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Mini Review

DIAGNOSTIC TECHNOLOGIES FOR COVID-19

GUPTA, P. D.

Former, Director grade Scientist, Centre for Cellular and Molecular Biology, Hyderabad, India. E. mail: pdg2000@hotmail.com, Cell: 91 80-728 91356

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Abstract: ***After Covid-19 became pandemic, scientists instead of routine rt PCR technique to identify SARS-CoV2 viral RNA, were trying to find rapid testing methods for the virus. Many methods were to identify SARS-CoV2 virus developed, such as immunochemical, electronic, physical identification after collection of the virus by filters. Dogs were trained to use their smelling power to identify very quickly the Covid-19 patients.***

Key words: Covid-19 diagnosis

INTRODUCTION

After the identification of SARS- CoV2 virus, very soon became pandemic whole over the world scientists were busy finding out its diagnostic tests. COVID-19 can provisionally be diagnosed on the basis of symptoms and confirmed using reverse transcription polymerase chain reaction (RT-PCR) or other nucleic acid testing of infected secretions [1]. Along with laboratory testing, chest CT scans may be helpful to diagnose COVID-19 in individuals with a high clinical suspicion of infection. Detection of a past infection is possible with serological tests, which detect antibodies produced by the body in response to the infection. Soon they found out a sure shot the standard diagnostic method is by detection of the virus' nucleic acid by real-time reverse transcription polymerase chain reaction (rRT-PCR), transcription-mediated amplification (TMA), or by loop-mediated isothermal amplification from a nasopharyngeal swab [2]. However, this technique take a long time and SARS- CoV2 virus spread easily by touch, aerosol and other common methods, its quick diagnostic methods are warranted.

Antigen-Antibody Testing: Antibodies are

Dr. P. D. Gupta, Former Director Grade Scientist, Centre for Cellular and Molecular Biology, Hyderabad, India. He is internationally known scientist for his broad research experience and impressive ability to connect the basic scientific disciplines (Physics, Chemistry, Engineering, and Biology) and come up with intriguing hypotheses, to be verified through experimental data.

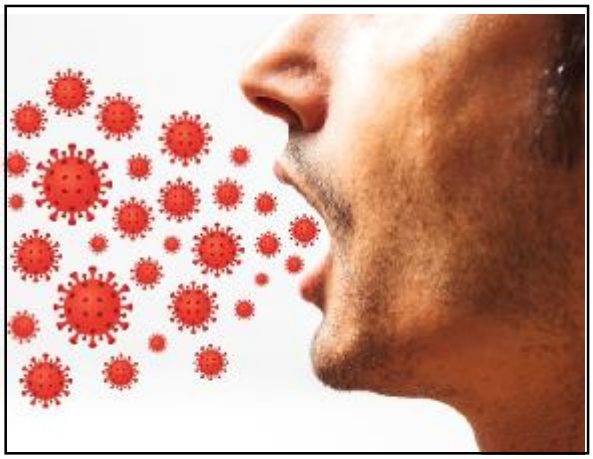

Fig.1: Screaming or Singing Emits out Viruses, these are collected by air purifying filters and then identified. (Source Economic Times)

produced over days to weeks after infection with the virus. In some people with COVID-19, disease confirmed by molecular testing (e.g. reverse transcription polymerase chain reaction: RT-PCR), weak, late or absent antibody responses have been reported. Studies suggest that the majority of patients develop antibody response only in the second week after onset of symptoms [3].

Antigen: Rapid diagnostic tests (RDT) detect the presence of viral proteins (antigens) expressed by the COVID-19 virus in a sample from the respiratory tract of a person [4].

Antibody: Serologic tests measure the antibody response in an individual. Antibodies to COVID-19 are produced over days to weeks after infection with the virus. The presence of antibodies indicates that a person was infected with the COVID-19 virus, irrespective of whether the individual had severe or mild disease, or even asymptomatic infection. Surveillance of antibody seropositivity in a population can allow inferences to be made about the extent of infection and about the cumulative incidence of infection in the population [5]. The use of serology in epidemiology and public health research enables understanding of:

- The occurrence of infection among different populations;
- How many people have mild or asymptomatic infection, and who may not have been identified byroutine disease surveillance;
- The proportion of fatal infections among those infected;
- The proportion of the population who may be protected against infection in the future

If the target antigen is present in sufficient concentrations in the sample, it will bind to specific antibodies fixed to a paper strip enclosed in a plastic casing and generate a visually detectable signal, typically within 30 minutes.

Dogs can also diagnose: In the search of certain non expensive and rapid tests scientists taking advantage of dog's very sensitive smelling power which is between10,000 and 100,000 times more than us. Dog can smells cancer, when they smell a cancer patient they act very different from normal. researchers found that certain strains of Dogs can also be used for detection of the infection of corona viruses in humans. Some of the metabolic volatile organic compounds(VOCs) produced during altered pathologicalconditions in human beings exhaled in breath, orsweat, or urine or stool samples, can therefore be characteristic of a particular disease can be identified by dogs to recognise diseases by smell [6-9]. Recently we have critically analysed the usefulness of dogs in the diagnosis of Covid-19 [7}. Indian army has fruitfully employed the technique to ascertain the infection among Javans (10)

Electronic nose: The high occurrence of false-negative results due to the non-presence of SARS-CoV-2 in the oropharyngeal environment renders this sampling method not ideal. Therefore, a new sampling device is desirable. This proof-of-principle study investigated the possibility to train machine-learning classifiers with an electronic nose (Aeonose) to

differentiate between COVID-19-positive and negative persons based on volatile organic compounds (VOCs) analysis. The Aeonose can distinguish COVID-19 positive from negative participants based on VOC patterns in exhaled breath with a sensitivity of 0.86 and a negative predictive value (NPV) of 0.92 were found [11].

A Dutch inventor [12] has come up with what he hopes could be a potentially faster and easier method to screen for coronavirus infections. Instead of unpleasant nasal swab tests, Peter van Wees asks participants to step into an air locked cabin and to scream, or sing. Van Wees said, It's always very nice to scream, when nobody can hear you though," lots of small particles from the person's clothes and breath are detected, an infection shows up. An industrial air purifier collects all the particles emitted, which are then analysed for the virus. "If you have coronavirus and are infectious and "yelling and screaming you are spreading tens of thousands of viruses.

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