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# LETTER TO THE EDITOR

## A RARELY ISOLATED GRAM-NEGATIVE BACTERIUM IN MICROBIOLOGY LABORATORIES: *LECLERCIA ADECARBOXYLATA*†

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Dear Editor,

*Leclercia adecarboxylata*, which is found widely in nature, was first isolated from drinking water and initially described as *Escherichia adecarboxylata* by Leclerc in 1962 [1, 2]. The species was renamed after phenotypic and genotypic studies by Tamura et al. [3] in 1986. It is a motile, facultative-anaerobic, Gram-negative rod of *Enterobacteriaceae* family [4]. Several *L. adecarboxylata* can be misidentified as *Escherichia coli*, because *L. adecarboxylata* and *E. coli* share many biochemical properties [2, 4]. In this report, we aimed to compare two identification systems, VITEK® MS (bioMérieux, France) and VITEK® 2 Compact (bioMérieux), and to evaluate *L. adecarboxylata* with colony color on chromogenic CPSE media (bioMérieux) to differentiate *L. adecarboxylata* from *E. coli*, using two clinical isolates definitively identified by sequencing of 16S rRNA.

Table I shows general information of two *L. adecarboxylata* cases. Urine and pus samples were inoculated on 5% sheep blood agar and MacConkey agar. Both VITEK® 2 Compact (bioMérieux) automatic identification system and matrix-assisted laser desorption/ionization time of flight mass spectrometry-based

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**Table I.** General information of two *Leclercia adecarboxylata* cases

| Case no. | 1 | 2 |
|---|---|---|
| Age (years) | 5 | 48 |
| Gender | Male | Female |
| Underlying disease | Renal atrophy, vesicoureteral reflux operated, and nephrostomy catheter | Stomach cancer |
| Culture source | Urine | Pelvic abscess |
| Co-infection | *Staphylococcus epidermidis* and *Enterococcus faecalis* | *Enterobacter cloacae* and *E. faecalis* |
| Antibiotic resistance | Fosfomycin and TMP/SMX | None |
| Colony color on chromogenic CPSE media | Turquoise green | Turquoise green |
| VITEK® 2 Compact | *L. adecarboxylata* | *L. adecarboxylata* |
| VITEK® MS | *L. adecarboxylata* | *L. adecarboxylata* |
| 16S rRNA sequencing result | *L. adecarboxylata* | *L. adecarboxylata* |
| % sequence similarity | 98 | 99 |

VITEK® MS system identified three isolates as *L. adecarboxylata, Staphylococcus epidermidis*, and *Enterococcus faecalis* for case 1, and three isolates as *L. adecarboxylata, Enterobacter cloacae*, and *E. faecalis* for case 2. The identification of *L. adecarboxylata* was, additionally, confirmed by 16S rRNA gene sequencing.

*L. adecarboxylata* grew as non-hemolytic colonies on blood agar and lactose-negative (case 1) and lactose-positive (case 2) colonies on MacConkey's agar from both of the samples. Pure colonies of *L. adecarboxylata* isolates were also inoculated on chromogenic CPSE media. They grew on the chromogenic medium forming the turquoise green colonies, whereas *E. coli* isolates usually produced pink colonies (Figure 1). The antibiotic susceptibility testing was done using VITEK® 2 Compact (bioMérieux). The isolate of case 2 was found susceptible to all the antimicrobials tested, including ampicillin, cefoxitin, ceftazidime, ceftriaxone, amikacin, gentamicin, ciprofloxacin, trimethoprim-sulfamethoxazole (TMP/SMX), imipenem, meropenem, ertapenem, piperacillin/ tazobactam, and fosfomisin. The isolate of case 1 was found susceptible to all the antimicrobials tested except fosfomycin and TMP/SMX.

*L. adecarboxylata* has been reported as an uncommon cause of sepsis, septic arthritis, peritonitis, and diarrhea, and usually isolated as an opportunistic pure pathogen from clinical specimens including blood, stool, sputum, urine, peritoneal fluid, and pus in reported cases of immunocompromised patients or patients with underlying medical conditions [2, 4]. In the immunocompetent patients, *L. adecarboxylata* is usually found as a part of polymicrobial infections [4]. This report shows that both of the patients had underlying medical conditions and demonstrated polymicrobial cultures.

