

## Diagnostic Techniques for Corona Virus

Muhammad Akram<sup>1</sup>, Umme Laila<sup>1</sup>, Muhammad Talha Khalil<sup>1</sup>, Hina Anwar<sup>1</sup>, Rida Zainab<sup>1</sup>,  
Nimra Shahid<sup>1</sup>, Ibrahim Mohamed Hamouda<sup>2,3\*</sup>

<sup>1</sup>Department of Eastern Medicine, Government College University Faisalabad-Pakistan.

<sup>2</sup>Professor of Dental Biomaterials, Faculty of Dentistry, Umm Alqura University, Makkah, KSA.

<sup>3</sup>Professor of Dental Biomaterials, Faculty of Dentistry, Mansoura University, Mansoura, Egypt.

\*Corresponding Author: Ibrahim Mohamed Hamouda.

### Abstract

For the early management of disease, infection & identification of corona virus for this purpose diagnostic testing is very effective because it provides significant effectiveness for the identification of cause. Number of tests are performed to investigate this viral infection but in some health institutions most of the tests are not present like viral traditional culture because for this purpose biosafety 3 level facilities are required. Currently one of the effective tests for the identification of covid 19 includes polymerase chain reaction real time reverse transcription. So, in all around the world this method is effectively used to detect the short acute respiratory syndrome corona virus. Some molecular test which performed for this purpose includes swab of oro-naso-pharyngeal also performed saliva & sputum test and for this purpose testing kits are available.

**Keywords:** diagnostics; corona; respiration

### Introduction

For the early management of disease, infection & identification of corona virus for this purpose diagnostic testing is very effective because it provides significant effectiveness for the identification of cause. Number of tests are performed to investigate this viral infection but in some health institutions most of the tests are not present like viral traditional culture because for this purpose biosafety 3 level facilities are required. Currently one of the effective tests for the identification of covid 19 includes polymerase chain reaction real time reverse transcription. So, in all around the world this method is effectively used to detect the short acute respiratory syndrome corona virus. Some molecular test which performed for this purpose includes swab of oro-naso-pharyngeal also performed saliva & sputum test and for this purpose testing kits are available (De Wit, Van Doremalen et al. 2016, Brown and Horton 2020, Zhang, Wang et al. 2020). In this we discuss the several methods which are effective in this pandemic era against covid 19 in these includes:

### Severe acute respiratory syndrome corona virus multiplex assay

From the center for control & disease prevention lab test investigate 2 types of viruses in which includes a & b virus of influenza & short acute respiratory syndrome corona virus ii. The name of this virus is influenza CDC multiplex assay SARS corona virus 2. After using this test, we investigate the viral infection so, by doing early detection we manage the health-related problems which causes hazardous effects on the health of human due to this viral infection. from the world report it was concluded that on 2 July 2020 the United State of drug & food administration revealed an emergency use for the sc2 flue multiplex assay is icon authorization external (COVID, Stephanie et al. 2020).

### Corona virus diagnosis via cytopathic viral effects

To detect the viral infections from the clinical sampling virus isolation is one of the gold standards tests. From the patient sampling the virus less the perturbation & enhance the ratio for the detection of virus. For the isolation of virus effective methods includes samples of stool & sputum, fluid Broncho-

alveolar lavage, oro-pharyngeal swab & nasopharyngeal swab (John, Wear et al.). Usually the time of sampling, source of specimen & operation sampling all these factors shows their influence on the detection of viral infection (Ai, Yang et al. 2020). So, the virus which extracted shows cyto-pathogenic effects in both huh7 cells & vero as a result morphological change observed which seen through electron microscopy after the staining nucleocapsid (Zhou, Lou et al.). In case of corona virus 2 short acute respiratory syndrome the presence of cell line veroe6 & tmprss2 expression observed which effective in case of cytopathic testing & isolation of virus (Matsuyama, Nao et al. 2020). Other factor which facilitates the detection of virus includes fluorogenic probes photoclickable (Wu, Guo et al. 2018). Culture & isolation of virus good test for the detection of these disease but usually not available in all the health care units (Artika and Ma'roef 2017).

