

PUBLICATIONS ON OUR RESIST RANGE

Performance evaluation of the newly developed In Vitro rapid diagnostic test for detecting OXA-48-like, KPC-, NDM-, VIM- and IMP-type carbapenemases: the RESIST-5 O.K.N.V.I. Multiplex Lateral Flow Assay - 2021 - *Antibiotics (Basel)*

Comparison of three lateral flow immunochromatographic assays for the rapid detection of KPC, NDM, IMP, VIM and OXA-48 carbapenemases in Enterobacterales - 2022 - *J Antimicrob Chemother.*

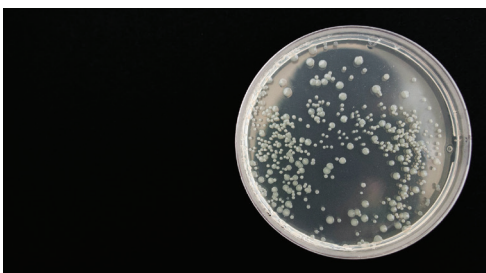
Assessing O.K.N.V.I. RESIST-5 performance for post-mortem biological samples: A prospective pilot study - 2023 - *Exp Ther Med.*

Carbapenem-resistant organisms isolated in surgical site infections in Benin: A public health problem - 2022 - *Trop Med Infect Dis.*

RESIST Acineto rapid immunological test for the detection of acquired carbapenemase producers among *Acinetobacter* spp - 2023 - *Diagn Microbiol Infect Dis.*

Evaluation of RESIST ACINETO immunochromatographic assay from positive blood cultures - 2023 - *J Antimicrob Chemother.*

Comparison of two immunochromatographic tests for the detection of CTX-M ESBL on clinical isolates at the Belgian National Reference Centre - 2023 - *ECCMID*



AntiMicrobial Resistance

Pressbook

*A selection of the most
recent publications on AMR*

www.corisbio.com
sales@corisbio.com
client.care@corisbio.com

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MECHANISMS OF RESISTANCE

Antimicrobial resistance : prevalence, economic burden, mechanisms of resistance and strategies to overcome - 2021 - *European Journal of Pharmaceutical Sciences*

- ♦ 10 million deaths annually by 2050 if current trends continue VS \$300 bn to \$1 tn by 2050 estimated cost due to prolonged hospital stays, increased treatment costs, reduced productivity
- ♦ Various mechanisms through which bacteria develop resistance, including genetic mutations, reduced permeability to antibiotics, enzymatic degradation of drugs, and bypassing drug effects through alternative pathways
- ♦ Resistance facilitated by the misuse and overuse of antibiotics in healthcare and agriculture
- ♦ Proposed strategies include developing new antibiotics, modifying existing drugs, and improving the use of combination therapies

Pervasive transmission of a carbapenem resistance plasmid in the gut microbiota of hospitalized patients - 2021 - *Nature Microbiology*

- ♦ Over 9,000 patients and whole-genome sequencing of 250 enterobacteria clones to investigate the spread of the pOXA-48 carbapenemase plasmid in a hospital over 2 years
- ♦ High rates of between-patient transmission of carbapenem-resistant *K. pneumoniae* and *E. coli*, identifying specific hospital wards and rooms as hotspots for transmission
- ♦ Frequent plasmid transfer within patients' gut microbiota, indicating that the plasmid moves horizontally among different bacterial hosts present in the gut.

Evaluation of antibiotic resistance mechanisms in Gram-negative bacteria - 2023 - *Antibiotics*

- ♦ Review of key MDR GNB, β -lactamases, aminoglycoside-modifying enzymes, OM remodelling, efflux pumps & alteration of target sites
- ♦ *E. coli*: efflux pumps + presence of C^{res} and ESBLs: highest threat, needing a combination therapy of several antibiotics
- ♦ *A. baumannii*: combination of *A. baumannii* strains harbouring OXA-like C^{res} = significant clinical impact
- ♦ *K. pneumoniae*: +50% produced ESBLs & were also MDR; possesses the ability to horizontally acquire resistance genes
- ♦ *P. aeruginosa*: its extensive formation of biofilms enables this bacterium to enhance the horizontal dissemination of resistant genes and increase the release of β -lactamase enzymes
- ♦ Recent advances in artificial intelligence and machine learning to develop novel narrow-spectrum antibiotics

A review of carbapenem resistance in enterobacterales and its detection techniques - 2023 - *Microorganisms*

- ♦ Acquired resistance development by genetic mutations & acquisition of resistant genes or through HGT
- ♦ Detection challenges due to diversity of carbapenemase enzymes. Traditional culture-based methods often inadequate for rapid detection, leading to delays in appropriate treatment
- ♦ Advanced genotypic and biosensing detection techniques developed for quicker identification of CRE: more accurate but require sophisticated lab facilities.

