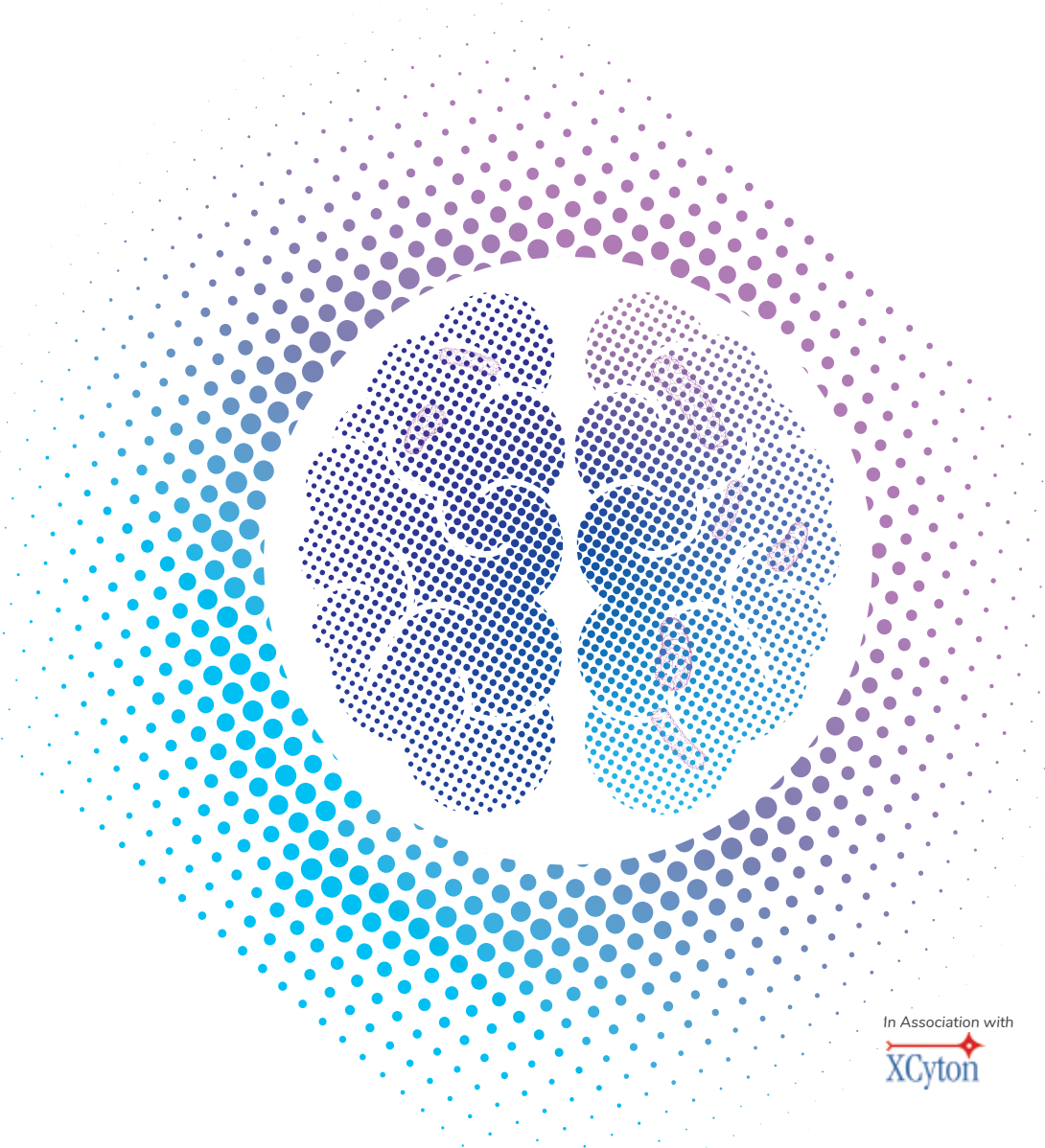
mocra
Infectious Disease Genetics

MEDGENOME

Syndrome Evaluation System (SES) for
CNS infections



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Prevalance

- According to WHO, 1 in 10 patients get infection while receiving care globally[1]
- The burden of HAI (healthcare associated infection) is several fold higher in low- and middle-income countries than in high-income ones
- Globally, more than 50% of surgical site infections can be antibiotic resistant[1]. In low-and middle-income countries, 11% of patients who undergo surgery are infected in the process[3]

Molecular Basis of diagnosis of infectious diseases[4]

Molecular detection by amplification and hybridization of nucleic acids as a technology has opened a new and innovative era for microbial diagnosis. The use of nucleic acid detection for the diagnosis of infectious diseases in clinical laboratories is facilitated by PCR (Polymerase Chain Reaction), This approach is useful to detect mutations associated to drug resistance directly on biological samples without the requirement of culturing organism.