### Investigation of severe acute respiratory syndrome corona virus II intact particles:

Spectroscopy is one of the effective techniques for the size identification of virus (Yeh, Gulino et al. 2020). In case of COV-2 the aerosol particles characterized on the chip spectroscopy via photonic cavity which increase the silicon nitride & it is racetrack-based resonator sensor (Singh, Ma et al. 2019). The detection of isolated virus done by using bio-sensor electro-chemical which are polymers of oxide graphene & it help in the identification of virus as like PCR-RT (Ashley, Shukor et al. 2018). By using ionic current of cross pores in the air the viral detection done by using nano & micro pores (Tsutsui, Yokota et al. 2019). The use of bio-sensor capillary effectively seen for the identification of viral & bacterial pathogens (Zhang, Xue et al. 2019). For the detection of virus nano-structure 3d used as scaffold (I'm, Castro et al. 2015, Sameiyan, Bagheri et al. 2019, Xia, Chen et al. 2019).

### Detection of severe acute respiratory syndrome corona virus 2 with genomic sequencing

Genomic sequencing is fast & complete identification test for the investigation of virus & it possess lots of advantages effects. It investigates the presence of virus during the tracking & transmission phase (Kupferschmidt 2020). Other advantage of using genomic sequencing it that it detects the presence of other pathogens. It also investigates the

presence of several pathogens in affected patient so, after identification treatment become easy. To achieve good & high efficiency for the detection of virus one of effective method is drop-seq & 10x. Now a days it is good & effective technique for the detection of viral infection (Wang, Cao et al. 2020).

### By using reverse quantitative transcriptase chain polymerase reaction identification of SARS COVID-2

Now a days one of the effective methods for the detection of short acute respiratory syndrome & corona virus 2 is quantitative reverse transcriptase polymerase chain reaction which effectively used in hospitals for the detection of viral infection (Jin, Cai et al. 2020). Some steps are followed when used quantitative reverse transcriptase polymerase chain reaction. In 1st step from the patient samples, we extract RNA, in 2nd step viral RNA transcribe reversely into cDNA & after that amplification occurs by polymerase chain reaction fragments, in 3rd step signal of fluorescent read. Positive values indicate when threshold of cycle is small. This technique is one of the effective emergencies methods which approved from China medical product national administration (Yuan, Yang et al. 2020) & kits of quantitative reverse transcriptase polymerase chain reaction good used in emergency authorization & it approved from drug & food administrative (Yuan, Yang et al. 2020).

### Severe acute respiratory syndrome corona virus 2 RNA identification with case system

For the editing of genome one of the best & effective technology which applied for the detection of virus is CRISPR system (Aad, Abbott et al. 2011, Anzalone, Randolph et al. 2019, Flint, Chatterjee et al. 2019). In this system usually involvement of fragments of DNA & RNA, gRNAs and cas protein present. After binding cas 12 & 13a possess cleavage characteristics at that point DNA & RNA in single standard shows association with receptors of fluorescent & after that release & digestion of quencher occurs (He, Yu et al. 2020). When cas 13 a crispr combine with isothermal amplification then it effective for the identification of short acute respiratory syndrome corona virus 2 (Qin, Park et al. 2019). This test approved from the food & drug administration of United State & it effectively used in emergency (Shan, Broza et al. 2020). This technique also used in the detection of swine Africa fever virus.

## Severe acute respiratory syndrome corona virus 2 RNA identification via microarray

One of the effective analytical techniques for the detection of corona virus is microarray. In the microarray of DNA presence of probe array DNA seen on the supporting materials. The platform of micro-array classified into several types based on the matrix types includes liquid & solid, density & size of probes which effectively used in visualizing the relative cost & hybridization results. The advantages of micro-arrays include it is a fast reaction which takes fifteen minutes, in this the target probes are multiple, for this purpose the require volume of sample is small & this is broadly used in the investigation of viral infection of respiratory tract (Reddington, Tuite et al. 2013, Xu, Xu et al. 2020). The concentration of pathogen determines by using nano-hole plasmonic gold.

## Molecular test

Molecular test also known as viral test, diagnostic test, amplification nucleic acid test, lamp test, reverse transcriptase polymerase chain reaction test. This test performs through swab of throat & nasal and saliva. The time which takes for the isolation of virus by using these techniques is some days or it may be take one week. The accuracy of this test highly specific & usually repetition not required after performing this test. By using these test diagnoses of COVID 19 become easy.

