

## A Report on the Shigella Cultures Isolated in Korea (1972)\*

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### —圖文抄錄—

### 1972年 韓國에서 分離된 痢疾菌에 關한 報告

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著者들은 1967年과 1971年에 各其 41株와 45株의 典型的인 痢疾菌株를 蒐集하여 微生物學的인 檢討와 分析을 施行하고 그들의 生化學的 性狀과 血清型的 分類 結果를 發表한 바 있었다<sup>1,2)</sup>.

今番에는 全國의인 規模에서 1972年 1月부터 12月까지 期間 各級 綜合病院, 市道立衛生試驗所 및 市郡保健所를 經由하여 蒐集된 約 4,000件의 腸內病原性 細菌에 關聯된 檢體를 分析한 結果 88株의 痢疾菌이 最終的으로 同定되었으므로 그 結果를 要約하여 이에 報告하는 바이다.

비록 檢體는 全國 11個市道에서 蒐集되었으나 痢疾菌이 檢出되었던 地域은 第1表에 나타난 바와 같이 서울 및 京畿道等 中部地方과 湖南地方인 全羅南北道 및 江原道이었으며, 例年에 없었던 現象으로서는 濟州島에서 1株의 *S. flexneri*가 發見된 事實이었다. 其他 地方에서 痢疾菌이 存在하지 않는다고 斷言하기 보다는 痢疾患者의 檢出, 診斷 및 檢體蒐集過程에서의 細密한 檢討가 앞서야 할 問題로서 將來에 對한 宿題로 남겨 둔다.

痢疾菌의 血清型別 分析結果는 第1表에 나타난 바와 같이 *S. flexneri* 77株와 *S. sonnei* 11株이었던 바 1967년까지 發見되었던 *S. dysenteriae*는 1株도 없었고 *S. boydii*도 檢出되지 않았다. *S. flexneri* 中에서는 B<sub>2a</sub>가 56株로서 第一 많았다.

生化學的 性狀을 要約하면 定義에 明示된대로 MR 陽性, NO<sub>3</sub>還元陽性, Hugh-Leifson 試驗에서 醱酵性 陽性 및 glucose 分解에서 酸產生은 陽性이었으나 가스產生은 陰性이었으며, VP 陰性, 尿素分解陰性, 硫化水素產生陰性, 運動性陰性, phenylalanine 陰性 및 dulcitol, salicin, adonitol, inositol, cellobiose 等 糖分解陰性性狀이 確認되었다. 그러나 第2表에 나타난대로 lactose, sucrose, mannitol, sorbitol, arabinose, raffinose, maltose, trehalose, rhamnose 및 xylose 等糖分解成績은 菌株에 따라서 서로 다른 樣相을 나타내었으며, 特히 arginine 과 ornithine test에 있어서는 數株의 變形性狀이 있었다.

韓國에서 比較的 널리 使用되고 있는 몇가지 抗菌劑에 對한 感受性을 Ericsson 氏 disc 法에 依하여 測定한 結果는 第3表에 나타난 바와 같다. 即 nitrofurantoin 이나 ampicillin, cephalosporin, gentamycin 및 carbenicillin 等에 對하여서는 大部分 菌株가 感受性을 나타냈으나 cloxacillin, tetracycline, erythromycin 및 doxycycline 等에 對하여서는 耐性을 나타낸 菌株가 많았다.

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## INTRODUCTION

Following the analyses of the *Shigella* cultures isolated in 1967<sup>1)</sup> and 1971<sup>2)</sup>, the authors identified eighty-eight cultures of *Shigella* among the enteric pathogens collected and sent by the provincial hygiene laboratories and some general hospitals in order to be confirmed bacteriologically in the National Institute of Health, Korea in 1972.

Of the eighty-eight *Shigella* cultures seventy-seven cultures belonged to the subgroup B and eleven cultures to the subgroup D. None of cultures belonging to the subgroup A or the subgroup C was identified although there were a few cultures consisting of agglutinogens which were reacting with either a type of subgroup A or of subgroup C on the slide agglutination tests. These cultures, however, did produce a little amount of gas from glucose and they were ruled out from this report in order to follow the definition made by the *Shigella* Commission of the International Enterobacteriaceae Subcommittee Report<sup>3)</sup> and to confirm the pathogenetic properties of them.

The biochemical and serological properties of the identified cultures were analyzed and the results obtained from the drug sensitivity tests were summarized in this report.

## MATERIALS AND METHODS

About four thousands cases of either stool specimens kept in the Cary and Blair transport media<sup>4)</sup> or the susceptible cultures screened through the procedures using MacConkey agar media and KIA media were collected from the provincial hygiene laboratories and the provincial hospitals, where the bacteriological laboratory diagnoses were undertaken either in the epidemic

control or in the carrier detection survey made throughout the country in cooperation with health centers in 1972.

