

SARS-CoV-2 Detection in Wastewater & Sludges of Turkey

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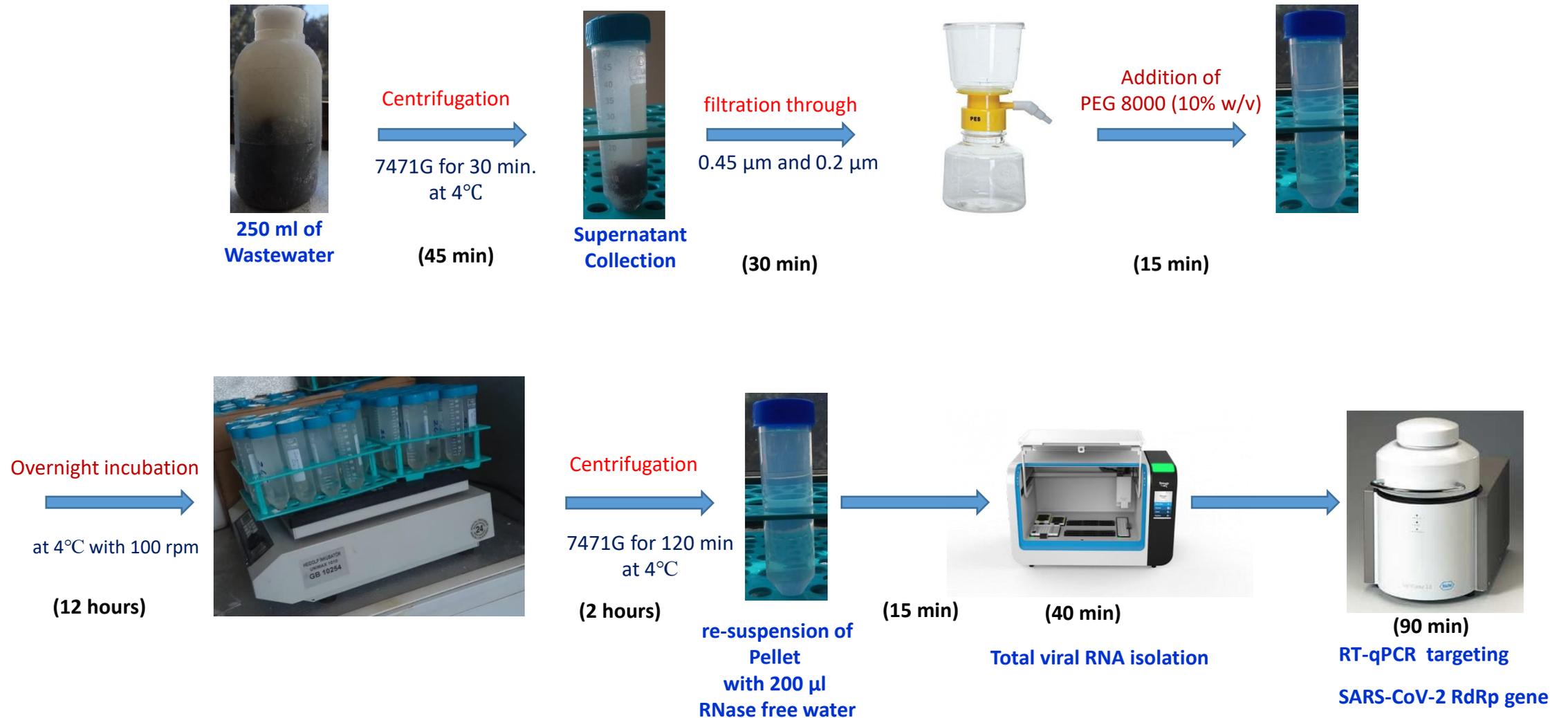


