ملخص الأبحاث

❖ **البحث الأول:**

Comparative study between molecular and non-molecular methods used for detection of Vancomycin Resistant Enterococci in Tanta University Hospitals, Egypt

دراسة مقارنة بين الطرق الجزيئية وغير الجزيئية المستخدمة للكشف عن المكورات المعوية المقاومة للفانكوميسين

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مكان و تاريخ النشر:

Life Science Journal, January 2016

Introduction: Enterococci have become resistant to a wide range of antibiotics which include aminoglycosides and glycopeptides like vancomycin. The rapid increase of vancomycin resistance compromises physicians' ability to treat infections caused by these strains because the therapeutic options for VRE infections are very limited. **Methods**: The present study included 112 hospitalized patients having nosocomial infections. Selective culture was done on bile esculinazide agar for all suspicious colonies. Enterococcal species were identified using the VITEK-2 system. Antibiotic susceptibility pattern for enterococcal isolates was done using disc diffusion method. Chromogenic medium used for screening VRE, The MIC of vancomycin was determined by E test and PCR was done for detection of vanA gene. **Results**: Out of 112 patients, 32 enterococci species (28.6%) were isolated. Most commonly isolated species were *E. feacalis* (53%), followed by *E. facium* (40.6%), *E. avium*(3.1%), and *E. durans* (3.1%). VRE strains were *E. facium* (83.3%) and *E. feacalis* (16.7%). By disc diffusion method, 34.4% of isolated enterococci were VRE. The same percentage was detected by Chrome agar. Lower percentage (18.8%) was detected by Vitek2 and E-test. Van A gene could be detected in 18.8% of enterococci. The highest sensitivity and specificity (100%) was proved by both E-test and Vitek2 and specificity (92%), Chrome agar showed 100% sensitivity but 81% specificity. However, disc diffusion method showed 83.3% sensitivity and 77% specificity. Accuracies of VRE detection by disk diffusion method, chrome agar, E-test

method, and Vitek 2 system were 78%, 84%, 100%, 100% respectively. **Conclusion**: PCR assay are in agreement with E-test and Vitek2 automated system employed for identification and test susceptibility of clinical *Enterococcus* spp. However, disk diffusion method proved to be less reliable for detection of resistance and should be replaced by routine MIC testing.

❖ **البحث الثاني:**

Efflux Pump Inhibition effect of Curcumin and Phenylalanine Arginyl β- Naphthylamide (PAβN) against Multidrug Resistant Pseudomonas aeruginosa Isolated from Burn Infections in Tanta University Hospitals

التاثير المثبط للمضخة للكركمين وفينيل الانين ارجينيل بيتا نفثالامايد ضد الزائفة الزنجاريه المتعددة المقاومه للدواء المعزوله من عدوى الحروق في مستشفيات جامعة طنطا

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مكان و تاريخ النشر:

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Introduction: Multidrug resistant (MDR) Pseudomonas aeuroginosa strains are very important pathogens causing hospital acquired infections especially in intensive care units. One of the mechanisms of developing drug resistance is efflux pump through which bacteria extrude antibiotics. If these efflux channels are blocked or inhibited, increased drug concentration can be obtained inside a bacterial cell with optimal drug dose. This study was aimed to investigate the role of curcumin and phenylalanine arginyl β-naphthylamide(PAβN) as efflux pump inhibitors (EPIs). **Materials and Methods**: A total of 40 Pseudomonas aeruginosa isolates were taken from burn wounds. Antibiotic susceptibility was performed using disc diffusion test, then minimum inhibitory concentration (MIC) against selected antibiotics before and after adding PAβN (20mg/L, 50mg/L) and curcumin (from 5 to 50µg/ml) was tested. **Results**: MDR isolates showed significant reduction in MIC after adding curcumin (50µg/ml) and PAβN (20mg/L) with selected antibiotics, while no change in MIC was observed when were used alone, indicating their efflux pump inhibitor activity. **Conclusion**: curcumin and PAβN potentiated the effect of antibiotics and thus change their susceptibility pattern

which can be attributed to efflux pumps inhibition. Further genotypic studies may be needed to confirm.

❖ **البحث الثالث:**

Flow Cytometric Detection of Natural Killer Cells and Natural Killer T Cells Changes in the Blood of Patients with Chronic Hepatitis C Virus Infection in an Egyptian University Hospital

الكشف عن التغييرات في الخلايا القاتلة الطبيعية والخلايا القاتلة الطبيعية تي باستخدام جهاز التدفق الخلوي في دماء المرضى المصابين بعدوى الالتهاب الكبدي المزمن سي في مستشفى جامعة مصرية

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مكان و تاريخ النشر:

International Journal of Current Microbiology and Applied Sciences, February 2017

