

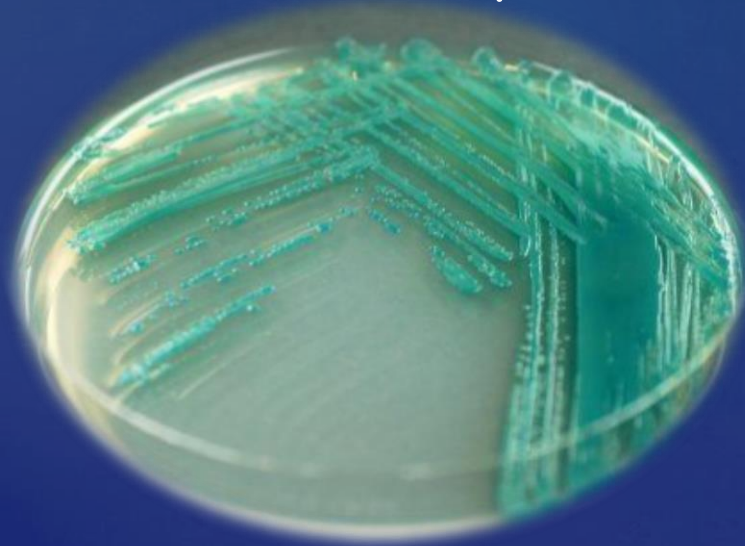
UNIVERSIDAD AUTÓNOMA DE SAN LUIS POTOSÍ

Facultad de Ciencias Químicas

Lab. General Microbiology



Case report: Meningitis caused by *Pseudomonas aeruginosa*



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Grupo: 8:00-9:00

Objective

Associate the knowledge on biochemical test for the identification of microorganism with the clinical importance for diagnosis and treatment in the patient.

To know the methods of identification and the specific antibiotic susceptibility of *Pseudomonas aeruginosa*.

Introduction

- *Pseudomonas aeruginosa* is a non-fermentative gram negative bacillus.
- Characterized by the production of pyocyanin.
- Infection caused by this bacterium have characteristics such as exudation of bluish purulent content and grape-like odor for the production of pyocyanin.
- It prevails in patients whit burns, cystic fibrosis, leukemia, organ transplants and intravenous drug use.



P.Aeruginosa at the microscopy
(gramnegative bacillus).
www.textbookofbacteriology.net

Clinical Case



Craneal magnetic resonance image showing edematous bulb-mesencephalic disease. portalesmedicos.com

⌘ Male patient with 54 years old, entered at emergency service, reporting vomiting, high fever and neck stiffness with 48 hours of evolution. Lumbar puncture is performed and cerebrospinalñ fluid of turbid aspect with polymorphous predominance is obtained, with presence of (25mg/dL) glucose. The simple is sent to the laboratory for acute bacterial respiratory infections for cultivate isolation and study of antibiotic susceptibility.

Metodology

It make a cultivate of the sample and it isolated *Pseudomona aeruginosa* and applying biochemical test: **oxidase (42°C)**.

It has been made a test OF (oxid-fementation).

It was determinated the sensibility of the strain by the method of disk diffusion .

Clinical case

*Ciprofloxacin
*Ceftriaxone
*Imipenem
*Amikacin
*Piperacilin
*Aztreonam

Microbiology lab.

*Ciprofloxacin
*Ceftriaxone
*Trimethoprim/sulphametoxasol
*Ampicilin
* Acid nalidixic



P. aeruginosa in blood agar
(Koneman diagnóstico microbiológico: 2008)

Cytochrome Oxidase Test

Identification of:
Pseudomonas,
Campylobacter and
Pasteurella.



Method

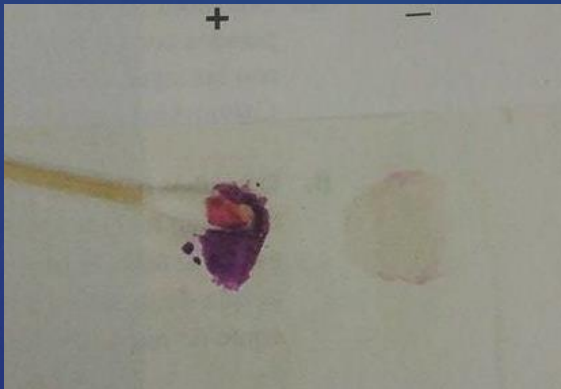
*Take part of the sample and put in a strip filter paper.