## Direct Detection of SARS-CoV-2 RNA

The detection methods of SARS- COV-2 may include the detection of mRNA or micro-RNA. The methods of logic sensing of micro-RNA boosts signal obtained from a programmable Nano-particle network, composed of quantum dots and DNA linked nanoparticles of gold (Dey, Fabri-Faja et al. 2018). The chemi-luminescence from smartphone is proficient to detect micro-RNA using RNA activated in situ development of Nano-probes present in globular enzymes of nucleic acid, such as amplifiers and Nano-labels (Shi, Sun et al. 2019). Biosensors of micro-RNA utilizes general neutravidin which is fused with nano-labels encoded electrochemically to quantify molecular beacons opening by using voltammetry (Zopf, Pittner et al. 2019). Biosensors with cyclic amplification and DNA hairpin can detect micro-RNA by using enhanced- Plasmon

electro- chemiluminescence (Feng, Han et al. 2019). Raman spectroscopy with gold nanoparticles consisting of 3- way junction RNA can also be used for sensing micro-RNA (Lee, Mohammad niaei et al. 2020).

## SARS-CoV-2 RNA Detection with Isothermal Amplification

LAMP (loop mediated isothermal amplification) is used for the detection of SARS-COV-2 exclude the melting step with high temperature in PCR by utilizing DNA polymerase displacement strand in combination with four to six primers particularly designed to gain high DNA amplification, which can result in 10<sup>9</sup>-10<sup>10</sup> folds greater amplification at 65°C in 15-60 minutes. RT- loop mediated isothermal amplification has the capability to detect at least ten copies of fragment RNA in 15-40 minutes (Yu, Wu et al. 2020). The final products of amplification can be seen in electrophoresis having agarose gel and real time monitoring by turbidity, fluorescence or calorimetry. Microfluidics based on silicon beads can detect the products of amplification in the range of femtomolar (Soares, Neumann et al. 2019). The concentration of DNA can be measured attomoles using membrane of silicon nitride fabricated with Nano pores (Beamish, Tabard-Cossa et al. 2019). An impedimetric label free electrochemical biosensor can detect Zika DNA in a range of Nano molar (Faria and Zucolotto 2019).

## COVID-19 Diagnosis by Chest Computed Tomography (CT)

SARS-COV-2 causes a contagious viral pneumonia, in which respiratory and breath chemical behavior sensors are helpful for the diagnosis and evaluation purposes (Güntner, Abegg et al. 2019). A wireless sensor present on a substrate paper can monitor breathing behavior and transfers ultrasonic data to smartphone (Chen, Halton et al. 2019). CT is a radiographic technique which is used for detection of covid -19 with features like multifocal consolidation, peripheral distribution of interstitial changes and ground glass opacity (Chung, Bernheim et al. 2020). These typical features of CT are seen in some patients which shows negative results of RT-PCR but are showing clinical symptoms (Ai, Yang et al. 2020). Lactate dehydrogenase, c- reactive proteins and erythrocyte sedimentation rate shows positive correlation with fetal condition of pneumonia on CT

(Dannhauer, Ruhdorfer et al. 2015). By learning features of CT images, the covid-19 is classified in to 6 categories: Healthy, Ultra-early, Early, Rapid, Progression, Consolidation, and Dissipation stages (Liu, Liu et al. 2019).

## Conclusion

For the early management of disease, infection & diagnosis of corona virus for this purpose diagnostic testing is very effective because it provides significant effectiveness for the identification of cause. In this we discuss the several methods which are effective in this pandemic era against covid 19 in these includes: Direct Detection of SARS-CoV-2 RNA, SARS-CoV-2 RNA Detection with Isothermal Amplification, SARS-CoV-2 RNA Detection with Isothermal Amplification, COVID-19 Diagnosis by Chest Computed Tomography (CT), COVID-19 Diagnosis by Chest Computed Tomography (CT) are currently the most effective tests for the identification of covid 19 includes polymerase chain reaction real time reverse transcription. So, in all around the world these methods are effectively used to detect the short acute respiratory syndrome corona virus.

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