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Invasive Strain of *Escherichia coli* Belonging to O Group 29

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A strain of *Escherichia coli* isolated from a child with diarrhea was biochemically similar and antigenically identical (O and K antigens) to the standard strain of *E. coli* O group 29 and was positive in the Serény test for invasiveness, which suggests that it can cause a *Shigella*-like illness.

Some *Escherichia coli* strains are positive in the Serény test (6) for invasiveness and cause a *Shigella*-like illness in humans, both children and adults. So far this kind of *E. coli* strain has been found in the following antigenic O groups: O28a,28c (9); O32 (9); O112a,112c (5); O124 (9); O136 (3, 9); O143 (11); O144 (2), and O152 (7, 8, 10). Recently, Rowe et al. (4) made a proposal to recognize the invasive strain 145/46 as *E. coli* O group 164.

The object of this paper is to describe a strain of *E. coli* O group 29 (strain 4CII-76) which yields a typical positive result in the Serény test. The strain was isolated in São Paulo from the feces of a 3-year-old child with diarrhea. Feces received for examination were semiliquid and contained a large number of leukocytes. Culture was made by plating the feces on MacConkey agar, hektoen enteric agar (before and after enrichment in tetrathionate broth), and salmonella-shigella agar, but the strain was isolated only in the last medium.

Biochemical reactions of strain 4CII-76 and the standard strain of *E. coli* O29 (Su 4338-41) are shown in Table 1. The reactions were carried out at 37°C, using the media, reagents, and techniques recommended by Edwards and Ewing (1).

In preliminary agglutination tests with *E. coli* O sera O1 to O152, a heated suspension of strain

TABLE 1. *Biochemical reactions of the standard strain of E. coli O29 (Su 4338-41) and strain 4CII-76*

Test	Reaction[a]		Test	Reaction[a]	
	E. coli O29 (Su 4338-41)	Strain 4CII-76		*E. coli* O29 (Su 4338-41)	Strain 4CII-76
Indole (Kovacs)	+	+	Lactose	+	+
Methyl red	+	+	D-Mannitol	+	+
Voges-Proskauer	−	−	Sucrose	−	−
Christensen citrate	−	(+)	Salicin	+	−
Simmons citrate	−	−	Dulcitol	−	−
Sodium acetate	+	−	*i*-Inositol	−	−
Growth in KCN	−	−	Adonitol	−	−
H_2S (TSI)[b]	−	−	Raffinose	+	−
Christensen urea	−	−	D-Sorbitol	+	+
Malonate	−	−	L-Arabinose	+	+
Mucate	+	−	L-Rhamnose	+	+
Jordan tartrate	−	−	D-Xylose	+	(+)
Phenylalanine deaminase	−	−	Trehalose	+	+
Arginine dihydrolase	(+)	−	Esculin	+	−
Lysine decarboxylase	−	−	Glycerol (acid)	+	+
Ornithine decarboxylase	−	+	Glycerol (gas)	−	+
Motility	−	−	Cellobiose	−	−
β-Galactosidase (ONPG)[c]	+	+	*meso*-Erythritol	−	−
D-Glucose (acid)	+	+	Maltose	+	+
D-Glucose (gas)	−	+	Melibiose	+	+

[a] +, Positive reaction within 1 or 2 days of incubation; −, negative reaction; (+), positive reaction after 3 or more days of incubation.

[b] TSI, Triple sugar iron.

[c] ONPG, *o*-Nitrophenyl-β-D-galactopyranoside.

4CII-76 was significantly agglutinated only by serum O29. When tested in serial dilutions of O antiserum for *E. coli* O29 (Su 4338-41), the heated suspension (100°C, 1 h) of strain 4CII-76 was agglutinated to the titer of the serum (1:1,280). Similarly, the heated suspension (100°C, 1 h) of *E. coli* O29 (Su 4338-41) was agglutinated to the titer of the 4CII-76 O serum (1:1,280). Further studies, using both OK sera and living suspensions of *E. coli* O29 and strain 4CII-76, showed that both suspensions were agglutinated to the titer of the heterologous serum (1:320). Cross-absorption tests, using heated (100°C, 1 h) and living suspensions, showed that strains 4CII-76 and Su 4338-41 removed agglutinins from heterologous serum to a titer of less than 1:2.

The results obtained show that strain 4CII-76 is antigenically identical (O and K antigens) to the standard strain of *E. coli* O group O29, whose K antigen has not been numbered yet. Both strains are also very similar biochemically. It is noteworthy that strain 4CII-76 does not decarboxylate lysine, which seems to be a common characteristic in invasive *E. coli* strains (9, 10).

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LITERATURE CITED

1. **Edwards, P. R., and W. H. Ewing.** 1972. Identification of Enterobacteriaceae, 3rd ed. Burgess Publishing Co., Minneapolis.
2. **Fernandes, M. R. F., and L. R. Trabulsi.** 1967. A new *Escherichia coli* serotype causing experimental keratoconjunctivitis in the guinea-pig (Culture 412 DEC-66). Preliminary report. Rev. Inst. Med. Trop. Sao Paulo **9**:62.
3. **Fernandes, M. R. F., and L. R. Trabulsi.** 1969. Antigenic identity of culture 193T-64 and *E. coli* O136: K78 (B22). Rev. Inst. Med. Trop. Sao Paulo **11**:101-103.
4. **Rowe, B., R. J. Gross, and D. P. Woodroof.** 1977. Proposal to recognise seroovar [sic] 145/46 (synonyms: 147, *Shigella* 13, *Shigella sofia*, and *Shigella manolovii*) as a new *Escherichia coli* O group, O164. Int. J. Syst. Bacteriol. **27**:15-18.
5. **Sakazaki, R., K. Tamura, and M. Saito.** 1967. Enteropathogenic *Escherichia coli* associated with diarrhea in children and adults. Jpn. J. Med. Sci. Biol. **20**:387-399.
6. **Serény, B.** 1955. Experimental *Shigella* keratoconjunctivitis. A preliminary report. Acta Microbiol. Acad. Sci. Hung. **2**:293-296.
7. **Stenzel, W.** 1975. Identität des Serotyps 185 Trabulsi mit *E. coli* O152. Zentralbl. Bakteriol. Parasitenkd. Infektionskr. Hyg. Abt. 1 Orig. Reihe A **232**:473-476.
8. **Stenzel, W.** 1975. Serotyp 185 und *E. coli* O115—zwei verschiedene Bioseropathotypen. Zentralbl. Bakteriol. Parasitenkd. Infektionskr. Hyg. Abt. 1 Orig. Reihe A **232**:462-467.
9. **Trabulsi, L. R., M. R. F. Fernandes, and M. E. Zuliani.** 1967. Novas bactérias patogênicas para o intestino do homem. Rev. Inst. Med. Trop. Sao Paulo **9**:31-39.
10. **Trabulsi, L. R., and M. R. F. Toledo.** 1969. *Escherichia coli* serogroup O115 isolated from patients with enteritis. Biochemical characteristics and experimental pathogenicity. Rev. Inst. Med. Trop. Sao Paulo **11**:358-362.
11. **Vöros, S., B. Rédey, and F. Csizmazia.** 1964. Antigenic structure of a new enteropathogenic *E. coli* strain. Acta Microbiol. Acad. Sci. Hung. **11**:125-129.