From the stool specimens sent to the National Institute of Health the suspicious colonies were detected on either MacConkey agar or SS agar media which did not ferment lactose in earlier stage and were inoculated into KIA or TSI media after being confirmed as Gram-negative rods. On the other hand the tests mentioned above were also performed in NIH for the susceptible cultures already screened and sent to NIH by other bacteriological laboratories.

Indole test, methyl red test, Voges-Proscauer test and citrate utilization test were performed by means of the conventional screening procedures as recommended by Edwards and Ewing<sup>5)</sup>. Motility test, the test for the growth in air, catalase test, oxidase test, glucose test (acid and gas) and oxidation-fermentation test were performed according to the first-stage diagnostic scheme published by Cowan and Steel<sup>6)</sup>. For the fermentation tests of carbohydrates, dulcitol, adonitol, salicin, inositol, cellobiose, lactose, sucrose, mannitol, sorbitol, arabinose, raffinose, maltose, trehalose, rhamnase and xylose were used, and nitrate reduction tests were performed. For the dihydrolase tests and decarboxylase tests of amino acids the modified method from Falkow was adopted by using L-arginine hydrochloride, L-lysine hydrochloride and L-ornithine hydrochloride.

The agglutination tests were carried out with the diagnostic subgroup antisera prepared in NIH, Korea and the determination of the specific serotypes was performed with both ordinary suspensions and boiled suspensions of the cultures by using the type-specific and group factors prepared by the Wellcome Research Laboratories.

The sensitivity tests to various antibiotics being widely in use in the country were carried

**Table 1.** Number of *Shigella* cultures isolated in 1972 by the serotypes and the geographical distribution

Areas	Number of <i>Shigella</i> cultures	Serotypes							D <sub>1</sub>	D <sub>2</sub>
		B <sub>1b</sub>	B <sub>2a</sub>	B <sub>3a</sub>	B <sub>3b</sub>	B <sub>3c</sub>	B <sub>4a</sub>	By		
Seoul area	2		1	1						
Kyongi-Do	2		2							
Chunlanam-Do	11		2	3		1	4			1
Chunlabuk-Do	2			1					1	
Kangwon-Do	70	1	51	3	1		2	3	6	3
Cheju-Do	1			1						
subtotal	88	1	56	9	1	1	6	3	7	4
total	88				77				11	

**Table 2.** The variations in some biochemical properties of *Shigella* cultures isolated in 1972\*

Tests	Sub-groups	B <sub>1b</sub>	B <sub>2a</sub>	B <sub>3</sub>	B <sub>4a</sub>	By	D <sub>1,2</sub>
Indole		0	21.6	91	100	66.6	0
Lysine decarboxylase		0	0	0	0	0	0
Arginine dihydrolase		0	9	9	0	33.3	100
Ornithine decarboxylase		0	1.8	9	0	0	100
Lactose		0	0	0	0	0	(9)
Sucrose	(100)		0	(72)	0	0	(36)
Mannitol	100	100	100	0	100	100	100
Sorbitol	0	(1.8)	91	16.6(83)	0	0	0
Arabinose	100	61.2(37.8)	54(18)	100	33.3(66.6)	100	100
Raffinose	100	37.8(27)	81	0	0	(9)	0
Maltose	0	12.6(5.4)	91	100	0	0	0
Trehalose	100	96.4(3.6)	100	0	100	100	100
Rhamnose		0	0	100	0	100	100
Xylose		0	0	100	0	0	0
No. of cultures tested		1	56	11	6	3	11

\* Numbers: percentage positive

( ): delayed reactions (three or more days)

out by means of Ericsson's disc method using nitrofurantoin, cloxacillin, colistin, chloramphenicol, ampicillin, tetracycline, erythromycin, cefalosporin, streptomycin, gentamycin, kanamycin, carbenicillin and doxycycline<sup>7</sup>.

## RESULTS

1. Eighty-eight cultures of *Shigella* were identified among about four thousands

specimens submitted in order to be confirmed bacteriologically in the National Institute of Health, Korea from all over the country in 1972.

2. Of eight-eight cultures of *Shigella* confirmed seventy-seven cultures belonged to the subgroup B and eleven cultures to the subgroup D, and none of subgroup A was detected in 1972 as it was found in 1971. And none of subgroup C was identified in 1972 as it was appeared in 1967.