*Add 2 to 3 drops of reagent.



Results

Blue coloration after
10 sec.



Cytochrome oxidase test, blue color
Indicate cytochrome oxidase activity.
(Koneman diagnóstico microbiológico:
2008)

OF (Oxide-Fermentation)

For microorganism which degrade glucose through fermentation and oxidation.

Components:
-peptone 0.2%
-carbohydrate 1.0%
-agar (semisolid medium)

Open tube	Covered tube	Metabolism
Acid (yellow)	Alkaline (green)	Oxidative
Acid (yellow)	Acid (yellow)	Fermentative
Alkaline (green or blue)	Alkaline (green or blue)	---



OF test:

Oxidative reaction characterized by yellow color in the open tube, the green color in the tube 2 remains. (www.textbookofbacteriology.net)

Results

Biochemical test	Clinical case	Microbiology laboratory
Oxidase	+	+
(OF)	+	+
Catalase	+	-----
SIM	-----	Movility (+) Production H2S (-) Production Indol (-)

Clinical case

susceptibility:
 ceftriaxone
 ciprofloxacin
 imipenem
 amikacin
 piperacilin
 aztreonam

Resistance:
 carbenicillina
 azocilin
 gentamicin
 ticarcillin

Microbiology Laboratory

susceptibility:
 ceftriaxone
 ciprofloxacin

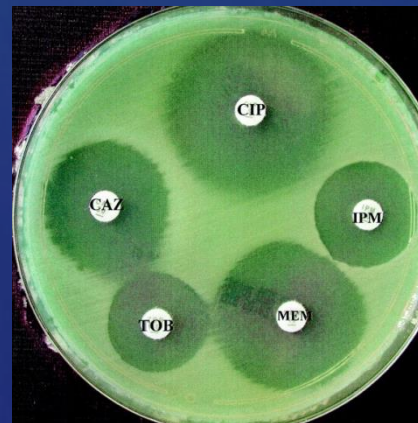
Resistance:

- ✓ Trimethoprim/
sulfamethoxazole
- ✓ Ampicilin
- ✓ Acid nalidixic

Picture 1: results obtained at the laboratory with results obtained in the clinical case.

Figure A) *Pseudomonas aeruginosa* antibiogram , using Ceftadizime (CAZ), Imipenem (IPM), meropenem (MEM), Ciprofloxacin (CIP) and Tobramicina (<http://aac.asm.org>)

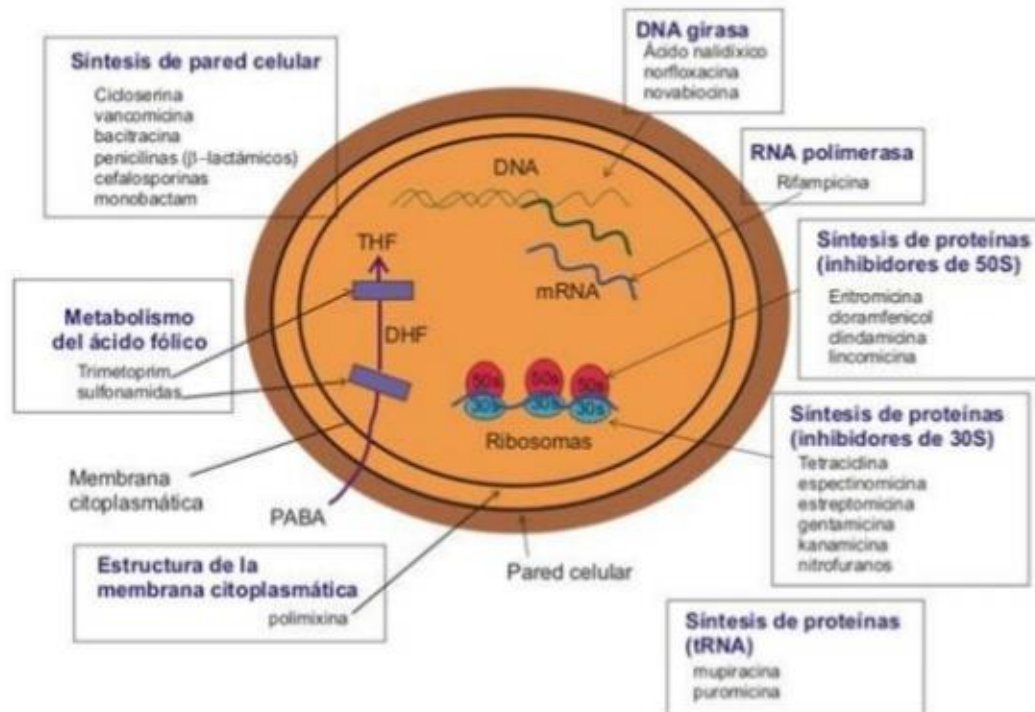
Figura B) *P. aeruginosa* antibiogram using Ciprofloxacin (CIP), Ceftriaxone (CRO), Ampicilin (AM), Ácido nalidíxico(NA), Trimethoprim/ sulfamethoxazol (STX). Experimental results.