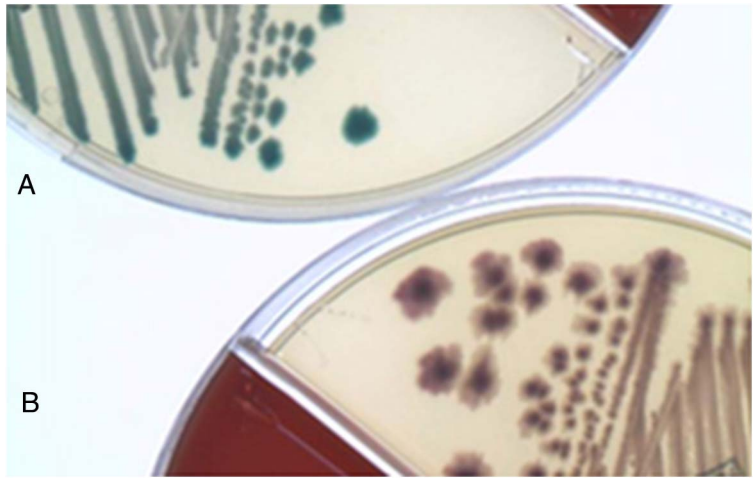


**Figure 1.** *Leclercia adecarboxylata* (A) and *Escherichia coli* (B) colonies on chromogenic CPSE media

The accurate identification of *L. adecarboxylata* isolates from clinical specimens is very important for diagnosis, treatment, and epidemiological information. Clinical microbiology laboratories play a key role in the accurate identification of microorganisms, using conventional methods, molecular tests, and automated systems. Especially technological systems, such as automated identification systems and mass spectrometry, may allow laboratories to identify unusual organisms rapidly and accurately [5]. In our report, we used VITEK® MS and VITEK® 2 Compact. Both identification systems accurately identified *L. adecarboxylata* isolates. In literature, there are many reports that *L. adecarboxylata* was identified by automated identification systems and mass spectrometry [4, 6–10]. However, only two of these reports were confirmed by 16S rRNA gene sequencing, like our report [9, 10].

Technological systems are quite expensive and may not be available in smaller laboratories [5]. *L. adecarboxylata* can be misidentified as *E. coli*, because *L. adecarboxylata* is phenotypically and biochemically very similar to *E. coli* that routine conventional methods may not reliably differentiate them from each other [2]. Chromogenic CPSE media might be used if automated systems are not available for identification of *L. adecarboxylata.* Figure 1 shows that it can provide preliminary information that can be used to differentiate *L. adecarboxylata* from *E. coli*.

Stock et al. [2] reported that *L. adecarboxylata* is naturally resistant to erythromycin, roxithromycin, clarithromycin, streptogramins, linezolid, penicillin G, oxacillin, ketolides, lincosamides, glycopeptides, rifampicin, fusidic acid, and

fosfomycin. They also stated that fosfomycin resistance might be useful to differentiate *L. adecarboxylata* and *E. coli* [2]. Despite this knowledge, there were no information about fosfomycin resistance, or it was not tested in most of the studies [2–4, 6–10]. One of our isolates was resistant to fosfomycin, whereas the other was susceptible.

In conclusion, *L. adecarboxylata* is rarely isolated from clinical specimens in literature, but usage of new identification systems in clinical microbiology laboratories would increase the prevalence of rare microorganisms, such as *L. adecarboxylata*. Besides, in laboratories where automated systems are not available, chromogenic agar may be useful to differentiate *L. adecarboxylata* from *E. coli*. Additional studies are needed to confirm this information.

## References

1. Leclerc, H.: Etude biochimique d'Enterobacteriaceae pigmentees [Biochemical study of pigmented Enterobacteriaceae]. Ann Inst Pasteur **102**, 726–740 (1962).
2. Stock, I., Burak, S., Wiedemann, B.: Natural antimicrobial susceptibility patterns and biochemical profiles of *Leclercia adecarboxylata* strains. Clin Microbiol Infect **10**, 724–733 (2004).
3. Tamura, K., Sakazaki, R., Kosako, Y., Yoshizaki, E.: *Leclercia adecarboxylata* gen. nov., comb. nov., formerly known as *Escherichia adecarboxylata*. Curr Microbiol **13**, 179–184 (1986).
4. Hess, B., Burchett, A., Huntington, M. K.: *Leclercia adecarboxylata* in an immunocompetent patient. J Med Microbiol **57**, 896–898 (2008).
5. Patel, R.: New developments in clinical bacteriology laboratories. Mayo Clin Proc **91**, 1448–1459 (2016).
6. Jean, S. S., Lee, W. S., Bai, K. J., Lam, C., Hsu, C. W., Chen, R. J., Hsueh, P. R.: *Leclercia adecarboxylata* bacteremia in a patient with long-term use of nonsteroidal anti-inflammatory drugs. J Microbiol Immunol Infect **49**, 452–454 (2016).
7. Kashani, A., Chitsazan, M., Che, K., Garrison, R. C.: *Leclercia adecarboxylata* bacteremia in a patient with ulcerative colitis. Case Rep Gastrointest Med **2014**, 457687 (2014).
8. Keren, Y., Keshet, D., Eidelman, M., Geffen, Y., Raz-Pasteur, A., Hussein, K.: Is *Leclercia adecarboxylata* a new and unfamiliar marine pathogen? J Clin Microbiol **52**, 1775–1776 (2014).
9. Shin, G. W., You, M. J., Lee, H. S., Lee, C. S.: Catheter-related bacteremia caused by multidrug-resistant *Leclercia adecarboxylata* in a patient with breast cancer. J Clin Microbiol **50**, 3129–3132 (2012).
10. Riazzo, C., López-Cerero, L., Rojo-Martín, M. D., Hoyos-Mallecot, Y., Fernández-Cuenca, F., Martín-Ruíz, J. L., Pascual-Hernández, Á., Naas, T., Navarro-Marí, J. M.: First report of NDM-1-producing clinical isolate of *Leclercia adecarboxylata* in Spain. Diagn Microbiol Infect Dis **88**, 268–270 (2017).