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# GENE TECHNOLOGY: REVERSE TRANSCRIPTION FROM RNA TO DNA

*Discovery that revolutionized molecular biology*

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The central dogma of molecular biology is DNA must be able to express genes through protein synthesis. The process of protein synthesis involves transcription of RNA and translation of polypeptide from RNA to produce protein e.g. hormone, enzyme. The basic principle of transcription is information from DNA used as a template, and the genetic information encoded in DNA is transcribed onto another nucleic acid known as messenger RNA or mRNA. The mRNA could carry the code to the ribosomes in the cytoplasm, and synthesis protein [1]

In the 1970s reverse transcriptase enzyme was discovered in retroviruses by Baltimore and Temin [2]. Retroviruses include Human Immunodeficiency Virus or HIV, and RNA tumor virus that causes leukemia disease. Their discovery was opposite with what initially dictated for the central dogma in molecular biology. The RNA animal virus or retrovirus has the most complex replication cycle. Further studies on reverse transcriptase led to the interpretation of the mechanism of retrovirus replication. This discovery has also revolutionized molecular virology and paved a platform for research in retrovirology and cancer biology [2].

## **Reverse Transcription-Polymerase Chain Reaction (RT-PCR).**

Molecular biologists have been using Reverse Transcription-Polymerase Chain Reaction (RT-PCR) as preferable RNA virus detection technique. The reverse transcription process starts by turning sample set of mRNA to complementary DNA (cDNA) by using reverse transcriptase to catalyze the reaction [1]. Treatment process using the alkaline would degrade the mRNA enzyme and resulting with double stranded cDNA. The cDNA later further amplified by using Polymerase Chain Reaction (PCR) technique. PCR process includes heat treatment to separate the two strands of DNA, elongation of DNA strands by using primer, and these steps would produce amplified copies of DNA.

## **References**

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- [2] Coffin, J. M., & Fan, H. (2016). The discovery of reverse transcriptase. *Annual review of virology*, 3, 29-51.

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