CIPROFLOXACIN

Mechanism: inhibition of topoisomerase IV and bacterial DNA-gyrase. These topoisomerases alter DNA by introducing superhelical folds in double-stranded DNA, facilitating the unwinding of strands. Quinolones inhibit these subunits by preventing replication and transcription of bacterial DNA.

Mecanismo de Acción ...



Attachments

Table 1: Antimicrobial agents approved for testing and reporting on organisms by microbiology laboratories.

<i>Pseudomonas aeruginosa</i>		
Group A	<ul style="list-style-type: none"> Ceftadizime Gentamicin 	<ul style="list-style-type: none"> Tiobramicin piperacilin
Group B	<ul style="list-style-type: none"> Amikacin Aztreonam Cefepime Ciprofloxacin Levofloxacin 	<ul style="list-style-type: none"> Imipenem Meropenem Doripenem Piperacilin-tazobactam

Table 2. Intrinsic Resistance

Organism	Antimicrobial Agent	Resistance
<i>Pseudomonas aeruginosa</i>	Ampicilin/Amoxicilin	R
	Piperacilin	
	Ticarcilin	
	Ampicilin /sulbactam	R
	Amoxicilia /clavulanate	R
	Piperacilin /tazobactam	
	Cefotaxime	R
	Ceftriaxone	R
	Ceftadizime	
	Cefepime	
	Aztreonam	
	Imipenem	
	Meropenem	
	Ertapenem	R
	Polymyxin B colistin	
	Aminoglycosides	
	Tetracyclines/Trigecyline	R
Trimethoprim	R	
Trimehtoprim/sulfametoxasole	R	
cloranphenicol	R	
Fosfomycin	R	

CONCLUSION

This results shown in the clinical case have completely coincided whit those obtained in the laboratory, which helps to verify that the procediments mentioned in the bibliography have been correctly performed.

Biochemical test for the identification of microorganisms as well as antimicrobial susceptibility test are of great clinical importance, as they allow the identification of the microorganism that causes the pathologies, as well as the selection of the apropiate antibiotic according to its capacity for bacterial inhibition an metabolism of the microorganism causing the disease.

References

- ✉ *Fariás Cisneros E, Medina Campos R, Chavarría Garcés J. Neumonía nosocomial por *Pseudomonas aeruginosa*. Med. Int. Vol. 21 (n°5). Mex; 2005 (acceso 10 de marzo de 2017). Disponible en: new.medigraphic.com/cgi-bin/resumen.cgi?IDARTICULO=6915
- ✉ **Clinical and Laboratory Standards Institute*. M100 Performance Standards for Antimicrobial susceptibility Testing; Twenty-Fifth Informational Supplement. Vol. 35. N°3: 2015(acceso 10 de marzo de 2017). Disponible en: Tzaloa.uaslp.mx
- ✉ *Koneman W, Procop W, Schreckenberger P, Woods L, Janda W, Allen S, et al. Diagnóstico microbiológico. Ed. Médica Panamericana 6° edición. Buenos aires: 2008. Capítulo 7: bacilos gramnegativos no fermentadores pp 301-305. Protocolo 1.2, 1.5, 7.1. págs 1383-1401.