**Table 3.** The sensitivity of *Shigella* to some antibiotics tested\*

	Nitrofurantoin	Cloxacillin	Colistin	Chloramphenicol	Ampicillin	Tetracycline	Erythromycin	Cefalosporin	Streptomycin	Gentamycin	Kanamycin	Geopen	Doxycycline
B <sub>1</sub>	0/1	1/0	1/0	1/0	0/1	1/0	1/0	0/1	1/0	1/0	1/0	0/1	1/0
B <sub>2</sub>	0/56	56/0	34/22	44/12	0/56	46/10	56/0	0/56	46/10	4/52	13/43	0/56	44/12
B <sub>3</sub>	0/11	11/0	3/8	1/10	0/11	2/9	11/0	0/11	4/7	2/9	4/7	1/10	2/9
B <sub>4</sub>	0/6	6/0	4/2	3/3	0/6	3/3	6/0	1/5	3/3	1/5	1/5	0/6	4/2
B <sub>y</sub>	0/3	3/0	2/1	2/1	0/3	2/1	3/0	0/3	3/0	0/3	0/3	0/3	2/1
D	0/11	11/0	9/2	7/4	1/10	6/5	11/0	0/11	6/5	1/10	1/10	0/11	7/4
Total	0/88	88/0	53/35	58/30	1/87	60/28	88/0	1/87	63/25	9/79	20/68	1/87	60/28

\* No./No.: Number of cultures showing resistant/sensitive results in vitro.

3. Out of seventy-seven cultures of the *Shigella flexneri* fifty-six cultures were B<sub>2a</sub>, nine cultures were B<sub>3a</sub>, six cultures were B<sub>4a</sub>, three cultures were B<sub>y</sub>, and each one of B<sub>1b</sub>, B<sub>3b</sub> and B<sub>3c</sub> were determined.

4. Seven cultures were appeared to be phase I among eleven cultures of *Shigella sonnei*.

5. According to the geographical distribution, *Shigella* organisms were found in Seoul area, Kyongi-Do, Kangwon-Do, Chunlabuk-Do, Chunlanam-Do and Cheju-Do and B<sub>2a</sub> were detected in the most of areas concerned as it was noticed in 1971. B<sub>3a</sub> also started to appear in the most of areas where the detection of the organism was possible.

6. It was confirmed according to the definition of *Shigella* organisms that the organisms identified showed positive results in MR test, acid production from glucose, nitrate reduction test and fermentative characteristics in the oxidation-fermentation test, and negative results in VP test, citrate utilization test, urease test, H<sub>2</sub>S production, growth in the presence of KCN, gelatin liquefaction, motility, phenylalanine test, gas from glucose, fermentation tests of dulcitol, salicin, adonitol, inositol and cellobiose.

7. There were some variations found in the biochemical properties between the different serotypes and the results were tabulated in the Table 2.

8. The results obtained from the antibiotics-sensitivity tests of eighty-eight *Shigella* cultures were summarized in Table 3. All the cultures tested were shown to be sensitive to nitrofurantoin and resistant to cloxacillin and erythromycin. The majority of them appeared to be sensitive to ampicillin, cephalosporin, gentamycin and geopen, and more than half of them showed resistant to colistin, chloramphenicol, tetracycline, streptomycin and doxycycline as shown in the Table 3.

## SUMMARY

The authors identified eighty-eight *Shigella* cultures among about four thousands specimens collected from all over the country in 1972.

Of eighty-eight cultures, seventy-seven cultures belonged to *Shigella flexneri* and eleven cultures to *Shigella sonnei*. None of cultures belonging to either subgroup A or C was detected in 1972. Of seventy-seven cultures of *Shigella flexneri* one

was B<sub>1b</sub>, fifty-six were B<sub>2a</sub>, nine were B<sub>3a</sub>, six were B<sub>4a</sub>, three were B<sub>y</sub> and one was each of B<sub>3b</sub> and B<sub>3c</sub>. Of eleven cultures of *Shigella sonnei* seven cultures appeared to be phase I and the others phase II.

Although there was quite a difference found in the incidence of isolating *Shigella* organisms between different areas as shown in Table 1, it would not be possible to understand that there might not have been the cases or carriers of *Shigella* in the areas where the organisms were not isolated in 1972.

Concerning the biochemical properties it was not possible to compare the results obtained from the decarboxylase and dihydrolase tests with them obtained in previous years except that of lysine decarboxylase tests since they were not reported individually by the different serotypes in the previous reports. These results obtained in 1972 would be the data for the future comparison.

In regards to the antibiotics-sensitivity of *Shigella* cultures the most of them showed sensitive results to nitrofurantoin, ampicillin, cephalosporin, gentamycin and geopen, and the majority of them appeared to be resistant to

cloxacillin, tetracycline and streptomycin by means of the In Vitro tests.

## REFERENCES

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