Syndrome Evaluation System (SES)

A patented technology that comprises of rapid multiplex amplification and accurate identification of the virulence associated genes of the causative agents or organisms. This amazingly fast and accurate platform transcends all conventional diagnostic tests and helpful when organisms are difficult to cultivate or difficult to find. The technologies currently available for diagnosis of infections are grossly inadequate to detect early during the illness and to institute specific therapy in critical illnesses, resulting in loss of function or even loss of life.

The amplification of the gene allows for higher sensitivity of the test and the re-naturation of the amplified signature gene to its chemically identified complementary gene sequence on the SES allows for higher specificity of the test. And the simultaneous detection of multiple pathogens allows for early diagnosis of the infection and initiation of therapy.

The SES Advantage

Rapid	Sample to report in 7 - 10 hours
Higher Accuracy	Detects more number of cases than conventional methods (75% by SES vs 10-15% conventional method)
Cost effectives	Avoids multiple testing and unnecessary investigations and reduces ICU stay & associated cost.
Provides Direct evidence for the presence of infection	Detects DNA of pathogens
Comprehensive	Detects fungi, viruses, parasites and bacteria in a single test. It also detects uni-microbial or poly-microbial infections.
Rules in or Rules out infections	

CNS Infections:

Infections of the central nervous system (CNS) pose a unique challenge due to high level of morbidity and mortality that they cause as well as the inherent difficulties involved in their diagnosis and treatment. These infections are meningitis, encephalitis, and brain abscesses, and they tend to cause more morbidity and mortality on an average than the infections involving the other organ systems [5]

Meningitis

Meningitis is a disease caused by the inflammation of the protective coverings of the brain and spinal cord known as meninges. The infection of the fluids surrounding the brain and spinal cord leads to inflammation of meninges. Globally, meningitis is a significant cause of morbidity and mortality in the pediatric population accounting for about 180,000 deaths annually[6]. Studies from India have attributed pneumonia and meningitis as the leading causes of deaths among children below five years of age accounting together to nearly 22.0% deaths[6].

Acute Encephalitis Syndrome

Acute encephalitis syndrome (AES) is characterized by an acute onset of fever and clinical neurological manifestation that includes fits, disorientation, behavioural changes, confusion, drowsiness delirium or coma. The causative agent of AES varies with season and geographical location, and predominantly affects population below 15 years[7]. Keeping in mind the wide range of causal agents and the rapid rate of neurological impairment due to pathogenesis, it poses a challenge of rapid diagnosis and early institution of appropriate therapy.

SES Pan CNS

Microbe Type	Microorganism
Leading Bacteria	*Streptococcus pneumoniae* *Haemophilus influenzae* *Neisseria meningitidis* *Mycobacterium tuberculosis*
Gram Positive Bacteria	*Staphylococcus aureus* *Group B Streptococcus* *Enterococcus spp.* *Streptococcus pyogenes*
Gram Negative Bacteria	*Klebsiella pneumoniae* *E.coli* *Enterobacter spp* *Pseudomonas aeruginosa* *Acinetobacter baumannii* *Bacteroides fragilis* *Leptospira* *Salmonella spp.* *Proteus mirabilis*
Fungi	*Cryptococcus neoformans* *Aspergillus spp.* *Candida spp.*
DNA Viruses	*Herpes Simplex Virus 1 & 2* *Cytomegalovirus* *Varicella Zoster Virus* *Human Herpes Virus-6* *John Cunningham Virus*
Parasite	*Toxoplasma gondii*
Sample Type : Whole CSF	

SES AES

Microbe Type	Microorganism
Leading Bacteria	*Streptococcus pneumoniae* *Haemophilus influenzae* *Neisseria meningitidis* *Mycobacterium tuberculosis*
Fungi	*Cryptococcus neoformans*
DNA Viruses	*Herpes Simplex Virus 1 & 2* *Cytomegalovirus* *Varicella Zoster Virus* *Human Herpes Virus-6* *John Cunningham Virus*
RNA Viruses	*JEV* *Dengue 1-4* *West Nile* *Enteroviruses* *Chikungunya* *Rabies* *Chandipura* *Measles* *Mumps* *Rubella* *Nipah*
Parasite	*Toxoplasma gondii*
Sample Type : Whole CSF	

