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Cleaning/Disinfection SOP for Research Laboratories for Mitigating DNA Contamination

Current COVID-19 screening and diagnostic testing methods rely on a PCR-based amplification of a section of the SARS-CoV-2 genes. Research labs working with SARS-CoV-2 DNA used in COVID-19 screening or diagnostic testing protocols must take precautions to prevent DNA interfering with such critical public health programs.

Persons who have been exposed to the SARS-CoV-2 DNA before being tested for COVID-19 may test positive though they have no clinical disease. Good laboratory practices, together with other mitigating strategies, can help reduce DNA contamination and interference with COVID-19 diagnostic tests. DNA contaminants interfering with testing can only originate from DNA plasmids or amplicons. As SARS-CoV-2 is an RNA virus, inactivated materials cannot be a source of DNA contamination.

This document aims to provide guidance for self-cleaning by researchers in laboratory spaces. This cleaning SOP is designed to disinfect high-touch surfaces and minimize the spread of SARS-CoV-2 DNA amplicon contaminants. **Published research (1) suggest that deep cleaning of laboratories help eliminate DNA contaminants, but does not remove ALL contaminating amplicon DNA.** Nevertheless, it could help mitigate likelihood of false positive test for SARS-CoV-2.

Scope:

This SOP aims to mitigate SARS-CoV-2 DNA contamination in a laboratory. This SOP should be used as an adjunct to good laboratory practices, including use of lab bench liner, frequent changing of gloves, not handling personal items during work in the lab, etc. Clean all touched surfaces, such as lab benches, chairs, chemical cabinets, doorknobs, fume hoods, etc. Use professional judgement and follow manufacturer recommendations concerning disinfecting sensitive equipment.

Cleaning frequency:

It is recommended to use a bench liner while working with SARS-CoV-2 DNA. This bench liner should be changed frequently depending upon the amount work done on the bench. Surface cleaning should be done before and following the use of lab areas and equipment with SARS-CoV-2 DNA. Be careful when cleaning sensitive equipment to prevent damage or disruption of the equipment. Consult with equipment manufacturers on viable options if you have questions. While frequency of cleaning will be determined by the individual labs based on the amount of work being done, it will be required in the event of lab member being diagnosed with an

amplicon related positive SARS-CoV-2 test administered through BU or upon receipt of results of a wipe test in which there are a significant amount of positive results.

Selection of a disinfectant:

When selecting and before applying a disinfectant, determine any materials or equipment located in the lab that potentially could be incompatible (e.g., bleach). Some disinfectants may require a secondary wipe-down with water or ethanol to remove residue. Read and follow disinfectant label guidelines. Do not mix incompatible disinfectants (e.g. bleach and ammonia) as it can produce toxic gases.

Household bleach (sodium hypochlorite) is effective for removal of DNA from surfaces [2]. Use freshly prepared solution of household bleach (1 % sodium hypochlorite) [3] for 30 minutes of contact time on the surface followed by rinsing with ethanol or water. Alternatively, consider using a product specifically designed to destroy nucleic acids (e.g. DNA Zap™ [4], Invitrogen; Klorrent, Novadan [5]). Please note that Ethanol or isopropanol is not sufficient to remove nucleic acid [3].

Personal protective equipment (PPE):

Use face mask, disposable lab coat, nitrile gloves and eye protection.

Cleaning/disinfection procedure:

- Dispose of all benchtop absorbent padding, cardboard, or other porous materials. Ensure that all sharps are stored or disposed of appropriately. Discard all contents of benchtop waste containers into an appropriate waste stream. Minimize clutter and other unnecessary items on countertops and desks/tables.
- Wear appropriate PPE (face mask, lab coat, disposable gloves, and eye protection).
- Clean surfaces by removing any visible contaminants. If the surface is visibly contaminated or wet with possible contaminants, place absorbent material (e.g. paper towels) directly over the contamination. Wipe to remove contamination and dispose of the absorbent material.
- Apply disinfectant by spraying or applying the solution onto a paper towel and then wiping it onto the surface. Allow appropriate contact time. The surface must remain wet for the contact time indicated for the disinfectant used. If the surface dries, reapply the solution.

- Dispose of cleaning materials in lab trash containers and any hazardous waste in accordance with the Hazardous Waste Disposal Guidelines.

Emergency response:

In case of an exposure to disinfectants wash the affected area with copious amount of water for 15 minutes. Contact ROHP and EH&S immediately after a potential exposure.

References:

1. Robinson-McCarthy et al. New recommended policies for pathogen surveillance testing of researchers and improved stewardship of diagnostic DNA. 2020. Science. PMID: 33446547
2. Champlot et al. An Efficient Multistrategy DNA Decontamination Procedure of PCR Reagents for Hypersensitive PCR Applications. 2010. PLoS One. 5(9): e13042.
3. Marie-Louise Kampmann*, Claus Børsting, Niels Morling. Decrease DNA contamination in the laboratories. Forensic Science International: Genetics Supplement Series 6 (2017) e577–e578.
4. <https://www.thermofisher.com/order/catalog/product/AM9890?us&en#/AM9890?us&en>
5. <https://datblade.novadan.dk/dokumenter/1055-1-en.pdf>