Introduction: Hepatitis C virus (HCV) infects many people worldwide and it is a leading cause of cirrhosis and hepatocellular carcinoma. Natural Killer (NK) cells have an important role during HCV infection as a part of innate immune responses. Three subtypes of NK cells are recognized: CD56dim CD16+ve, CD56bright CD16+ve and CD56–veCD16+ve. Natural killers T (NKT) (CD3CD16CD56+ve) cells are subsets of T lymphocytes that help in innate immune response because they can be directly cytotoxic. Our study was performed to investigate the role of NK cells and NKT cells in the pathogenesis of HCV infection. **Methods**: Our study was conducted on 30 adult patients (18 males and 12 females) with chronic HCV infections. All patients were seropositive for HCV antibodies and positive for HCV-RNA. Anti– CD56, Anti– Cd3, and Anti–perforine labeled monoclonal antibodies were used for flow cytometry. **Results**: There was a significant reduction in the frequency and function of the NK cells (CD3- and CD56+) coincided with a quantitative imbalance of the CD56bright and CD56dim Subsets

within the total NK population. Also, there was a shift in NK subsets dim into bright with a marked decrease in the CD56dim cell fraction as compared to CD56bright cells. **Conclusion**: A decrease in the frequency and function of the NKT cells (CD3+ and CD56+) in the peripheral blood of chronic HCV infected patients, compared to healthy controls, was observed. NK and NKT cells play important roles in the pathogenesis of chronic hepatitis C virus infection.

❖ **البحث الرابع:**

Rapid Species Identification and Antifungal Susceptibility Testing of Candida Isolated from Different Hospital Acquired Infections by VITEK 2 System

التحديد السريع للنوع و اختبار الحساسيه لمضادات الفطريات في المبيضات المعزولة من مختلف أنواع العدوى المكتسبة من المستشفيات بواسطة نظام الفيتك ٢

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مكان و تاريخ النشر:

International Journal of Current Microbiology and Applied Sciences, September 2017

Introduction: Hospital acquired Candida infection is a major cause of morbidity and mortality especially in critically ill and immunocompromised patients. Therefore, an accurate and early identification is necessary for the management of patients. The aim of our study was rapid identification of Candida species and their antifungal susceptibility testing (AST) by VITEK 2 system in hospital acquired fungal infections. **Methods:** A total of 50 Candida isolates were identified by both conventional methods and by Vitek-2 system. Antifungal susceptibility of each isolate was determined by broth microdilution method and Vitek-2 system. **Results:** Out of these 50 Candida isolates, C. albicans (n = 29) were most commonly isolated, followed by C. tropicalis (n = 9), C. krusei (n = 6), C. glabrata (n = 4), and C. parapsilosis (n = 2). C. albicans, C. tropicalis and C. krusei showed

resistance to Flucytosine. C. albicans and C. glabrata showed resistance to Voriconazole. C. krusei showed resistance to Amphotericin B. All the correlation coefficient indices were statistically significant between Vitek-2 system and broth microdilution method in antifungal susceptibility testing of different Candida species. Sensitivity and specificity of Vitek2 system method in antifungal susceptibility testing for Flocytosine were 84%, 86% respectively, for Voriconazole were 94%, 96% respectively, and for Amphotericin B were 96%, 98% respectively. **Conclusion:** Our study revealed that Vitek-2 system reduces the period required for identification and antifungal susceptibility of Candida species. So, Vitek-2 system appeared to be a rapid reliable method for identification and AST for the Candida species to prescribe appropriate antifungal agents for early and better management of fungal infections especially in critically ill and immunosuppressed patients.

❖ **البحث الخامس:**

Inhibitory Effect of Silver Nanoparticles on Biofilm Production by Methicillin Resistant Staphylococci

التأثير المثبط لجزيئات الفضة النانونية على إنتاج المكورات العنقودية للأفلام الحيوية

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مكان و تاريخ النشر:

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Background: The ability of bacteria to colonize surfaces and form biofilms is a major cause of antibiotic resistant infections. Biofilm formation is characteristic for Staphylococcus aureus and Staphylococcus epidermidis infections. Biofilm consists of several layers of bacteria encased within an exopolysachharide

glycocalyx. Nanotechnology may help to penetrate such biofilms and reduce biofilm forming ability of the bacteria. Objectives: This study aimed to evaluate the anti-biofilm efficacy of silver nanoparticles against biofilm producing strains of methicillin resistant Staphylococcu aureus (MRSA) and methicillin resistant Staphylococcus epidermedis (MRSE). **Methodology:** biofilm formation by MRSA and MRSE strains was detected twice, before and after addition of Silver nanoparticles (AgNPs) using Congo Red Agar and tissue culture plate method to determine the anti-biofilm activity of AgNPs. **Results:** Addition of AgNPs by different concentrations reduced biofilm formation. For example, addition of 50µg ml of AgNPs, reduced biofilm formation. Percent of inhibition were 96.6 ± 1.85 for MRSA and 95.75 ± 4.18 for MRSE. **Conclusion:** AgNPs play a major role in the inhibition of biofilm formation by MRSA and MRSE.