SES Meningitis

Microbe Type	Microorganism
Leading Bacteria	*Streptococcus pneumoniae* *Haemophilus influenzae* *Neisseria meningitidis* *Mycobacterium tuberculosis*
Gram Positive Bacteria	*Staphylococcus aureus* *Group B Streptococcus* *Enterococcus spp.* *Streptococcus pyogenes*
Gram Negative Bacteria	*Klebsiella* *E.coli* *Enterobacter spp* *Pseudomonas aeruginosa* *Acinetobacter baumannii* *Bacteroides fragilis* *Leptospira* *Salmonella spp.* *Proteus mirabilis*
Fungi	*Cryptococcus neoformans* *Aspergillus spp.* *Candida spp.*

Sample Type : Whole CSF

SES Encephalitis- Outbreak

Microbe Type	Microorganism
RNA Viruses	*JEV* *Dengue 1-4* *West Nile* *Enteroviruses* *Chikungunya* *Rabies* *Chandipura* *Measles* *Mumps* *Rubella* *Nipah*

Sample Type : Whole CSF

SES Encephalitis- Sporadic

Microbe Type	Microorganism
Leading Bacteria	*Streptococcus pneumoniae* *Haemophilus influenzae* *Neisseria meningitidis* *Mycobacterium tuberculosis*
Fungi	*Cryptococcus neoformans*
DNA Viruses	*Herpes Simplex Virus 1 & 2* *Cytomegalovirus* *Varicella Zoster Virus* *Human Herpes Virus-6* *John Cunningham Virus*
Parasite	*Toxoplasma gondii*

Sample Type : Whole CSF

SES Antibiotic resistance markers

ESBL: Detects genes that confers resistance to Extended Spectrum Beta Lactams

Carbapenem: Detects both, Betalactamases and Metallo Betalactamases

NDM-1: Detects New Delhi Metallo Betalactamases

Van A: Detects resistance to Vancomycin and Teicoplanin

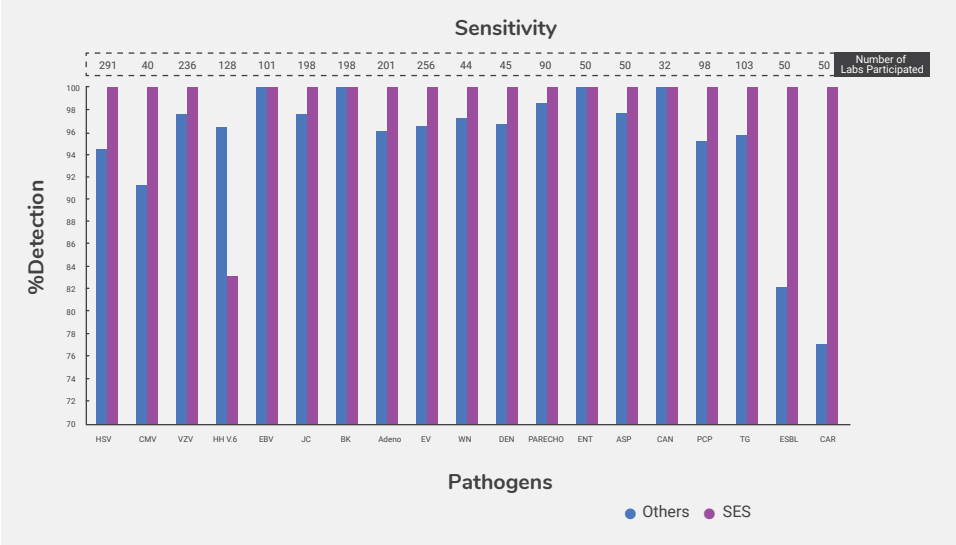
Van B: Detects resistance to Vancomycin (Teicoplanin Sensitive)

Methicillin: Detects resistance to Methicillin

Performance of SES Testing-Quality Considerations

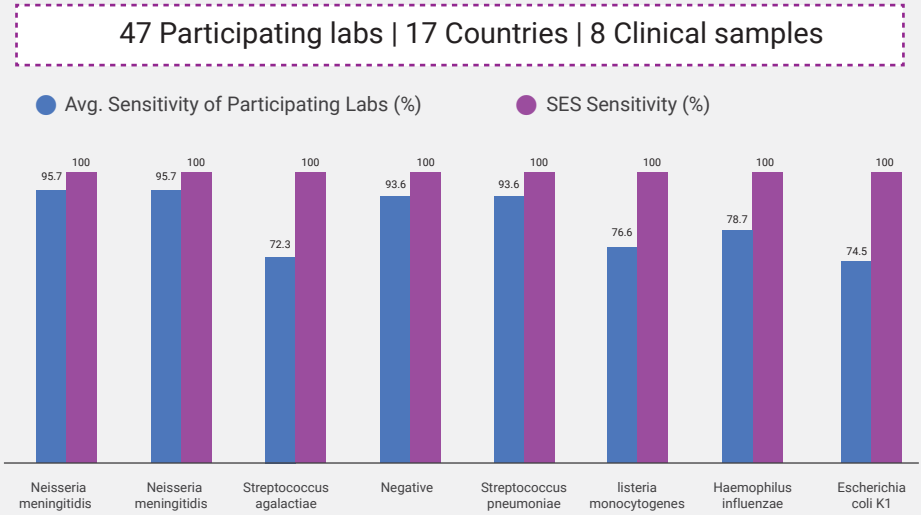
The SES test scored exceptionally in International Proficiency Test conducted by Quality Control for Molecular Diagnostics (QCMD), an independent International External Quality Assessment (EQA) / Proficiency Testing (PT) organisation

