

Evaluation of the Chromogenic medium ChromID CPS for Isolation & Identification of Urinary Tract Pathogens

Thesis

Submitted for partial fulfillment of
M.Sc. Degree in Basic Medical Science
(Medical Microbiology & Immunology)

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2015



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وقل زدني علماً

صدق الله العظيم

سورة طه آية (114)



Acknowledgement

First of all, all gratitude is due to **God** almighty for blessing this work, until it has reached its end, as a part of his generous help, throughout my life.

Really I can hardly find the words to express my gratitude to **Prof. Dr. Tahany Abdel Hameed Mohammad**, Professor of Medical Microbiology & Immunology, faculty of medicine, Ain Shams University, for her supervision, continuous help, encouragement throughout this work and tremendous effort she has done in the revision of the whole work. It is a great honor to work under her guidance and supervision.

I would like also to thank **Dr. Kholood Wagdy Ziada**, Lecturer of Medical Microbiology & Immunology, faculty of medicine, Ain Shams University, for her continuous directions and support throughout the whole work.

I owe much to **Dr. Wael Fawzy Abdel Kader** Lecturer of Urology, Faculty of Medicine, Ain Shams University, for continues help, valuable suggestions and final revision of manuscript.

Last but not least, I dedicate this work to my family whom without their sincere emotional support, pushing forward this work would not have ever been completed.

Nehal Fathy Ahm

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List of Abbreviations

Afa	:	Afimbrial adhesions
AMP	:	Antimicrobial peptides
ASB	:	Asymptomatic bacteriuria
BA	:	Blood agar
CAUTI	:	Catheter-associated urinary tract infection
CDC	:	Centers for Disease Control
CFU	:	Colony Forming Unit
CLED	:	Cystine lactose electrolyte-deficient
CNF1	:	Cytotoxic necrotizing factor 1
DsDNA	:	Double-stranded DNA
ED	:	Emergency departments
GBS	:	Group B Streptococcus agalacticae
HBD2	:	Human betadefensins 2
HIV	:	Human immunodeficiency virus
IDSA	:	Infectious Disease Society of America
KESC	:	Klebsiella, Enterobacter, Serratia a Citrobacter
KTRs	:	Kidney transplantation recipients
LE	:	Leukocyte esterase
MAC	:	MacConkey agar media
MSU	:	Mid-stream sample of urine

List of Abbreviations (Cont.)

SCIs	:	Spinal cord injuries
THP	:	Tamm-Horsfall protein
UPEC	:	Uropathogenic <i>E.coli</i>
UTIs	:	Urinary tract infections

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Introduction

Urinary tract infections (UTI) are considered one of the most common bacterial infections. They affect up to 1 million individuals annually. There are limited data on the true impact of UTIs in the developing world. In USA, UTIs are responsible for 7 million physician visits and more than 100,000 hospital admissions annually (*Renuart et al., 2013*).

The total annual direct and indirect cost due to UTIs in the US alone is estimated to be greater than US\$ 1.6 billion (*Talan et al., 2004*). Globally, they cause not only a significant amount of morbidity, but also a significant financial burden (*Habte et al., 2009*).

Rapid identification of the infecting organism provides useful information to the clinician for appropriate antibiotic choice prior to organism susceptibilities being available and can alert infection control teams to potential outbreaks (*Merlino et al., 1996*).

Most urinary tract infections are caused by gram-negative bacteria like *Escherichia coli*, *Klebsiella* spp., *Proteus mirabilis*, *Pseudomonas aeruginosa*, *Acinetobacter* spp., and *Serratia* spp., and gram-positive bacteria such

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Enterococcus spp and *Staphylococcus spp* (**Grude et al., 2001**).

In recent years, a range of chromogenic media has been made commercially available for the improved isolation and identification of urinary tract pathogens (**Scarpato et al., 2002**). These media detect key microbial enzymes and diagnostic markers for pathogens through the use of “chromogenic” substrates incorporated into a solid-agar based matrix (**Van et al., 2011**).

In contrast to conventional culture media, chromogenic media allow direct colony color-based identification of the pathogen from the primary culture (**Kumar et al., 2010**). This not only minimizes the need for further identification tests but also reduces the time required to report the results to the clinician to facilitate early initiation of antibiotic therapy (**Lakshmi et al., 2004**).

In addition, routine use of chromogenic media carries the potential for cost savings in the clinical microbiology laboratory since they could potentially save the time and expense of performing assimilation panels and other fermentative or biochemical tests (**Horvath et al., 2003**).

Introduction and Aim of the Work

Furthermore, the diagnosis of urinary tract infection contributes significantly to the daily workload in microbiology laboratory; hence any innovation that tends to reduce the workload is always welcome when a high-quality standard is still maintained (*Hengstler et al., 1997*).

Aim of the work

To compare between the use of chromID CPS agar and the conventional culture and identification methods as reference to conclude the best way for rapid diagnosis of the most frequent urinary tract pathogens reducing the burden of biochemical characterization, allowing the clinician to commence an initial course of antibiotics.

Urinary Tract Infections

Urinary Tract Infection (UTI) is one of the most common infections which affect humans, cause significant distress to individuals, and is associated with high healthcare and social costs. If UTI is not treated by primary health care providers, it can cause serious potential consequences, such as pyelonephritis and bacteremia. In addition, it is believed that UTIs have become increasingly resistant to first-line antibiotic therapy (*Tehrani et al., 2014*).

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UTIs account for more than 100,000 hospital admissions annually, (*Foxman et al., 2002*). They also account for at least 40% of all hospital-acquired infections and are, in the majority of cases, catheter-associated. Bacteriuria develops in up to 25% of patients who require a urinary catheter for > 7 days, with a daily risk of 5%. It has been estimated that an episode of healthcare-associated (nosocomial) bacteriuria adds significantly to the direct cost of acute-care hospitalization. In addition, the pathogens are fully exposed to the nosocomial environment, including selective pressure by antibiotic or antiseptic substances. Nosocomial UTIs therefore comprise perhaps the largest