected, depending on the specimen type

# Questions?



Contact information:  
Emily Travanty, PhD

Supervisor, Public Health Microbiology and Serology  
Colorado Department of Public Health and Environment (CDPHE)

Laboratory Services Division

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303-692-3094



**COLORADO**

Department of Public  
Health & Environment