

### Fast, and Cost-Effective Fourier Transform-Infrared (FT-IR) – Spectroscopy-Based For Bacterial Typing



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Conventional microbiology tests are mainly dependent on time consuming culture and antibiotic susceptibility methods, putting patients and communities at risk of these infections. For epidemiological investigations, identified pathogens are usually subjected to further analyses to determine clonality and subtyping. Phenotypic methods (e.g., biochemical-typing, serotyping and antibiogram) do not produce high resolution typing results, and hence provide uncertainty to guide infection control. Consequently, molecular typing methods are able to distinguish between closely related bacteria and allow analyses of clonal diversity within single species to follow-up outbreaks. The ongoing advancements in next generation whole genome sequencing has increased accessibility and provided even higher-resolution typing. Results can help to identify the predominant genotypes existing within the community, which can direct interventions. Despite the great applications of molecular typing and next generation sequencing methods, the expertise and cost associated remains a challenge to most laboratories.

This presentation will demonstrate our experience in subtyping carbapenemase producing *Klebsiella pneumoniae* isolates from the Gulf States using the fast, and cost-effective Fourier Transform-Infrared (FT-IR) – Spectroscopy- based typing system named IR Biotyper (Bruker Daltonics, Inc.). The subtyping result generated by the IR Biotyper will be compare against the genotyping system DiversiLab® (bioMérieux), which was used against the same collection of isolates.

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### Molecular Characterization of Multidrug-Resistant Gram-negative Bacilli in Egypt: A Snapshot Study



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**Background:** Infections due to multidrug-resistant Gram-negative bacilli (MDR-GNB) are increasingly reported worldwide. Many studies from the Middle East report a high prevalence of MDR-GNB. This high prevalence limits treatment options. We aimed to thoroughly characterize MDR-GNB from Egypt using Whole Genome Sequencing.

**Materials/Methods:** MDR-GNB associated with a range of clinical infections were collected from Egypt as part of a region-wide study. One isolate per patient was included. Species identification was performed using MALDI-TOF-MS. DNA. Paired-end reads were generated using Illumina. De novo assembly was performed using CLC-Genomics-Workbench and consensus sequences were compared to ResFinder. MLST were also assigned.

**Results:** Most isolates (47%) were *Klebsiella pneumoniae* of which two were ST-11, and the remainder were ST-15, ST-35, ST-307, ST-376 and ST-395. All isolates harboured ESBL genes blaCTX-M-15 except *K.pneumoniae* ST-376 which instead carried blaCTX-M-14b. Three *K.pneumoniae* (ST-11, ST-35, and ST-395) possessed the carbapenemase gene blaNDM-1 and ST-376 possessed blaOXA-48. All *K.pneumoniae* carried multiple genes encoding aminoglycoside resistance including aac(3)-IIa, aac(6')Ib-cr, aadA1, aadA2, aacA4, aph(3')-VIa, strA, strB. All isolates

possessed fluoroquinolone resistance genes aac(6')Ib-cr, oqxA, and oqxB, and all except ST-376 also possessed QnrB1, QnrS1, or QnrB66. Six isolates (40%) were *Escherichia coli* of which four were ST-410 and two were ST-167 and ST-405. All *E.coli* isolates carried blaCTX-M-15 while ST-405 additionally harboured blaCTX-M-14b. All isolates carried aminoglycoside resistance genes aac(6')Ib-cr, aadA5; ST405 additionally had aac(3)-IIId and ST-167 also carried aac(3)-IIId, strA, and strB. Two (13%) *Acinetobacter baumannii* isolates were included: ST-499 carried blaOXA-23 and blaGES-11; and ST-557 co-harboured blaOXA-23 and blaNDM-1. Both *A.baumannii* isolates had the aminoglycoside resistance determinants aph(3')-VIa. ST-499 and ST-557 additionally possessed aacA4, or aph(3')-Ic and armA, respectively.

**Conclusions:** This study identified resistance mechanisms and STs associated with MDR-GNB in Egypt. Raising awareness of MDR bacteria has important implications for controlling AMR in MENA.

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### Comorbidities among HIV Adult Patients in King Abdulaziz Medical City, Western Saudi Arabia: 30 Years Retrospective Cohort Study



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**Background:** With successful medications, HIV is a lifelong condition. HIV-positive patients are considerably susceptible to encounter higher incidence of comorbidities related to normal aging, HIV infection and treatment.

**Aim and objectives:** This study aims to estimate incidence and assess pattern and factors associated with comorbidities among HIV patients in King AbdulAziz Medical City, Jeddah (KAMC-J).

