



Autonomous University of San Luis Potosí.

Faculty of Chemical Sciences.



General microbiology laboratory

Escherichia coli

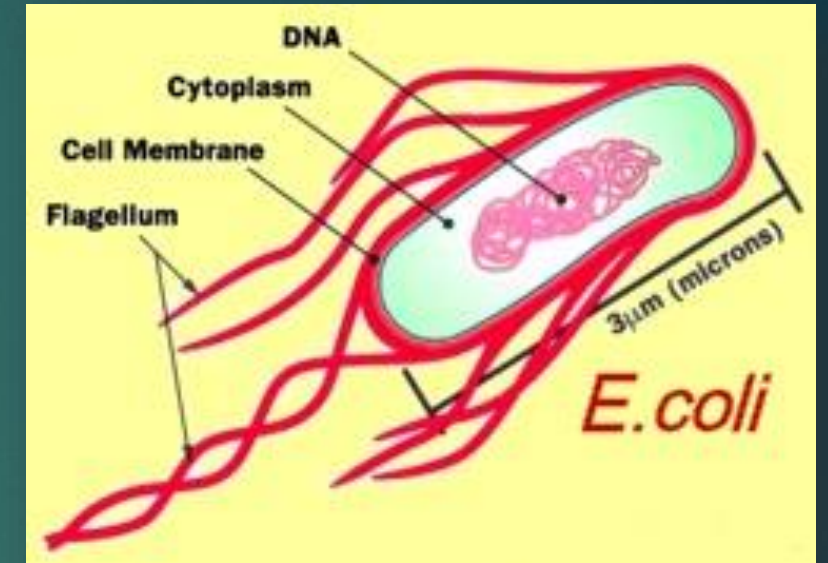
STUDENT: RAUL ALDAIR DIAZ GAMBOA

TEACHER: Q.F.B. JUANA TOVAR OVIEDO

GRUPO: 11:00-12:00

OBJETIVE:

- To determine the presence of enterohemorrhagic escherichia coli in a 6 month-old male patient
- To determine the sensitivity of E. coli to different antibiotics



Characteristics

- ▶ Belongs to the Protist Kingdom.
- ▶ From the family Enterobacteriaceae.
- ▶ It is a bastoniform bacteria.
- ▶ It can be mobile or stationary.
- ▶ It is aerobic but can grow under anaerobic conditions.
- ▶ They can ferment lactose.
- ▶ It can grow easily in crops.
- ▶ It adapts well to varying chemical conditions of its environment.
- ▶ It reproduces quickly.
- ▶ It has unique double-stranded and circular DNA.
- ▶ Bacteria GRAM-

BIOCHEMICAL TESTING	
Indol	(+)
Rojo de metilo	(+)
Vogues Proskauer	(-)
Citrato de Simmons	(-)
Ácido sulfhídrico	(-)
Urea	(-)
Movilidad	(V)
Gelatina	(-)
Lisina descarboxilasa	(v)
Ornitidina descarboxilasa	(v)
Fenilalanina desaminasa	(-)
Lactosa	(-)
Glucosa (sin gas)	(+)



Escherichia coli enterohemorrhagic

Pathogenic biological agent

- ▶ E. coli is a widespread gram-negative bacterium. Several non-pathogenic strains are part of the normal flora of man's intestine. However, there are different serological strains, which can cause intestinal diseases in humans. In addition to the EHEC, which was first documented in 1977, there are other E. coli pathogens: enteropathogenic E. coli (EPEC), E. coli enterotoxin toxin (ETEC) and E. coli enteroinvasive (EIEC), E. coli Enteroaggregative (EAEC) 1 as well as diffusing E. coli (DAEC).
- ▶ Enterohemorrhagic E. coli bacteria (EHEC) have several peculiarities that increase their pathogenic potential: in the first place they can adhere to the cells of the epithelium of the wall of the intestine thanks to a coat protein (Adhesina). Secondly, thanks to a phage infection they have a gene for the production of a toxin, which resembles the necrotic neurotoxin of the bacterium Shigella dysenteriae, which is called Shiga-type toxin II or also vero toxin. Finally, EHEC cultures also produce encoded plasmid hemolysis (blood cell killing toxin).

