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Rapid Identification of *Escherichia Coli* Cultured on CHROMagar Orientation Agar Plate (Becton Dickinson)

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Abstract

CHROMagar Orientation media were designed for rapid differentiation of Enterobacteriaceae and identification of *E. coli* colonies cultured from urinary tract sample. As this media is superior to non- chromogenic media for colony differentiation, it is now commonly used for the culture of others clinicals specimens. But *E. coli* could not be identified without additional testing as microbiological epidemiology might not be similar to urinary samples. We assess the reliability of CHROMagar orientation for identification of *E. coli* colonies recovered from a wide range of clinical samples. Overall, 470 clinical samples were included. The sensitivity of 99.0% was similar to that reported from urinary sample. Misidentification are rare and might be due to less common organisms. Although, young colonies should not be identified without additional test as they might not have reached all their characteristics

Keywords: CHROMagar Orientation, *E. coli*

Mini Review

CHROMagar Orientation media (Becton Dickinson) was designed for the culture of urinary sample in the early 1990's. The media composition supplies the growth of most frequently encountered micro- organisms from urinary sample. Before the introduction of MALDI-TOF mass spectrometry, bacterial identification was based on cultural and biochemical characteristics such as enzyme production, for instance ß-glucosidase or tryptophan deaminase. The CHROMagar Orientation media allows to assess both cultural and biochemical characteristic of bacterial colonies. Indeed, the media contains chromogenic substrates which release differently colored compounds upon degradation by specific microbial enzymes. Thus *E. coli* colonies are rapidly recognized by their characteristic coloration in pink or dark-rose while Klebsiella spp, Enterobacter spp and Serratia spp colonies are colored in blue to dark blue and Proteus spp, Providentia spp and Morganella spp in pale to beige surrounded by brown halos. Using this media for urinary samples, *E. coli* colonies presenting characteristic coloration and morphology can be identified without additional tests.

Moreover, CHROMagar Orientation is superior to CLED agar or combination of blood and MacConkey agars, for the isolation, differentiation and counting of urinary tract pathogens [1-3]. Chromogenic media were consequently developed for other specific use, such as screening of multidrug resistant organisms (methicillin resistant Staphylococcus aureus, ESBL producing Enterobacteriaceae) or rapid identification of pathogens (*S. aureus, Candida species)* with superior results to non-chromogenic media. As a consequence of their superiority for differentiation of colonies, CHROMagar Orientation media are now frequently used in clinical laboratory in addition to non-chromogenic media or in replacement of Drigalski media for inoculation of a wide variety of clinical samples. However, micro-organisms epidemiology might be different in urinary tract, digestive or respiratory infections. Thus, CHROMagar Orientation agar can only be used as a help for colonies differentiation, but not for *E. coli* identification.

We assess the reliability of CHROMagar Orientation media for direct identification, without additional testing, of *E. coli* recovered from a wide range of clinical specimens, excluding urinary sample. Consecutive clinical samples usually inoculated on CHROMagar Orientation agar in our laboratory between April and July 2018 were included. All colonies presenting *E. coli* characteristics (pink or dark-rose round shaped millimetric colonies) were identified using MALDI-TOF mass spectrometry (Bruker Daltonic, Bremen, Germany) as recommended by the manufacturer. Overall, 410 clinical samples, including 177 subcultures of positive blood culture,

83 gastric liquid, 15 respiratory samples, 76 suppurations, 39 digestives samples and 20 other samples (biopsies…), yield growth of colonies presenting *E. coli* characteristics. All but four isolates were identified as E. coli by MALDI-TOF mass spectrometry. Two isolates recovered from positive blood culture were identified as Pantoea agglomerans and Hafnia alvei. The two other isolates were recovered from digestives samples and were identified as Hafnia alvei and Citrobacter freundii. The culture age of the latter was about 12 hours when identified as *E. coli*. Overall, CHROMagar Orientation agar media sensitivity was 99.0%.CHROMagar Orientation media represent a useful tool for rapid and direct identification of E. coli colonies cultured from a wide range of clinical sample without additional testing. It displays a sensitivity similar to that reported for urinary sample (96.9%) [4]. Misidentification are rare and might be due to rarely encountered micro-organisms. They might be avoided by a) confrontation with others clinical samples results; b) the use of a second method of identification in case of discordance with antibiotic susceptibility testing results; c) or the use of additional test such an indole test. Moreover, young colonies should not be identified without additional test as they might not have reached all their characteristics.

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