

Lung capacity testing as a method of pre-screening for COVID-19

Jeevan Joy, Accubits Technologies Inc.

Maximal voluntary inspiratory breath holding time test (MVIBHT) could be used for the pre-screening of COVID-19 infection. The MVIBHT is a simple test to evaluate functional capacities in patients with chronic obstructive pulmonary disease (COPD) (Slim et. al. 2018) but has the potential to be used as a method for assessing the presence of scar tissue and/or reduction in the functional lung capacity. Lung capacity deterioration could be a sign of lung disease.

Lung capacity test

There are many lung function tests in practice, like Spirometry and Plethysmography. These methods are extensive and would require the presence of equipment and trained personnel. A simpler, self-test, if performed carefully, could provide an insight into the lung capacity. Divers and swimmers are known to have a higher lung capacity as they regularly improve upon their breath-holding capacity. MVIBHT is a similar method that doesn't hurt or have any side effects. But you shouldn't smoke right before the test, and you should make sure you don't eat or drink too much. If you need medication, such as an asthma spray, it is best to first ask the doctor whether you can still use it as you would otherwise. For MVIBHT collection, the subjects are required to make a maximum expiration (breath-out to the fullest of your capabilities) followed by a maximum inspiration (breath-in to the fullest of your capabilities) and to hold the breath as long as possible. The process is to be performed in triplicates with 3-5 minutes of normal breathing in between and the average time is taken as the value. The method could be followed for 3-4 days consecutively to assess any variation in time presents. If a variation of more than 10 seconds occurs over 3 days, it is advisable to report to the medical professionals. This method could be practiced throughout the period of the spread of the COVID-19 to self assess any deterioration in lung capacity and/or any lung disorders.

Types of asymptomatic carriers

Carriers of an infectious disease can be of two types, ones who show symptoms and the ones who don't show any symptoms (asymptomatic). The asymptomatic carriers are the ones to be taken care of for arresting a pandemic as they are unaware of their spread. These carriers can be

further classified into 3 based on their state. Incubatory carriers are individuals that transmit the virus immediately after being infected themselves but prior to developing symptoms, unaware of the infection. Convalescent carriers are individuals that transmit pathogens following a period of illness, thinking themselves cured. Healthy carriers are individuals that never exhibit any symptoms or contracts the disease, yet transmit the disease. They are considered to be the classic asymptomatic carriers. In the case of COVID-19, it is reported that the asymptomatic ratio is 30.8%. (Nishiura et. al., 2020)

It is still unclear as to the efficacy of lung function tests to detect asymptomatic carriers, but it is generally accepted that if you are in the incubation period, it might reflect in the test.

References

Slim, Azza, et al. "Maximal voluntary inspiratory breath holding time test in patients with chronic obstructive pulmonary disease." (2018): PA4053.

Nishiura, Hiroshi, et al. "Estimation of the asymptomatic ratio of novel coronavirus infections (COVID-19)." medRxiv (2020).