SARS-CoV-2 DETECTED IN WASTEWATER CAN BE A VALUABLE INFORMATION

- Infected individuals **even the ones who are asymptomatic** shed the virus in their stool. The virus can be detected in manholes and at the wastewater treatments plants (WWTPs).
- The increase and decrease of the cases of the area served by WWTPs can be monitored **almost two weeks before the medical reports.**
- **Localizations of Concern** (Nursing homes, Prisons, Army, Schools, Tourism Complexes) can be monitored instead of testing each individual.
- Continuous monitoring can warn about **the second wave (1918 & 1957 influenza resurgence).**

SARS-CoV-2 Measurement in Wastewater & Sludge

One test lasts 36 hours (70 USD/test)



Pilot City: ISTANBUL Population: 16 Million



Pre-print Publication-I

First Data-Set on SARS-CoV-2 Detection for Istanbul Wastewaters

<https://www.medrxiv.org/content/10.1101/2020.05.03.20089417v1>

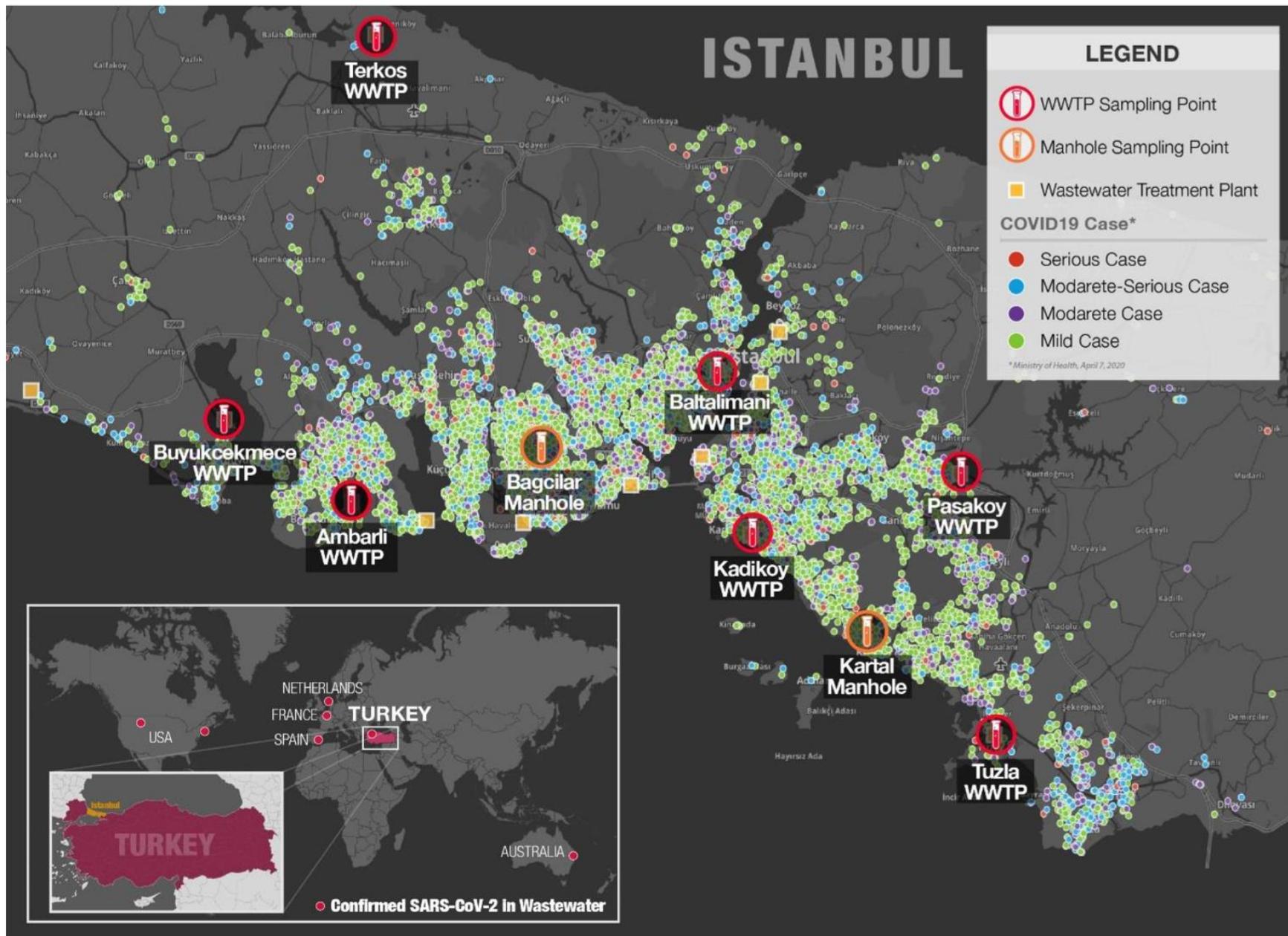
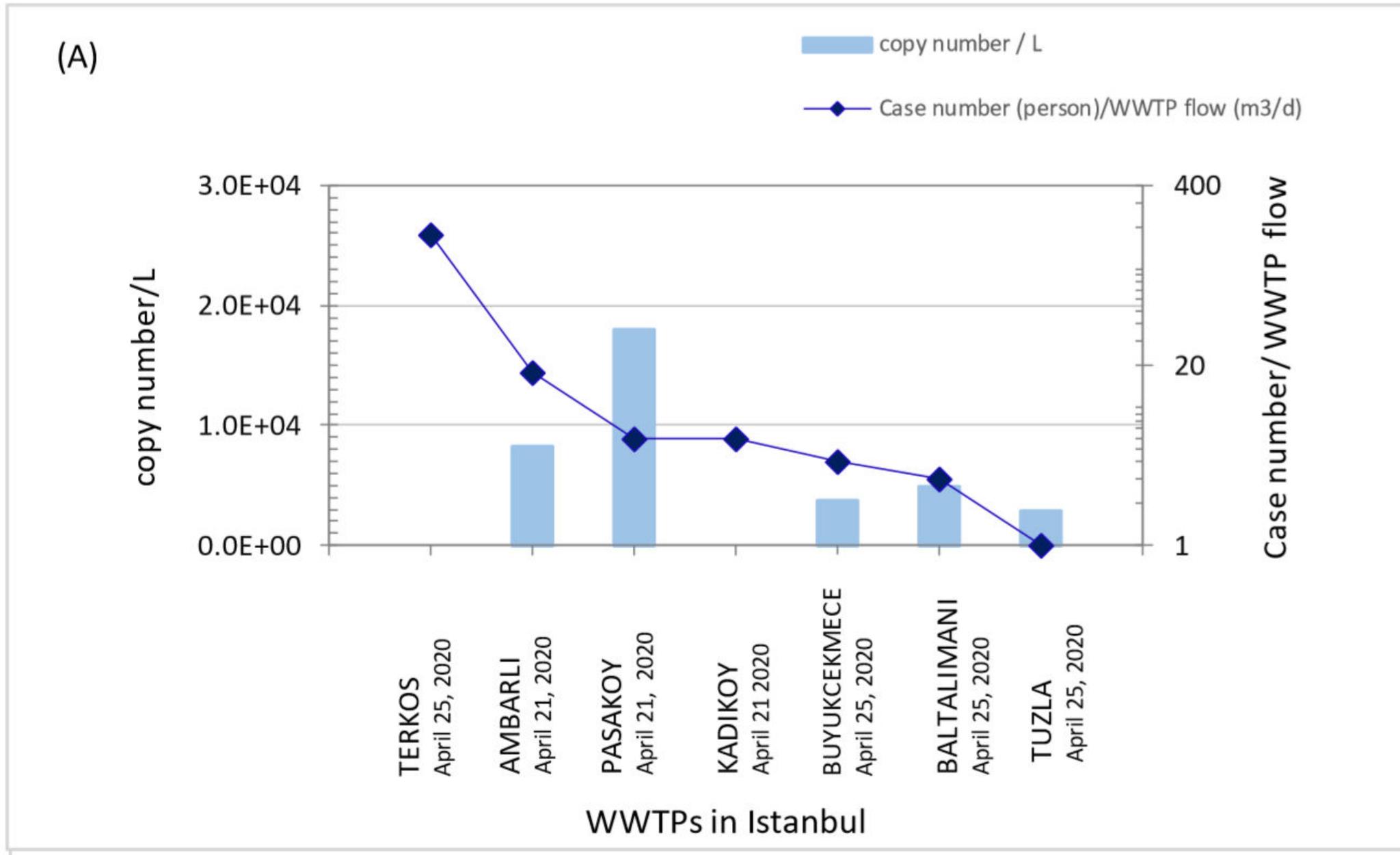


