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## PRESENCE OF SARS-COV-2 IN WASTE WATER: FIRST CONCLUSIVE RESULTS OF THE CORONASTEP STUDY

**On Wednesday 18 May, LIST sent its first report to the national task force regarding the presence of SARS-CoV-2 in waste water in Luxembourg (CORONASTEP study). This indirect virus monitoring technique enables early detection of its spread among the population.**

The purpose of the CORONASTEP study conducted by Dr Leslie Ogorzaly and Dr Henry-Michel Cauchie, responsible for the CORONASTEP study and the LIST Environmental Microbiology research group respectively, is to document the emergence or re-emergence of the virus in Luxembourg as early as possible. It complements the CON-VINCE study, which aims to test asymptomatic people to assess the spread of COVID-19 in Luxembourg. The purpose is also to obtain a tool to complement traditional monitoring to observe the effects of lifting lockdown restrictions as closely as possible.

**Identifying the general state of contamination among a population of more than three hundred thousand people in real time**

The method for monitoring the virus in waste water is highly sensitive, i.e. it can detect low amounts of the virus in the samples analysed. The technique used by LIST makes it possible to identify the general state of contamination among a population of more than three hundred thousand people (i.e. the number of people connected to the sampled water treatment plants) within one day. This overall picture of contamination of the population complements but does not replace the information obtained from the analysis of human samples. In particular, it will be useful in detecting any new increase in the prevalence of COVID-19.

**COVID-19 has been in circulation in Luxembourg as from 25 February 2020**

From waste water samples taken since April 2019 as part of a joint study at LIST and the National Health Laboratory (LNS), it was possible to detect traces of the SARS-CoV-2 genome from 25 February 2020, before the first human samples were analysed. During the wave of contamination in Luxembourg from mid-March to today, the virus concentration curves in waste water correlated closely with the curve of positive COVID-19 cases shown on the Government website.

**Waste water samples have not yet yielded all their secrets**

Viruses are present in relatively low concentrations in waste water. A phase of concentration of these viruses therefore takes place in LIST laboratories before analysis. The concentrated samples are kept at LIST and will still yield further information, particularly as a result of cooperation expected to take place in the coming weeks with the Luxembourg Institute of Health (LIH), the University of Luxembourg and the LNS. The aim will be to try to sequence the complete genome of the viruses found in waste water in order

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to determine whether any genetic variants of SARS-CoV-2 are circulating among the population in Luxembourg.

Other analytical techniques will also be tested in order to expand the capacity for analysing waste water in Luxembourg. Furthermore, the multidisciplinary team currently working on modelling epidemiological data in the national COVID-19 task force will be responsible for a more detailed analysis of the relationships with human cases, their geographical location and the data obtained from waste water. All the scientific data collected provide a very useful resource for monitoring the drop in the level of infection in the population as closely as possible during the current stages of lifting lockdown restrictions.

### **A long-standing activity for LIST**

The LIST Environmental Microbiology Group has been tracking waste water viruses for more than 10 years. The work of LIST, in particular coupled with the data collected in samples of human faeces by the LNS, has provided a better understanding of the circulation of viruses such as noroviruses, responsible for winter gastroenteritis, or enteroviruses, responsible for a wide spectrum of benign or severe symptoms (hand, foot and mouth disease, angina, respiratory disease, diarrhoea, heart disease, acute flaccid paralysis or even meningitis).

The CORONASTEP study was made possible thanks to the collaboration established with the country's waste water treatment unions (SIDEN, SIDERO and SIDEST). Recently, some of the country's hospitals, including the Emile Mayrisch Hospital (CHEM) and the Centre Hospitalier de Luxembourg (CHL), also agreed to provide access to their sewers to track the virus as closely as possible to infected people.

### **Importance of building strong monitoring networks**

Reconstructing virus dynamics in waste water in Luxembourg through samples taken prior to the start of the health crisis highlights the value of pursuing long-term waste water monitoring programmes. LIST is also in partnership on a European level with the main teams working on these issues. Cooperation between these teams was frequent before the pandemic and has increased over the past few months for the purposes of building strong, relevant monitoring networks that can be used in the event of a future viral pandemic.

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