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A dialemma? what works as diagnostic tool and therapy in post COVID-19.

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Abstract
Novel coronavirus COVID-19(2019-nCoV) known as SARS-COV-2, is highly pathogenic with severe pneumonia associated with rapid virus replication. Emerged into an epidemic is a serious health threat to many countries in the world, resulting in significant morbidity and mortality. Hence the situation demands an immediate and efficient method for the diagnosis and treatment of the disease. In the current review, we outline the importance of the role of detection of the virus and what could be an efficient method for diagnosis and also new approaches to improve patient's biological resistance to COVID-19 treatment. Since highly sensitive and specific laboratory diagnostics are important in controlling the rapidly evolving disease (COVID-19). The current review is on diagnostic and prognostic strategies of screening of patients by health workers post covid 19 infections.

Keywords: Diagnosis, therapy, prognosis, SARS-COV-2, COVID-19

Introduction
A covid-19 infection starts as a local upper respiratory tract infection, but can spread to affect multiple organ systems with consequences that are only now being understood. When it does spread in this way, the result is multi-system critical illness associated with a high risk of death [1].

Diagnosis criteria
The multistep process of infection to COVID-19- (3stages) that typically takes place over 1-2 weeks.
1st stage-The body responds to a viral infection immediately with a non-specific innate response in which macrophages, neutrophils, and dendritic cells slow the progress of virus and may even prevent it from causing symptoms.

2nd stage-This non-specific response is followed by an adaptive response where the body makes antibodies that specifically bind to the virus. These antibodies are proteins called immunoglobulins. The body also makes T-cells that recognize and eliminate other cells infected with the virus. This is called cellular immunity.

3rd stage-This combined adaptive response may clear the virus from the body, and if the response is strong enough, may prevent progression to severe illness or re-infection by the same virus. This process is often measured by the presence of antibodies in blood.
There is currently no evidence that people who have recovered from COVID-19 and have antibodies are protected from a second infection [2].

Timeline at each step multistep process of infection to COVID-19 (labwise)
Day 0: infected
Upto Day 5: Onset of symptoms
Day 7: IgM positive (D7- D 21)
Day 14: IgG positive
Days 1-28: SARS CoV2 RNA & Antigens will be positive
Day 21: IgM disappears

Day 28: SARS CoV2 RNA & Antigens disappear
D0 - D5: Asypmptomatic phase
D0 -D7: Window period (Only PCR is positive in this phase)
D 14- D21: Decline phase (Still infective)
D 21- D28: Convalescence phase (Still infective)

Screening at each step of infection.

Early stage (day0-day14)

Screening to most of the individuals at early stage will be borderline, suggesting that they recently been exposed to the virus and were just starting to make antibodies against it. There's no pre-existing immunity. And that makes it very easy to distinguish between people who have been infected and who haven't been infected" [2].

Early to mid and infective stages (day0-day28)

A growing list of commercial kits like Polymerase chain reaction (PCR) also referred to as molecular or nucleic acid–based tests-antibody tests are not intended to identify active SARS-CoV-2 infections, instead basic antibody tests reveal markers of immune response-the IgM and IgG antibodies that for most people show up in blood more than a week after they start to feel sick, when symptoms may already be waning.[3]As of any point of time once the patient is infected apart from antibody screening the two important test for quantifying and knowing the species of covid 19 from early to infective stages remains (RT -PCR and ELISA).

Researchers do not know the relationship between each of these forms of infection and the resulting immune response, but limited evidence from macaques infected with SARS-CoV-2 and from human challenge and other studies with seasonal coronaviruses suggests that infection probably produces immunity that is protective for some period of time.[4] So testing is also prioritized for people who have a high risk for bad outcomes from COVID-19 infection, such as elderly or immunosuppressed patients, and those with high risk of exposure and transmission of the disease to other people, such as health care workers [5].

But then what remains important is (The Right Test at the Right Time). False-negative serologic result in an acutely symptomatic patient with replicating and shedding virus has serious public health consequences [2].

Therapeutic strategies

With unknown cases of infection vaccine is still under trial, but for patients with infective stages and especially with elderly, immunocompromised and children the treatment is being given in form of drugs, plasma therapy, stem cell therapy to antibody therapy all are being tested for cure.

Turning antibodies into therapies

Plasma containing the antibodies from recovered patients is then transfused to gravely ill patients in an experimental treatment known as convalescent plasma. Antibody testing could help to address a potential unintended consequence of receiving convalescent plasma or hyperimmune globulin, but there is a possibility that some COVID-19 survivors who undergo these treatments won't develop their own immunity, putting them at risk for reinfection [2].

Stem cell therapies

Though stem cell therapies have promising treatment from leukemic patients to aging and cancer, still there is no evidence that stem cell is cure post covid infection. Still a recent report says in elderly patients MSCs may support the immune response as already proved by the Florida University trial and support the healing process absolutely necessary after the damage generated by the virus [7].

Things to ponder in health workers

Though rapid testing kits are available which gives results in very less time still a proper understanding of the diagnostic criteria amongst health workers who are back to work post covid pandemic, what remains important in suspected cases will be the antibody titre and strains of genome sequences of the viruses as they are replicating, hence the important diagnostic procedure which remains highly specific and sensitive is RT-PCR and ELISA to determine the type of covid genome and antibody titres respectively.

Future perspective

Currently scientists started sequencing strains of novel coronavirus isolated from patients from different parts of country to track the spread and to look into the signs of emerging mutations in viruses and analysing the different genome viruses will be key to track new positive cases and hence further treatment therapies.

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