Figure 2. SARS-CoV-2 detection studies in wastewater around the world and in Turkey (Cases from <https://geomatic.org/koronavirus> on 21st April, 2020.)

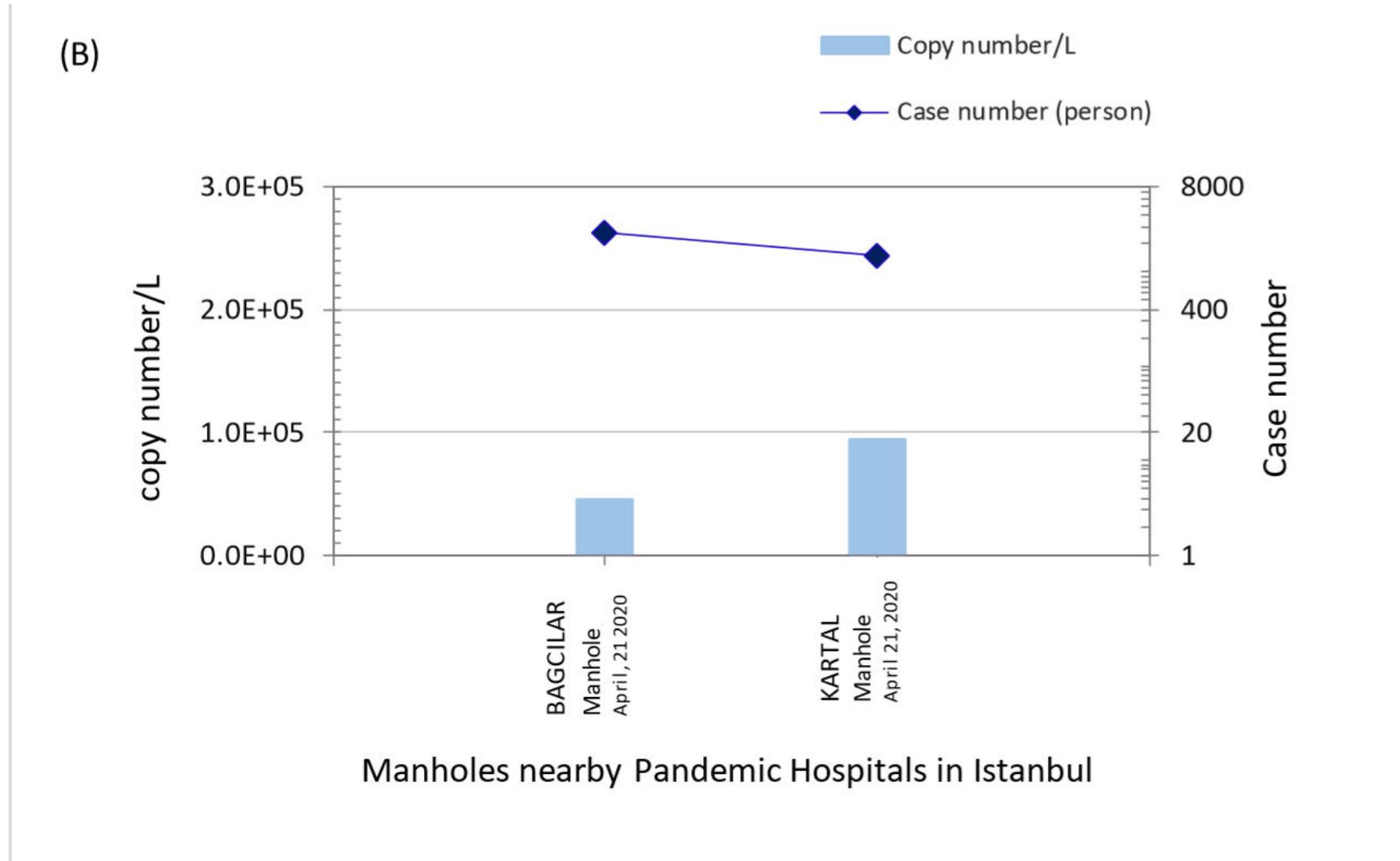
Data-Set on SARS-CoV-2 Detection for Istanbul Wastewaters