Molecular mechanisms of resistance revisited - 2023 - *Nature Microbiology*

- ♦ Comprehensive review of the molecular mechanisms of antibiotic resistance
- ♦ New technologies have unraveled structural details of key resistance mechanisms
- ♦ Role of genomics: identification of new resistance gene families & how they contribute to the biology of their host organisms
 - ♦ Interactions between different resistance mechanisms: how they can enhance bacterial survival and complicate treatment strategies

EPIDEMIOLOGY

Extended-spectrum β -lactamases - an update on their characteristics, epidemiology and detection - 2021 - *J Antimicrob Chemother.*

- ♦ ESBL-producing Gram-negative pathogens: major contributors to AMR worldwide, affecting hospital-associated & community-acquired infections
- ♦ "CTX-M pandemic": shift from TEM- (243 variants) and SHV-type (228 variants) ESBLs to CTX-M-type enzymes
- ♦ ESBL phenotype OXA-type β -lactamases: 27 oxacillinase enzymes described as extended spectrum ; OXA-48 derivatives described to display activity against extended-spectrum β -lactams, with or without many of the OXA-48-like enzyme's characteristic carbapenemase activity
- ♦ Epidemiology & prevalence of CTX-M-producing in *E. coli*, *K. pneumoniae*, *P. aeruginosa*, *A. baumannii*
- ♦ Numerous phenotypic & genotypic diagnostic tools available to detect β -lactamases, but delayed identification of ESBLs can lead to improper antimicrobial therapy and poor patient outcomes

Global point prevalence survey - Impact and value - 2023 - *Global PPS*

- ♦ Web-based tool for data collection featuring a validation process ensuring quality assurance
- ♦ Real-time feedback reports that detail institutional antimicrobial prescribing practices
- ♦ Broad international participation, with more than 90 countries involved
- ♦ Selection of relevant surveys & publications discussing antimicrobial prevalence, consumption, resistance and epidemiology

Carbapenem-resistant *Escherichia coli* exhibit diverse spatiotemporal epidemiological characteristics across the globe - 2024 - *Communications Biology*

- ♦ Carbapenem-resistant *E. coli*: severe global public health risk due to its antibiotic resistance & resistance to carbapenems
- ♦ Spatiotemporal epidemiological characteristics showing a shift in the prevalence of some CREC strains exhibiting higher antibiotic resistance
- ♦ Horizontal gene transfer of resistance plasmids facilitates rapid spread of resistance traits among bacterial populations
- ♦ Identification of specific global transmission hubs & patterns for dominant CREC strains (ST131: major hubs in UK, Italy, US, China ; ST167: India, France, Egypt, US). Several regions identified as hyperendemic.
- ♦ Gene prevalence: NDM (Asia, North America, Africa, Oceania), OXA-48-like (Spain, France), KPC (South America, UK, Germany). Intercontinental transmission routes identified

Global epidemiology of CTX-M-type β -lactam resistance in human and animal - 2022 - *Comp Immunol Microbiol Infect Dis.*

- ♦ Exponential spread of CTX-M enzymes leading to a wide diversity of strains, with 242 allelic variants enlisted since 2020, and with CTX-M-1 group being the most diversified
- ♦ Maximum variants reported from North America, followed by Asia. Europe also a hotspot & possess a total of 14 variants
- ♦ Some amino acid residues in the specific region of β -lactam ring vary in different CTX-M categories with varying success rate in the environment as an infectious agent

Prevalence of Carbapenemase and Extended-Spectrum β -Lactamase producing enterobacteriaceae - 2023 - *Antibiotics*

- ♦ Cross-sectional study aimed at determining the prevalence of C^{res} , CRE- and ESBL- producing *Enterobacteriaceae* and their antibiotic susceptibility profiles
- ♦ *E. coli* widespread transmission & different resistance patterns, followed by *K. pneumoniae*, *A. baumannii* & *P. aeruginosa*
- ♦ All of the ESBL-producing bacteria were completely resistant to amoxicillin-clavulanic acid, cefotaxime and ceftazidime
- ♦ Overall carbapenem resistance seen in 31,4% of non-ESBL-producing *E. coli* VS 39,2% in the case of ESBL-producing *E. coli*