

Testing as Key Tool in the Fight against Covid-19

KNF pumps are an important component of essential test applications.

In the fight against Covid-19, hope around the world lies not only in the development of a vaccine. People are also focusing on developing and optimizing testing procedures to detect existing infections and prevent new ones.

South Korea is a leading example of this. It has managed to largely control the spread of the virus within a short period of time. Although the interplay of various aspects may have led to successful containment, extensive testing in the population is considered a critical factor. This testing made it possible to detect and isolate even mild and asymptomatic cases at an early stage.

There is a worldwide consensus on the importance of testing to control the pandemic. But how exactly can Sars-CoV-2 – the virus that causes Covid-19 infections – be detected? And what kind of tests are available to physicians?

Find out more in the following article and learn how KNF pumps play a crucial part in these testing processes.

PCR tests are the gold standard for detecting infections

Nucleic acid amplification technique tests (NAT tests) are usually used to detect Covid-19. They are based on the so-called PCR method and can reliably detect a recent infection with the virus. For this purpose, a throat or nose swab is taken from the patient. Alternatively, cough sputum is collected to obtain a sample from the deep respiratory tract. The sample is then examined in the laboratory to find out if it contains the genetic material of the virus. When the test is performed, the virus's genome from the smear is specifically amplified using a polymerase chain reaction (PCR). This procedure makes it possible to detect even a minimal amount of the virus.

For amplification purposes, the sample is most often thermally cycled to split the DNA strand. This process is repeated multiple times in order to make the virus traceable. Each duplication of DNA takes a thermal cycle to keep the sample at a proper temperature. This process usually requires a loop of coolant to heat up the sample for splitting the DNA or to lower the temperature in order to bring the DNA strands back together.

In PCR testing, several of the world's leading medical companies rely on KNF diaphragm pumps, which ensure rapid and accurate testing. Amongst other functions, KNF pumps are typically used for needle washing and aspiration of waste.

Second tests stretch testing capacities

Despite the high reliability of the PCR test, the result largely depends on the manner and time of taking the sample. For instance, it is assumed that in the first week of illness, the Covid-19 virus is detectable only in the throat area while it can be measured in lung secretion in the second week. Since the incubation period is at least ten days, there is a chance that a person who tested negative a few days ago could now be infected and could pass on the virus. Patients who are strongly suspected of having Covid-19 are therefore usually tested a second time after a few days. Due to the need of repeating tests, with each test taking 3 – 4 hours to run, the increasing global demand for testing, and the growing number of Covid-19 patients, countries worldwide are already struggling with their testing capacities.

However, reliable, widespread, and rapid diagnosis of infections is crucial to contain the virus.

Rapid testing to increase testing capacity

To meet the increasing demand for testing, companies worldwide are working to develop reliable, rapid test methods to detect Sars-CoV-2. The Swiss pharmaceutical company Roche is one of many companies rising to the challenge and has been successful in this endeavor: the U.S. Food and Drug Administration (FDA) has granted emergency approval for the company's Cobas SARS-CoV-2 test. The test has also been approved in the European Union.

The fully automated test system make it possible to analyze up to 4,000 samples per day. Processes such as sample preparation, sample loading, nucleic acid purification, amplification, and detection of genetic material by real-time PCR are performed fully automatically. Thus, the Roche Cobas system offers up to ten times higher test capacities than manually performed PCR tests. Working at maximum capacity, Roche's Cobas 6800 system can perform 1,440 tests and the Cobas 8800 system can test up to 4,128 samples within 24 hours.

Antibody testing acts as an additional pillar

While the PCR test enables detection of active infections, it does not give any indication of how many people in the population have already built up immunity. Thus, antibody tests are another important tool in the fight against the corona pandemic.

According to the current state of research, patients show immunity to the virus for a certain period of time after having overcome an infection with Covid-19. Of course, this also applies to people who have had the virus but have never been tested for it due to lacking or only mild symptoms. The growth of this group of people could make a significant contribution to slowly flattening out the curve of the current pandemic. Additionally, knowing about the

immunity of medical staff would make it possible to preferentially deploy them to care for Covid-19 patients in hospitals.

A valid antibody test is a prerequisite before such conclusions can be drawn. ELISA (Enzyme-Linked Immunosorbent Assay) is one such test. In this test, a small amount of the test person's blood is examined to discern whether it contains certain antibodies. This is done by applying the blood sample to a small plastic plate with around 100 small holes. The number of antibodies can then be assessed by a color reaction: special light causes the blood to acquire a yellow shade. The darker the shade, the more antibodies were produced.

For decades, KNF diaphragm pumps have proven to be reliable components in blood analysis. Amongst other functions, KNF micro gas and liquid pumps are being used for degassing, as well as safely transferring samples from one process to another. Our pumps stand out thanks to their durability and low maintenance. Both of these characteristics are important when it is necessary to perform a large number of tests reliably and over a long time.