<u>Sampling Point</u>	<u>Virus titer per liter</u>	<u>Sampling Point</u>	<u>Virus titer per liter</u>
Terkos WWTP	ND	Baltalimani WWTP	4.95E+03
Ambarli WWTP	8.26E+03	Buyukcekmece WWTP	3.73E+03
Pasakoy WWTP	1.80E+04	Tuzla WWTP	2.89E+03
Kadikoy WWTP	ND	Bagcilar Manhole	4.49E+04
Baltalimani WWTP	4.95E+03	Kartal Manhole	9.33E+04

SAR-Cov-2 Levels in Istanbul wastewaters at the inlet of WWTPs



SAR-Cov-2 Levels in Istanbul wastewaters at the manholes nearby pandemic hospitals



Value of the Data

- Istanbul has 16 million inhabitants and a very high population density (2987 persons/km²). The dataset presents Covid-19 case numbers against wastewater SARS-CoV-2 titers.
- Can monitor the epidemic not only with the blood tests but also wastewater monitoring. May have chance to catch the districts not exhibiting too many cases but under risk.
- The study has quite potential for verifying the reported number of Covid-19 cases with the real situation.
- Continuous monitoring of wastewater for SARS-CoV-2 may provide an early warning sign before an epidemic starts in case of infection resurge.

