



Tec lab tracks monkeypox virus in wastewater

[Tec de Monterrey's Wastewater Monitoring Laboratory \(MARTEC\)](#) reported that it is looking for the [monkeypoxvirus](#) in the city of Monterrey.

Laboratory coordinator **Dr. Mariel Oyervides** said that they began **tracking** in **July**, by taking weekly samples at Monterrey's **water treatment plants**.

"The samples have been negative because there is not a sufficient number of cases to be detected at city level."

She also said that the laboratory continuously provides updates on **COVID-19 variants** and **subvariants**, which has helped to anticipate the increase in cases prior to the waves that have occurred in Mexico.



MARTEC monitoring monkeypox

The MARTEC laboratory specializes in **wastewater-based epidemiology**, in which urine and feces samples are taken. These have **genetic information** that helps researchers **detect virus molecules**.

Monkeypox is a **viral zoonotic** disease, which is transmitted from **animals to humans**, and then **humans to humans**. Its **symptoms** are **skin rashes**, fever, severe headache, muscle aches, back pain, low energy, and swollen lymph nodes.

“We’re looking for it in the wastewater of the city (Monterrey). Should it become a problem of concern, we could begin to look for it the rest of the Tec de Monterrey campuses.

“If cases start to rise and we start detecting it in the wastewater, we’ll be able to estimate the minimum number of cases that are required to detect it at city level.”

Dr. Oyervides said they are **standardizing the technique** so there are no false positives or false negatives.

*“We’re implementing the technique in case it becomes a concern, so that we can detect it. The marker is ready. It’s practically **the same technique as detecting COVID** in wastewater.”*

The specialist said that the leaders of this project for detecting the virus that causes monkeypox are **Dr. Roberto Parra and Dr. Eduardo Sosa**.

“If cases start to rise and we start detecting it in the wastewater, we’ll be able to estimate the minimum number of cases.”

Monitoring more diseases

Dr. Oyervides said that they will also be able to detect other diseases and even illicit substances.

*“**MARTEC is evolving**. Now, we’re not only detecting COVID-19, but we’re also detecting other diseases, such as the **human papillomavirus**,” she emphasized.*

In addition to **monkeypox**, this laboratory can detect other diseases such as **chagas disease, human papillomavirus, or norovirus**, said the specialist.

The laboratory uses **molecular technology** and develops **biomarkers** to detect microorganisms with the support of the [Tec BASE Genomic Sequencing Laboratory](#).

Analysis is conducted by searching for the presence of **ribonucleic acid (RNA)** in the samples through reverse transcription polymerase chain reaction (RT-qPCR) technology.

*“**We can analyze the same sample** and see if there is more than one type of disease or, in the case of COVID, find out if there are Delta variants **or even several types of Omicron**,” said Dr. Oyervides.*

Currently, MARTEC has around **seven biomarkers for the direct detection of COVID-19**, and it can develop more if new variants appear. In addition, it has **approximately 15 markers for different diseases**.

*“We have a wealth of opportunities to **find almost any disease** that can be detected in wastewater. Obviously, it’s not possible for all of them, but we can develop a marker for the vast majority of them,” she added.*



MARTEC also wants to detect illicit substances

Another aspect of MARTEC's evolution is the implementation of its technology to detect **illicit substances** and other compounds that could affect the population.

MARTEC is currently collaborating with public organizations in Mexico City and the **Monterrey** metropolitan area to carry out **monitoring** of sectors to detect the use of these types of substances, said Dr. Mariel.

*"A few months ago, we held talks with the **Ministry of Health** because they **took an interest in the detection of illicit substances**, so we began to standardize and design specific detection tests," she said.*

The researcher explained that one of the objectives of MARTEC is to propose the implementation of this type of **marker at the Tec, in order to raise awareness** and alert the community to the use of harmful substances.

“We want to propose it to keep our **employees and students safe**. At the beginning, it will be monitoring, then we will focus on **awareness-raising campaigns** or strategies for **random anti-doping tests**,” she said.

She added that **12 substance-detection markers are currently being developed** through a collaboration between [Arizona State University \(ASU\)](#) and the Tec with research from **Dr. Adolfo Caballero**.



MARTEC publishes article on findings in wastewater

The MARTEC laboratory detected, at least 15 days in advance, the approach of the **peak of the second wave of COVID-19** between December 2020 and January 2021 in the metropolitan area of Monterrey, Nuevo León.

As a result of this monitoring, they wrote the article *Extensive Wastewater-Based Epidemiology as a Resourceful Tool for SARS-CoV-2 Surveillance in a Low-to-Middle-*

Income Country through a Successful Collaborative Quest: WBE, Mobility, and Clinical Tests.

It was published by the [Multidisciplinary Digital Publishing Institute](#), which is an open-access scientific journal, in June 2022.

“We were able to anticipate an increase in the number of COVID-19 cases two weeks in advance. By January 5, 2021, the maximum peak of the second wave was reported; that is one of the most important achievements in the article,” said Dr. Oyervides.

Research for this article was conducted through a **collaboration between researchers** from **MARTEC** and **ASU**, as well as **Water and Drainage Services of Monterrey**, added the doctor.

Currently, **a MARTEC research team is preparing to publish three more articles** on the analyses that were conducted on Mexico City and Monterrey campuses.

You can read the full article [here](#).



A decision-making support tool

Similar to the analysis they did during the second wave of COVID-19, the MARTEC lab has been anticipating community outbreaks during recent waves, the researcher said.

*“We are currently continuing to monitor during the fifth wave and have also seen how the number of cases has increased through the **amount of virus detected in the wastewater,**”* she added.

Every week, the laboratory receives samples from different Tec campuses. The results of these samples are sent to TecSalud, where decisions are made to benefit the **safety of the Tec community.**

*“For example, **TecSalud has recommended the use of face masks again in enclosed spaces** on campuses and in laboratories due to this increase in detected cases,”* she added.

Also, the severity of the cases that are currently occurring is being evaluated, as well as making sure that staff and students are already vaccinated to **establish preventive measures** for avoiding COVID outbreaks.

*“Many outbreaks were prevented within campuses with this tool. **MARTEC helped prevent TecSalud from becoming overloaded**; random testing would have been the only accurate data regarding the circulation of COVID,”* said Dr. Mariel.

MARTEC is currently collaborating with institutions such as the **National Autonomous University of Mexico, the National Polytechnic Institute**, and other laboratories in Mexico. Internationally, it is collaborating with **ASU** and other institutions in countries such as the United Kingdom.

The MARTEC laboratory

MARTEC was introduced at the **51st Research and Development Conference**, in February 2021. Based on Monterrey campus, **it has the capacity to efficiently cover the rest of the institution’s campuses.**

*“This project includes several of the principles that define the Tec (...): taking action to **care for the health and integrity of the community**, providing continuity of operations, and making everything we do available to society,”* emphasized **David Garza**, Rector and Executive President of the Tec, at its inauguration.

Last September, it won in the **Water Projects in Latin America category** at the **2021 Aquatech LATAM Awards** during the **Aqua Tech Mexico** conference, a platform for companies in the water technology industry.

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