Transmission

Transmission of the agent can occur in a variety of ways, but mainly through direct or indirect oral ingestion of fecal matter. The agent can be transmitted to food, especially raw meat or milk. An infection is also possible through drinking water or hygiene contaminated with feces. Water for consumption contaminated with animal waste in 2000 in the Canadian town of Walkerton caused more than 2,000 patients and 18 deaths. In addition, it is also possible to spread from man to man or from animal to man through contact. Flies can also propagate the EHEC. With less than 100 bacteria is enough for the infection to occur.



Diagnostic

The diagnostic is produced by polymerase chain reaction (PCR) with primers that bind to EHEC-specific DNA sections and thus enable the replication of a typical gene for EHEC to DNA polymerase. The PCR results can be checked against typical EHEC DNA. In addition, the existence of the Shiga toxin I and II produced by the biological agent can be demonstrated. How methods can be used ELISAs¹⁴ or mass spectrometry methods.¹⁵ Together with the classical techniques of chromatographic coupling or mass spectrometry, MALDI-TOF analytical is increasingly used.



Haemorrhagic colitis caused by *Escherichia coli* H7-O157. (Articulo)

- ▶ *Escherichia coli* enterohaemorrhagic O157 H: 7 is an emerging infection in our country. Two serious cases in our unit allow updating little known aspects. Unlike developed countries (mean age 15 years), in our country affects young children (mean 1.5 years) probably indicating domestic transmission from the adult, who does not suffer from immunity. Colitis can be severe and require colectomy whose indications are not accurate. It is not proven that antibiotics increase the incidence of HUS but it is suggested to avoid its use early. Not all clinical laboratories look for this germ even when the technique is easy. Treatment should include careful observation of complications such as hemolytic uremic syndrome and proper management of contacts. Prevention is based on good washing of kitchen utensils in contact with raw meat, the hands before taking or feeding children, and the ingestion of beef and pork well cooked, especially if it is ground. Proposals: The physician should seek etiology, and the authorities disseminate prevention measures and establish mandatory notification.

Clinical case

Patient of 6 months, male who entered the Pediatric Service due to an obstructive respiratory tract with abrupt onset, diarrhea with no special characteristics and poor general condition. Upon admission the hemogram revealed a white blood cell count of 19,300 with a formula with 1 myeloid, 24 bacilliform and 38 segmented. It evolved favorably of its respiratory picture but the diarrhea became more profuse and sanguinolent, adding vomits and fever of 38.4 ° C. Examination of stools revealed *Escherichia coli* O 157, enterohaemorrhagic. It evolved poorly by adding pallor of skin and mucous membranes, recurrent rectal prolapse, irritability, arterial hypertension and oliguria. Blood counts revealed an increase in leukocytosis and maintenance of left-sided deflection, promyelocytes and abundant schistocytes with decreased hemoglobin and platelets, hyponatremia and hyperkalemia, and increased urea nitrogen. Hemolytic uremic syndrome was diagnosed and treatment with hemodiafiltration was initiated.

Clinical case

He maintained an acceptable diuresis but began, on the third day, with abdominal distension and increased blood loss from bowel movements. Ultrasonography showed a thickened colonic wall with probably blood content and small amount of free liquid. Contrast enema showed a diffuse decreased lumen of the colon with thick, irregular and rigid walls, with no areas of stenosis or dilation observed. An abdominal puncture showed uninfected peritoneal fluid. It remained stable until the sixth day of evolution, with daily ultrasonography due to its increased abdominal distension and on the ninth day presented disseminated intravascular coagulation. A rectal examination showed a stenotic area 7 cm from the anus. An enema with hypaque revealed a homogeneous stenosis with cardiac walls of the large intestine with no signs of rupture. The possibility of colectomy was raised but the child's conditions did not allow it and he died on the 11th of his intrahospital evolution.