Pre-print Publication-II

SARS-CoV-2 Detection in Istanbul Wastewater Treatment Plant Sludges

<https://www.medrxiv.org/content/10.1101/2020.05.12.20099358v1>



Figure 2. Primary and waste sludge sampling WWTPs in Istanbul

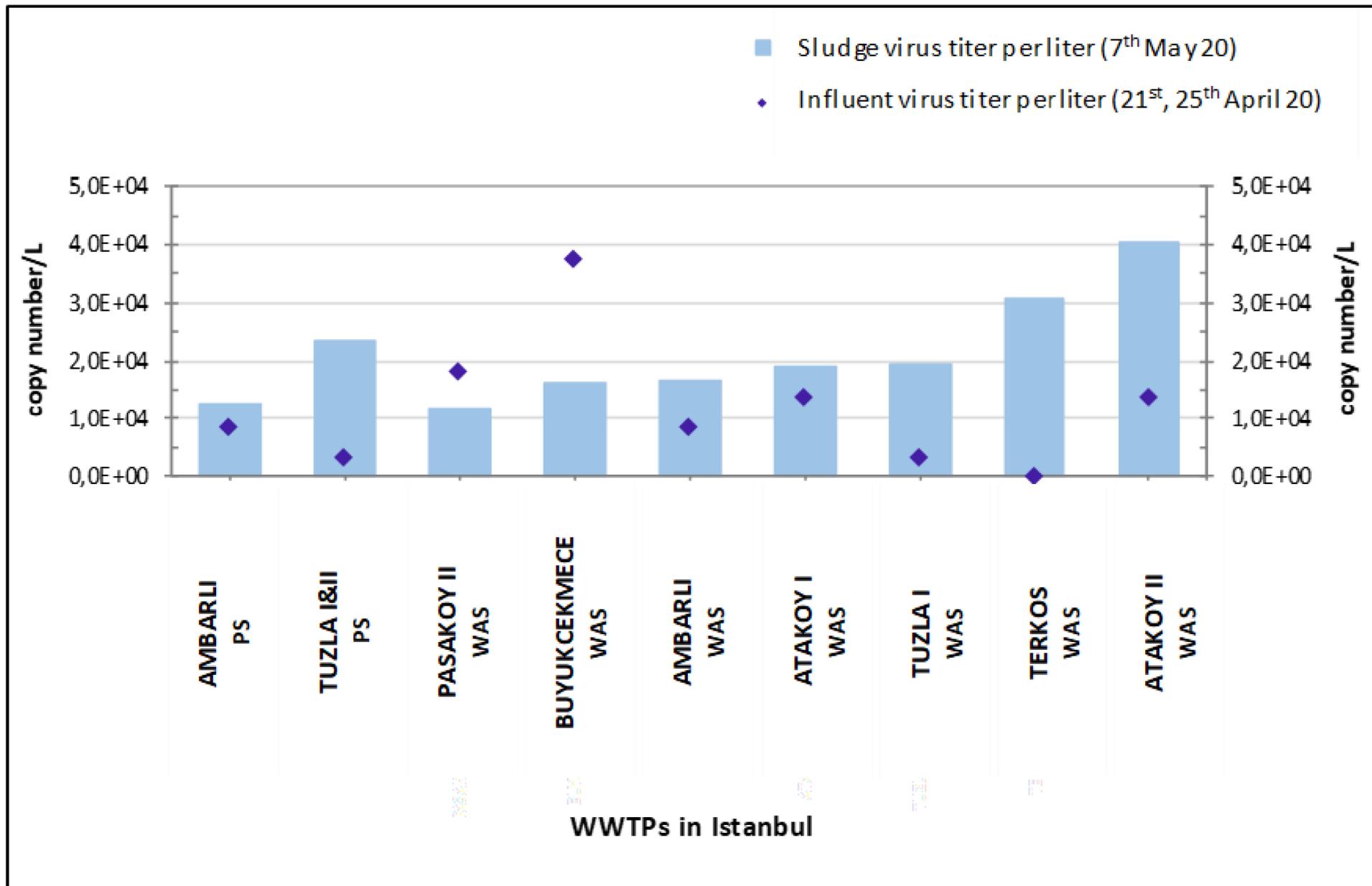


Figure 1. SAR-CoV-2 Levels in primary and waste activated sludges of Istanbul WWTPs.

Results of the Paper 1

(<https://www.medrxiv.org/content/10.1101/2020.05.25.20112706v1>)

- «.....keeping in mind that the presence of SARS-CoV-2 genetic material *does not imply that it is in an infective state*».
- «most of SARS-CoV-2 particles *cannot be detected in the water effluent as they are retained by the sludge line.* “

Results of the Paper 2

- «SARS-CoV-2 RNA was systematically detected in the influent to the primary settler (between 7.5 and 15 cp/ml) but not in the secondary treatment effluent, confirming that the effluent is safe for reuse and discharge to water bodies... «
- «Given the rare occurrence of SARS-CoV-2 RNA in the inflow to the secondary treatment, the potential of dispersion by aerosols created during aeration can be ruled out»

Further Research

- The data provided should not be concluded as information on **active or inactive** SARS-CoV-2 RNA concentrations in the WWTP effluents, in primary or waste activated sludge.
- We have started the **active/inactive tests** to see whether the SARS-CoV-2 is active at the effluent of WWTPs.
- All districts of Turkey (81 major cities) will be covered in this survey.

Further Research Topics

- Comparison of various virus concentration methods
- Various disinfection methods (SARS-Cov2 active? inactive?)
- Biosensors

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THANK YOU.....