**Methods:** This retrospective cohort study analyzed data on HIV positive cases diagnosed at KAMC-J from 1984 – July 2018. Duplicate files and files with no follow up were excluded. Descriptive statistics were used to measure occurrence of co-morbidities. Multivariate logistic regression analysis (Odds Ratio and 95% confidence interval) was applied to assess risk factors associated with multiple co-morbidities (> 3). Kaplan Meier curve with log-rank test was plotted to estimate survival. Level of significance was determined at p-value <0.05.

**Results:** Out of 198 HIV positive cases diagnosed at KAMC-J since 1984, 102 patients (51.5%) were included. All patients were Saudi with majority of them being males (73.5%). Mean ± SD of age was 49.0 ± 12.2 years. There were 15.7% deaths. Most common existing medical conditions were diabetes mellitus (29.4%), hypertension (24.5%), dyslipidemia (23.5%), tuberculosis (19.6%), pneumonia (18.6%) and lymphoma (16.7%). Pneumonia was the most common newly diagnosed disease (16.7%) followed by dyslipidemia (14.7%), TB (13.7%), candidiasis (13.7%) and lymphoma (10.8%). Infections were identified in 90.2%, followed by cardiovascular and endocrine/metabolic conditions (66.7% each). Patients with more than 3 comorbidities were 53.9%. Multivariate regression analysis identified age (≥50 years) and those received Raltegravir as more likely to have multiple comorbidities (OR=4.56, 95%CI=2.13, 15.68 and OR=4.52, 95%CI=1.15, 17.68; respectively).

**Conclusion:** This study highlights the substantially increased burden of chronic comorbidities among HIV patients. Patient coun-

seling is highly recommended not only for infectious diseases prevention (e.g., vaccination) but also for lifestyle modification.

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### Co-Existence of BKV and Disseminated Tuberculosis in Transplant Recipient

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Tuberculosis (TB) in renal transplant recipients presents important diagnostic difficulties because of the greater incidence of extra-pulmonary involvement, negative sputum smear results despite active disease and its atypical presentation, specifically reactivation of the latent form. BKV nephropathy was first reported in 1995, coinciding with the widespread use of immunosuppressive drugs, which can complicate the cores of 1–10% of renal transplant recipients. It is also not uncommon to find the existence of bacterial or fungal infections in the presence of an immuno-modulating virus like cytomegalovirus infection. Herewith, we describe a 67-year-old Saudi male who presented with deterioration of renal function and fever of unknown origin and was documented to have polyoma virus nephropathy and disseminated TB. To the best of our knowledge, this is the first report of such an association in the literature

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### Antimicrobial resistance treatment out of pocket expenditure cost analysis in Saudi Arabia and other Arab countries

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**Background:** Antimicrobial resistance remains a persisting and growing public health menace in Saudi Arabia and other Arab countries.

**Methods:** A randomized comparative and prospective study was conducted in Mars 2017 to uApril 2018 on 387 clinical cases with history of drug or multidrug resistance.

**Results and discussions:** A total 27% were related to antibacterial resistance, 12% linked to insulin resistance and 5% mixed. The cost of treatment varied from pathogen, disease severity, duration of treatment and age related complications. Insights AMR risk factors, out of pocket and insurance impact was analysed and discussed.

**Conclusions:** AMR impact is still poorly understood in Arab countries including Saudi Arabia, UEA and presents a huge out of pocket expenditures both individual and insurance firms. AMR insured policy should be explored and implemented. Evidence-based population AMR risk and cost-assessment in generating effective data and AMR data sharing forecasting is needed in advancing drug prescription, medication adherence and patient centered quality service delivery.

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### Molecular and serological monitoring of dromedary camel herds for the Middle East Respiratory Syndrome Coronavirus

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**a. Background and Purpose:** The Middle East respiratory syndrome coronavirus (MERS-CoV) is ubiquitous in dromedary camels. Several studies reported the high seroprevalence of MERS-COV among dromedary camels in the Middle East and Africa. Furthermore, it was not clear if the previously infected animals could be further infected if exposed to the virus for the second or third time. The reasons behind these phenomena still require more explanation. We conducted a longitudinal study to answer these important questions and provide some clues on the potential vaccination strategies for dromedary camels against MERS-CoV.

**b. Methodology:** Two herds of dromedary camels were longitudinally sampled with nasal and rectal swabs and serum, between September 2014 and May 2015, and the samples were tested for Middle East Respiratory Syndrome (MERS) coronavirus RNA and antibodies.

**c. Results and Discussions:** Evidence of MERS-CoV infection was confirmed in one herd on the basis of detection of virus RNA in nasal swabs from three camels and significant increases in the antibody titers from three others. The three viruses were genetically identical, thus indicating introduction of a single virus into this herd.

**d. Conclusions:** There was evidence of reinfection of camels that were previously seropositive, thus suggesting that prior infection does not provide complete immunity from reinfection, a finding that is relevant to camel vaccination strategies as a means to prevent zoonotic transmission.

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