# RADT Vs RT-PCR

## Why in News

Recently, New Delhi's **Covid-19** testing strategy has become controversial due to **the low level** of **RT-PCR** (Reverse Transcription Polymerase Chain Reaction) **re-testing in persons** tested negative in **RADT** (Rapid Antigen Detection Tests).

- Using RADT **widely without following up** with **adequate retests contradicts** Indian Council of Medical Research **(ICMR) guidelines** on use of the RADT test.

## Key Points

- **ICMR Guidelines:**
    - RADT ought to be used only in **containment zones, hotspots, hospital settings and laboratories** among those who manifested one or other symptoms of the disease, influenza-like illnesses.
    - People with **comorbidities who were asymptomatic** and high-risk contacts of those confirmed positive.
    - Those who tested 'negative' and whom **clinicians suspected** to be harbouring the disease ought to be **definitely tested sequentially by RT-PCR** to rule out infection and **higher chances of false negatives.**
    - Those who test positive don't need a re-test and must be considered positive.
- **Testing in New Delhi:**
    - From 18$^{th}$ June - 16$^{th}$ July, it has conducted 3,05,820 RADT. Of these, 2,85,225 tests came 'negative' and out of them only, 1,670 were chosen for re-test by RT-PCR and 262 of these were confirmed positive.
    - Only **1 in 200 of those who tested negative in an antigen** test to detect possible coronavirus cases **were re-tested,** which is against the given guidelines of ICMR.
    - Of those re-tested with **RT-PCR, around 15% tested positive,** which is higher than the **RADT positive results i.e. 6%.**
- **Arguments for Low Re-tests:**
    - Re-testing everyone would defeat the purpose of having another (rapid antigen) test.
    - The RT-PCR test takes a minimum of 2-5 hours including the time taken for sample transportation. This **limits the widespread use of the test** and also impedes quick augmentation of testing capacity in various containment zones and hospital settings.
        - In **RADT, the maximum duration** for interpreting a positive or negative test is **30 minutes,** thus **a quicker complement to the standard RT-PCR** tests.
- **Arguments Against:**
    - The consequence of **indiscriminately deploying antigen tests** would mean expanding the number of tests and presenting a lower positivity rate while not necessarily being able to **reliably establish the extent of the spread** of the coronavirus in the population.
    - A low level of re-testing with RT-PCR in persons who are testing antigen negative will

**underestimate the cases** and make the **tracking inaccurate.**

**RADT**

- It is a test on swabbed nasal samples that detects antigens (foreign substances that induce an immune response in the body) that are found on or within the SARS-CoV-2 virus.
- It is a **point-of-care test,** performed outside the conventional laboratory setting, and is used to quickly obtain a diagnostic result.
- Like RT-PCR, the rapid antigen detection test too seeks to detect the virus rather than the **antibodies** produced by the body.
    - While the mechanism is different, the **most significant difference between the two is time.**
    - As the ICMR has pointed out, the **RT-PCR** test takes a minimum of **2-5 hours** including the time taken for sample transportation..
    - In a reliable **rapid antigen detection test,** the maximum duration for interpreting a positive or negative test is **30 minutes.**

**RT-PCR Test**

- **Kary Mullis,** the American biochemist invented the PCR technique. He was awarded the **Nobel Prize** for Chemistry in 1993.
- Under this, **copies of a segment of DNA (deoxyribonucleic acid)** are created using an enzyme called Polymerase.
    - The 'chain reaction' signifies how the DNA fragments are copied, exponentially — one is copied into two, the two are copied into four, and so on.
- A fluorescent **DNA binding dye called the "probe" is added to DNA,** which shows the presence of the virus on a **fluorometer.**
- However, coronavirus is made of **RNA (ribonucleic acid).**
- Therefore to detect coronavirus, **RNA is converted into DNA** using a technique called reverse transcription.
    - A 'reverse transcriptase' enzyme converts the RNA into DNA.
- Copies of the DNA are then made and amplified.

**Source: TH**