



# Polymerase Chain Reaction (PCR): Revolutionizing Molecular Biology

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## **Abstract**

Polymerase Chain Reaction (PCR) has emerged as a transformative force in molecular biology, reshaping research methodologies and expanding our capabilities in understanding, analyzing, and manipulating DNA. Developed by Kary B. Mullis in 1983, PCR has become an indispensable tool for amplifying specific DNA sequences, enabling exponential replication even from minute sample quantities. This article provides a comprehensive overview of PCR, exploring its principles, applications, and recent advancements. The three-step process of denaturation, annealing, and extension forms the basis of PCR, allowing the selective amplification of targeted DNA segments. This technique has found widespread applications in genetic research, medical diagnostics, and forensic investigations. In genetic research, PCR facilitates the study of genes and their variants, while in medical diagnostics; it plays a crucial role in the detection of pathogens, genetic disorders, and mutations. Forensic investigations benefit from PCR's ability to analyze trace

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