❖ **البحث السادس:**

A Study of Central Line Associated Blood Stream Infections among Patients on Hemodialysis before and after Implementation of a Catheter Care Bundle

دراسة عن عدوى تيار الدم المرتبطة بالقسطرة المركزية في مرضى غسيل الكلى قبل وبعد تطبيق حزمة العناية بالقسطرة

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مكان و تاريخ النشر:

Universal Journal of Microbiology Research, March 2018

Background: Central venous catheters (CVCs) are often used as a vascular access in patients with end stage renal diseases when emergency hemodialysis is required, before maturation of arteriovenous fistula or graft, or when a permanent access becomes non-functioning. The most common complication following insertion of a

CVC is infections including exit site infection, tunnel infection, or central line related blood stream infections (CLABSIs). Preventing such complications is crucial in these vulnerable patients and this can be accomplished by strict adherence to infection control guidelines. This study aimed to evaluate the efficacy of implementation of a CVC care bundle composed of best evidence-based practices to see whether the rates of CLABSIs rates would decrease. **Methods:** the study was divided into pre and post intervention phases. The duration of each phase was 6 months during which rates of confirmed CLABSIs per 1000 catheter days as well as the causative microorganisms were recorded. The data were then compared and analyzed to evaluate the intervention. **Results:** CLABSIs rates decreased from 6.7 in phase 1 to 4.1 in phase 2. The relative risk reduction was 0.39. **Conclusions:** Implementation of bundles for insertion and maintenance of CVCs can help preventing CRBSIs which is very important to improve patient care.

❖ **البحث السابع:**

Resistance to mupirocin among Methicillin Resistant Staphylococcus Aureus isolates from Community Acquired Infections, Hospital Acquired Infections, and colonized Health Care Workers

المقاومة للميوبيروسين بين عزلات المكورات العنقودية الذهبية من العدوى المكتسبة من المجتمع و العدوى المكتسبة من المستشفى و العاملين الصحيين

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مكان و تاريخ النشر:

Egyptian Journal of Medical Microbiology, April 2018

Background: Mupirocin is prescribed as a topical treatment of Staphylococcus aureus infections as well as in decolonization of methicillin-resistant S. aureus (MRSA) in both patients and health care workers (HCWs). Availability and increased use of this drug has led to emergence of resistance especially among

MRSA compared to methicillin sensitive S. aureus (MSSA). Objectives: Our study aimed to evaluate the prevalence of mupirocin resistant MRSA isolated from clinical infections and from colonized HCWs. **Methodology:** Between January to August 2017, 61 MRSA isolates were collected. Mupirocin MICs were detected using mupirocin E-test. mupA PCR was performed for resistant isolates. **Results:** 86.9%of MRSA were isolated from clinical infections; 22.9% were Community acquired (CA-MRSA) and 64% were Health Care acquired (HCA-MRSA). 13.1% of total isolated MRSA were from HCWs. 23% of all MRSA were mupirocin resistant. The percentages of mupirocin resistance in CA-MRSA, HCA-MRSA, and MRSA nasal carriers of HCWs were 1.6%, 18.1%, 3.3% of the total Mupirocin resistant MRSA, respectively. 14.8% of MRSA showed low level resistance, while 8.2% were high level Mupirocin resistant. MupA gene was detected in 42.9% of strains with high level mupirocin resistance. **Conclusions:** Routine MRSA testing for mupirocin resistance is recommended for early detection and control of the spread of resistance.

❖ **البحث الثامن:**

Presence and persistence of different multi-drug resistant bacteria on hospital staff uniforms

تواجد و دوام البكتيريا المتعددة المقاومة للدواء المختلفة على زي العاملين بالمستشفى

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مكان و تاريخ النشر:

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Background: Uniforms of hospital staff are often contaminated during their daily patient care activities. Although most of microorganisms harbored on uniforms are commensal bacteria but also some pathogens and even multidrug resistant organisms may spread via contaminated uniforms. There are no standard policies regarding wearing uniforms outside the hospitals and this may spread infections to

the community. Also, there is a debate regarding ideal policy for laundering uniforms either at hospital laundry or at home. **Objectives:** This study aimed to investigate the ability of bacteria to spread and survive on different fabrics used for manufacturing uniforms. **Methodology:** during three months' period (January to March 2018), 50 uniforms (white coats and scrubs) of 20 physicians and 30 nurses were sampled. Bacterial isolates were identified using standard microbiological methods. Multi-drug resistant organisms (MDROs) including Methicillin Resistant Staphylococcus aureus (MRSA), Vancomycin-resistant enterococci (VRE), Extended-spectrum b-lactamase producing E. coli (ESBL), and MDR Pseudomonas auroginosa strains were tested for their survival time on different fabrics used in uniforms. **Results:** Thirty-five (70%) of uniforms were contaminated. MDROs isolated were 12 (16.2% of isolated bacteria) including MRSA (9.5%), VRE (1.3%), ESBL Escherichia coli (2.7%), and MDR Pseudomonas aeruginosa (2.7%). Different MDROs could survive longer on polyester. The survival time on cotton, cotton/polyester blend, and polyester varied from days to months. **Conclusion:** Hospital staff uniforms could be a vehicle of transmission of MDROs. Policies regarding wearing uniforms in streets, ideal frequencies of washing and changing uniforms in our hospital should be strictly regulated.