Final Diagnostics

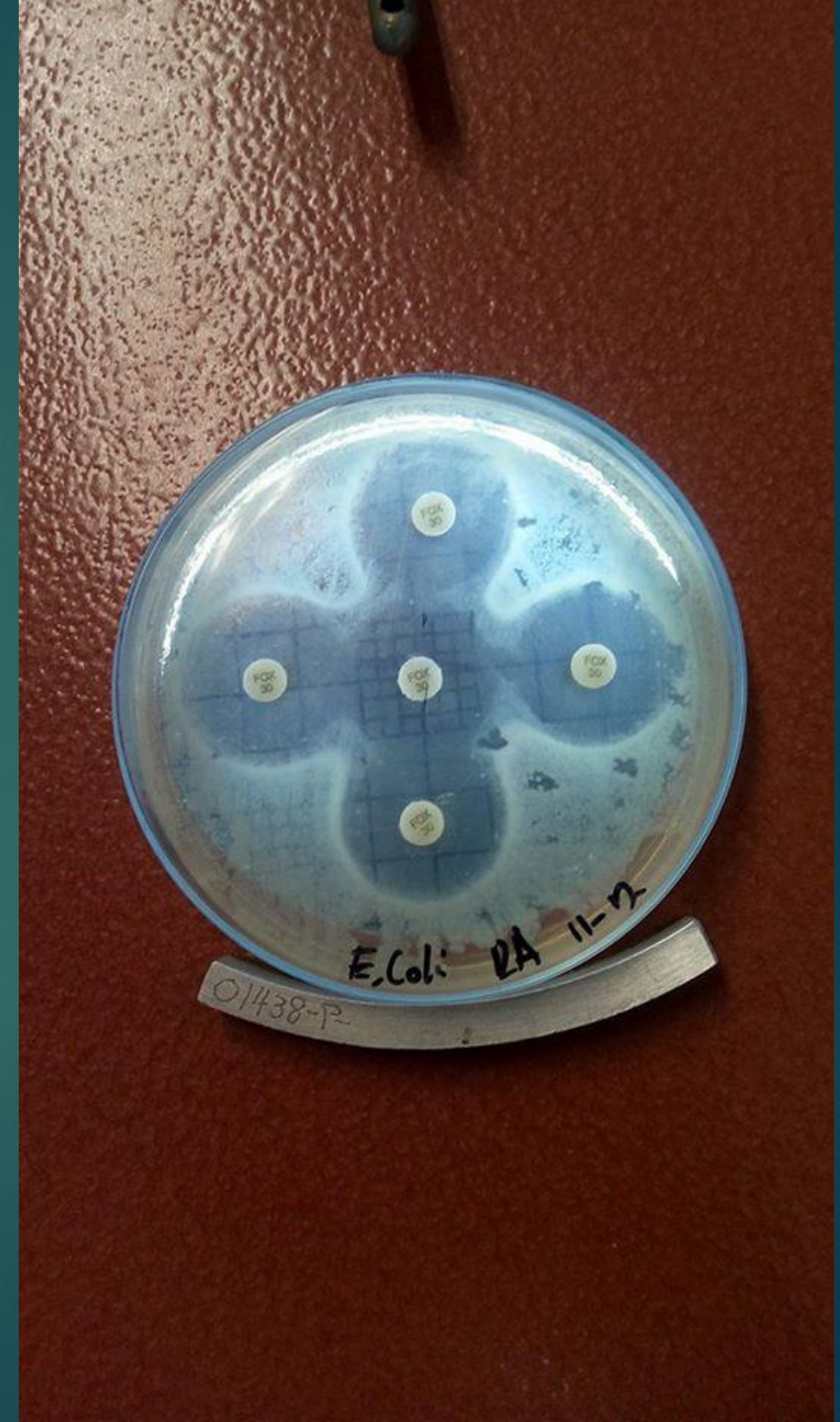
1. Acute enterocolitis by enterohaemorrhagic *Escherichia coli* H7: O157
2. Hemolytic uremic syndrome
3. Acute renal failure
4. Disseminated intravascular coagulation
5. Multisystemic failure

Results

Cefoxitin Fox-30 inhibits the growth of the strain.

Table 2 - Acceptable Quality Control Ranges for Cefoxitin

QC Strain	Minimum Inhibitory Concentrations (mcg/mL)	Disk Diffusion Zone Diameters (mm)
<i>Escherichia coli</i> ATCC 25922	2 to 8	23 to 29



Bibliography

- ▶ Alberts, B. & Bray, B. (2004). Introducción a la Biología Celular. (2ª ed.) Madrid, España: Editorial Medica Panamericana. (pp. 28)
- ▶ http://www.scielo.cl/scielo.php?script=sci_arttext&pid=S0370-41061999000300008
- ▶ Riley LW, Remis RS, Helgerson SD, et al: Hemorrhagic colitis associated with a rare Escherichia coli serotype. N Engl J Med 1983; 308: 681.
- ▶ <https://www.drugs.com/pro/cefoxitin.html>