



Molecular Diagnostics Services Section Home

History

The foundations of molecular diagnostics were laid with the discovery of the DNA double helix in 1953 by James Watson and Francis Crick. This breakthrough paved the way for understanding the genetic basis of diseases. The evolution of techniques like polymerase chain reaction (PCR) in the 1980s and DNA sequencing in the 1990s accelerated the field. The completion of the Human Genome Project in 2003 marked a turning point, providing a reference genome for comparative analysis and disease research.

Kary Mullis

His invention of the polymerase chain reaction (PCR) earned him the Nobel Prize and revolutionized DNA amplification.

2.

Alec Jeffreys

His discovery of DNA fingerprinting enabled identification and forensic applications.

4.

Evolution Till Date

Molecular diagnostics has evolved from basic DNA fingerprinting to a sophisticated field integrating genomics, proteomics, and advanced analytical methods. The advent of high-throughput sequencing, microarray technology, and digital PCR has empowered researchers to analyze large datasets, identify disease-specific markers, and design personalized treatment regimens. The field's rapid progress has driven the emergence of precision medicine.

Infectious Disease Diagnosis

Molecular diagnostics detect pathogens, aiding rapid and accurate diagnosis of infections.

2.

Pharmacogenomics

Molecular diagnostics guides drug selection and dosing based on an individual's genetic makeup.

4.

Non-Invasive Prenatal Testing

Molecular diagnostics analyzes fetal DNA in maternal blood for genetic abnormalities.
6.

Liquid Biopsies

Molecular diagnostics detects cancer-associated genetic alterations in bodily fluids, aiding monitoring and treatment response assessment.
8.

Forensic Analysis

Molecular diagnostics identifies individuals based on DNA fingerprinting in criminal investigations.
10.

Neonatal Screening

Molecular diagnostics detects genetic disorders in newborns, allowing early intervention.
12.

Microbial Genomics

Molecular diagnostics tracks disease outbreaks and identifies drug-resistant pathogens.
14.

Rare Disease Diagnosis

Molecular diagnostics identifies genetic mutations underlying rare diseases.
16.

Metabolic Disorder Diagnosis

Molecular diagnostics identifies metabolic disorders through enzyme assays and genetic testing.
18.

Biomarker Discovery

Molecular diagnostics identifies novel biomarkers for disease diagnosis and prognosis.
20.

Future Prospects

The future of molecular diagnostics is promising, driven by rapid advancements in genomics, bioinformatics, and technology. Liquid biopsies will become more sophisticated, enabling early detection and real-time monitoring of diseases. Single-cell analysis will uncover disease heterogeneity and treatment resistance mechanisms. The integration of molecular diagnostics with

artificial intelligence will enhance diagnostic accuracy and predictive modeling. In the era of precision medicine, molecular diagnostics will play a crucial role in tailoring treatments based on individual genetic profiles.

Molecular diagnostics stands as a beacon of hope in modern medicine, offering a transformative approach to disease diagnosis, treatment, and prevention. From its inception in DNA fingerprinting to its current role in precision medicine, this field has redefined how we understand and manage health conditions. As technology continues to advance and interdisciplinary collaborations flourish, molecular diagnostics will remain pivotal in shaping the future of healthcare, offering personalized solutions to complex medical challenges and ushering in an