

HIV-1 RNA, NAAT Description:

A Nucleic Acid Amplification Test, or NAAT, is a molecular-based diagnostic test used on several disease-causing viruses, including Human Immunodeficiency Virus type 1 (HIV-1). Real-time transcription-mediated amplification (TMA) is a specific, sensitive type of NAAT test used for the detection and quantitation of RNA or DNA in a sample. The RNA of HIV-1 is the target of the TMA test. The process is made up of three steps that occur in a single tube: RNA capture, amplification, and detection.

To begin the process, detergent is used on the sample to burst the virus particles and release the viral RNA. The sample is then combined with magnetic beads that capture the target RNA. The magnetic beads and attached RNA are separated from the sample using a magnet, and then washed to remove impurities.

Once purified, the target RNA is converted into DNA. Through a process called *transcription*, an initial DNA copy of the target RNA sequence is used to produce several new copies of target RNA. These multiple RNA copies are called *amplicons*. Each new amplicon repeats this process, leading to the exponential production, or *amplification* of the target RNA. During the amplification step, fluorescent markers attach to each RNA amplicon.

When a fluorescent marker attaches to an RNA amplicon, a fluorescence signal is released. As more RNA amplicons are produced, a higher fluorescence signal is emitted. The RNA concentration in a tube is determined by measuring the time taken for the fluorescence signal to reach a certain threshold. The higher the starting RNA concentration in the tube, the more rapidly the threshold is reached, and the more viral RNA is present in the specimen.