Clin. Lab. 2022;68:XXX-XXX

LETTER TO THE EDITOR

Problem due to SARS CoV2 Nucleocapsid Variant in Term of Cycling Time Value

Somsri Wiwanitkit [1] and Viroj Wiwanitkit [2]

[1] *Private Academic Consultant, Damipur, India*
[2] *Dr. DY Patil University, Pune, India*

(Clin. Lab. 2022;68:xx-xx. DOI: 10.7754/Clin.Lab.2021.210942)

Correspondence:
Somsri Wiwanitkit
Private Academic Consultant
Damipur
India
Email: somsriwiwan@hotmail.com

KEY WORDS

SARS CoV2, cycling time, nucleocapsid, variant, diagnosis

LETTER TO THE EDITOR

Rapid immunological based point of care testing assays for diagnosis of SARS CoV2 is widely used at present. The effect of a SARS CoV2 variant on the diagnostic property of those assays is an interesting issue in laboratory medicine. In a recent report, a nucleocapsid variant, D399N, was reported for its effect on diagnosis [1]. Bourassa et al. reported that Sofia 2 assay could not diagnose this variant but the Abbott BinaxNOW COVID-19 Ag Card assay could [1]. Bourassa et al. also proposed "*an approximate 1000-fold loss in sensitivity for the Quidel Sofia SARS Antigen FIA test associated with the D399N mutation* [1]."

The effect of the problematic variant is interesting and it might relate to specific antibody for antigen detection of the immunological assays. Different assays have different diagnostic sensitivity limits. For Sofia 2 assay and Abbott BinaxNOW COVID-19 Ag Card assay, diagnostic sensitivity limits are equal to 140.6 and 113 TCID50/mL, respectively [2]. Based on this data, it might imply that Sofia 2 assay should be better in detect a lower amount of the pathogen's antigen if there is no variant. However, when D399N occurs, Sofia 2 assay is less effective. In case with the variant, it can be assumed that the level of pathogen is at least 140.6 TCID50/mL, which is at the diagnostic sensitivity level of BinaxNOW COVID-19 Ag Card assay.

Hence, the gap that Sofia 2 assay loses in diagnosis is equal to TCID50/mL. Based on a recent study on corre-

Letter to the Editor accepted October 28, 2021

Table 1. Inaccuracy rate due to self-testing and professional testing with a SARS-CoV-2 antigen-detecting rapid test.

Viral load	Viral load chance probability (%)	Inaccuracy rate (%)		Probability of missed COVID-19 (%)	
		Self	Professional	Self	Professional
Low	27.5	3.45	3.45	0.09	0.09
High	72.5	54.54	45.45	3.95	3.30

lation between TCID50 and RT-PCR cycling time (ct) value [3], it can simply be said that there is an influence of the D399N variation on ct value. In a previous report [3], the association between TCID50 and ct value was represented as "Log_{10}(TCID50) = -0.3152 (ct value) + 9.988 [3]". Referring to the previously described effect of the variant, the magnitude of altered TCID50 is equal to 27.12 TCID50/mL. Using the previously mentioned association equation, the calculated magnitude of altered ct value will be equal to 27.12. Hence, it can show that Sofia 2 assay can lose a considerable property for diagnosis in case of D399N variant.

Declaration of Interest:
None.

References:

1. Bourassa L, Perchetti GA, Phung 1 Q, et al. A SARS-CoV-2 nucleocapsid variant that affects antigen test performance. Clin Virol 2021 Aug;141:104900. (PMID: 34171548)

2. Loeffelholz1 MJ, Tang YW. Detection of SARS-CoV-2 at the point of care. Bioanalysis 2021 Aug;13:1213-23. (PMID: 34289741)

3. Brandolini M, Taddei F, Marino MM, et al. Correlating qRT-PCR, dPCR and viral titration for the identification and quantification of SARS-CoV-2: A new approach for infection management. Viruses 2021 May 28;13:1022. (PMID: 34071726)