JOURNAL OF CLINICAL MICROBIOLOGY, Apr. 1980, p. 422-423
0095-1137/80/04-0422/02$02.00/0

Vol. 11, No. 4

New Invasive *Escherichia coli* Strain

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A new invasive *Escherichia coli* serogroup is described. Its O antigen is identical to the O antigen of *Shigella boydii* 3. We propose the designation of *E. coli* São Paulo for this serogroup until the situation of its O antigen is settled.

Invasive *Escherichia coli* strains have been described in at least 10 *E. coli* O serogroups (3, 7, 8). These strains are positive in the Serény test for invasiveness (5) and cause a *Shigella*-like infection in humans, both children and adults (2, 4, 8).

During an investigation on the etiology of endemic infantile diarrhea in São Paulo, Brazil, we found three *E. coli* isolates which were strongly positive in the Serény test. Two of them (23-79 and 71-79) were recovered from two children, each presenting symptoms of diarrhea and vomiting, whose feces were semiliquid and contained increased amounts of mucus. The last one (299-79) came from a child without gastrointestinal disorder. Strain 23-79 was isolated in June 1978, and the other two were isolated in January 1979. The three isolates were inagglutinable in OK antisera prepared against all the invasive *E. coli* serogroups described until now (7).

Our routine procedure for identifying invasive *E. coli* consists of slide agglutination tests of 5 to 10 *E. coli* strains from each stool culture, in OK antiserum pools which contain antisera for all known invasive serogroups. Afterwards, one strain of each stool culture is submitted to the Serény test, even if the agglutination tests are negative.

Heated suspensions of the three isolates were tested in tube agglutination with *E. coli* O sera O1 to O152 and, with the exception of a low-titer agglutination with O62 and O73, the results were also negative. The three strains were sent to the International *Escherichia* and *Klebsiella* Centre of Copenhagen, Denmark, and one of them (23-79) was sent to the Enteric Section of the Center for Disease Control, Atlanta, Ga., but neither laboratory was able to determine their O-antigen type.

An O antiserum prepared against strain 71-79 gave agglutination titers with the two other strains equal to the homologous titer (1:2,560), which suggests that they belong to the same serogroup.

The results of biochemical tests (Table 1) show that the three isolates are very similar and can be considered typical lactose-positive *E. coli*. However, it should be noted that they do not decarboxylate lysine and are nonmotile, two

TABLE 1. *Biochemical reactions of the three invasive E. coli isolates*[a]

Test	Reaction of isolates:		
	23-79	71-79	299-79
Indole (Kovacs)	+	+	+
Methyl red	+	+	+
Voges-Proskauer	−	−	−
Christensen citrate	(+)	−	(+)
Simmons citrate	−	−	−
Sodium acetate	+	+	+
Growth in KCN	−	−	−
H_2S (TSI)[b]	−	−	−
Christensen urea	−	−	−
Malonate	−	−	−
Mucate	−	+	−
Jordan tartrate	+	−	−
Phenylalanine deaminase	−	−	−
Arginine dihydrolase	(+)	(+)	(+)
Lysine decarboxylase	−	−	−
Ornithine decarboxylase	−	−	−
Motility	−	−	−
β-Galactosidase (ONPG)[c]	+	+	+
D-Glucose (acid)	+	+	+
D-Glucose (gas)	+	+	+
Lactose	+	+	+
D-Mannitol	+	+	+
Sucrose	(+)	(+)	(+)
Salicin	−	−	−
Dulcitol	−	−	−
i-Inositol	−	−	−
Adonitol	−	−	−
Raffinose	+	+	+
D-Sorbitol	+	+	+
L-Arabinose	+	+	+
L-Rhamnose	+	+	+
D-Xylose	+	+	+
Trehalose	+	+	+
Esculin	−	−	−
Glycerol (acid)	+	+	+
Glycerol (gas)	+	+	+
Cellobiose	−	−	−
meso-Erythritol	−	−	−
Maltose	+	(+)	(+)
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 agar.

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

characteristics which have been found in all invasive *E. coli* strains, with the exception of some *E. coli* O124 strains that are motile (6–8; R. M. Silva et al., unpublished data).

As most of the known invasive *E. coli* strains have O antigens identical or strongly related to the O antigens of some serotypes of *Shigella dysenteriae* and *Shigella boydii* (1), we investigated the serological relationship between our strains and *Shigella*. The three strains were strongly agglutinated with *S. boydii* 3 and, to a minor degree, with *S. boydii* 5 antisera. On the other hand, an antiserum prepared against strain 71-79 agglutinated *S. boydii* 3 strongly but did not agglutinate *S. boydii* 5. Reciprocal agglutination tests performed with heated suspensions (100°C, 1 h) of *S. boydii* 3 and isolate 71-79 showed that the two strains agglutinated to the titer of the heterologous O serum. Cross-absorption tests, using heated suspensions (100°C, 1 h), showed that strains 71-79 and *S. boydii* 3 removed agglutinins from heterologous serum to a titer of less than 1:20.

We carried out biochemical and serological tests, using the methods recommended by Edwards and Ewing (1).

Our results show that these three isolates belong to a new invasive *E. coli* serogroup and have an undescribed O antigen which is identical to the O antigen of *S. boydii* 3. Although there is antigenic relationship between *S. boydii* 3 and *E. coli* O85 (1), our three isolates were not agglutinated by O85 antiserum because of its low titer (1:640).

We propose the designation of *E. coli* São Paulo for this invasive strain until the situation of its O antigen is settled.

We thank Don J. Brenner and Betty R. Davis of the Enteric Section, Center for Disease Control, Atlanta, Ga., and Frits and Ida Ørskov of the International *Escherichia* and *Klebsiella* Centre, Copenhagen, Demark, for the serological tests.

This study was supported by grants from the U.S. National Science Foundation, Brazilian National Research Council, and Financiadora de Estudos e Projetos.

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