1. International Proficiency Testing- SES sensitivity



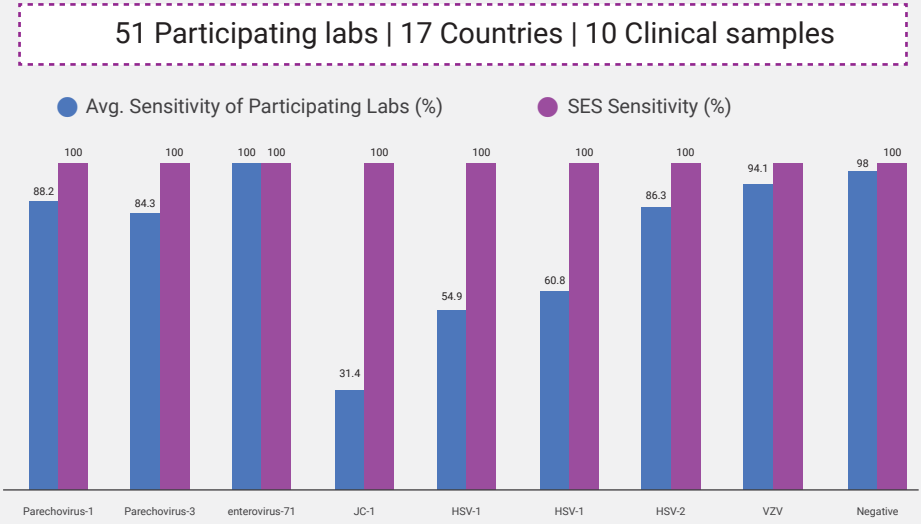
2. International Proficiency Testing- SES specificity

3. Validation for SES Bacterial Meningitis Panel



SES Test shows 100% Concordance

4. Validation for SES Viral Panel Pathogens



SES Test shows 100% Concordance

Sample Requirements:

Sample Type
Whole Cerebrospinal Fluid (CSF)

Volume
1-2 mL

Acceptance Criteria of Sample
- Freshly collected whole CSF samples
- Samples volume greater than 1ml
- Sample collected directly from LP needle into potassium EDTA vacutainer

Rejection Criteria of Sample
- CSF samples stored for more than 24 hours
- CSF samples that are spun down (cytospin) to remove WBC
- Samples volume being less than 750 µl
- Sample collected in in-house sterilized injection vials/Falcon tubes/ test tubes or wide mouth containers

Precaution during sampling
- Sterilise the collection site to prevent skin contaminants getting into the sample
- Collect CSF directly into the vacutainer whose cap is opened, as LP is being performed. This helps to prevent contamination of sample and avoids transfer of sample.

References

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2. https://www.who.int/infection-prevention/publications/burden_hcai/en/
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Micra by MedGenome offers advanced test for genetic and molecular testing in infectious diseases

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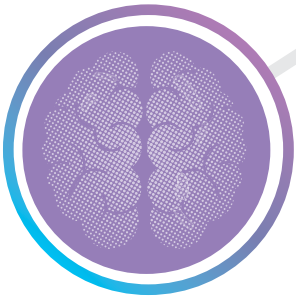
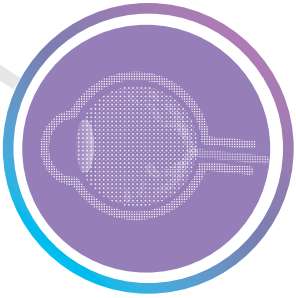


CNS Infections

- Meningitis
- Meningo-encephalitis
- Acute Encephalitis Syndrome

Systemic Infections

- Sepsis
- Febrile Neutropenia
- Pneumonia
- Respiratory Infections



Eye Infections

- Endophthalmitis
- Uveitis
- Fuch's Disease
- Retinitis

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For more information

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