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Commentary

Persistence of SARS-Cov-2 on the Beauty Products, Their Containers' Surfaces, and the Possibility of Secondary and Cross-Contamination

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The recent pandemic of COVID-19 is a newly emerged respiratory infection caused by SARS-COV-2. The Speed of virus spread and rapid outbreak of the disease has made the global concern urgent and essential. The severity of COVID-19 disease varies from mild pneumonia to Acute Respiratory Distress Syndrome (ARDS).[1] Like former coronaviruses, SARS-CoV-2 has spike glycoproteins on the outer surface as adhesive components. The viral spike (s) attaches to the host cell receptor and then the virus enters into and introduces its material to the cell and contaminates it.[2] Cosmetics are defined by the Council of European Union regulation as the substance or mixture that contacts with the external parts of the human body (epidermis, hair, nails, lips, and external genital organs) or with the teeth and the mucous membranes of the oral cavity.[3] Cosmetics application during outbreaks seems to be challenging due to the probable presence of a highly transmissible pathogens. There is no research to date about the role of cosmetics on the transmission rate of the virus into the makeup wearer.

Contamination during manufacturing (primary contamination) and/or during application (secondary contamination) is also important in pandemics. The vast majority of cosmetics are lipid-based products. SARS-Cov-2 is a lipid-enveloped virus and questions about the possibility of the secondary contamination should be answered. Cosmetics and medicines prepared by pharmaceutical companies seem to be safe from the primary contamination; however, standards and principles of sanitation should be carefully evaluated encountering the viral outbreaks.

Studies have shown that secondary contamination may occur by encapsulated viruses,[4] some studies reported the transmission of viruses as a result of the contacting with household setting[5] or dry surfaces.[6] A combination of hand hygiene and surface cleaning suggested for the proper inhibition of the secondary contamination.[7,8] Viruses do not replicate outside the living cells while they can maintain this ability in the environment. So, they do not produce spoilage on or inside the cosmetics however, the contaminated products may pose a major health threat for consumers. Many cosmetic products were contaminated via direct contact with virus particles that remained on the consumer body. For instance, contamination of lipsticks or toothpastes with infectious saliva, a mascara with lachrymal fluid, soaps with papillomaviruses or even with fecal viruses via contaminated hands. Since cosmetics are frequently used by several members of a family or even by other clients (as testers), they can be a carrier for viral cross-contamination. The effect of some preservatives on the surveillance of viruses in the water filters has been studied and the results showed increased surveillance of some viruses in the presence of preservatives,[9] while other studies suggested the toxic effect of some preservatives on the virus survival on cosmetics.[10] The positive effect of preservatives on the virus surveillance in water filters is a result of the co-contaminations such as bacteria or Fungi.[11]

To find out whether secondary contamination of cosmetics could cause viral transmission, the stability of some viruses investigated in different types of soaps, creams, toothpastes, lipsticks, and mascaras. Viruses such as poliovirus or SV40 possess high stability in certain types of cosmetics.[12] Adenoviruses are non-enveloped DNA viruses that can be dissolved in lipophilic substances.12 However, some investigation has shown that parabens (used as preservatives in cosmetics), could potentially inactivate HSV in paraben-preserved emulsions compared with unpreserved samples.[13] Quantitative determination of the virus deactivation is complicated and to the best of our knowledge, there are not many studies on the cosmetics contamination by viruses.

The current knowledge of the coronaviruses consistent with the overall agreement on the coronaviruses' survival on the surfaces.[14] Also it is believed that coronaviruses remain infectious, from 2 h up to 9 days on inanimate surfaces such as metal, glass, or plastic, with increased survival in colder and dryer environments.[14] The persistence of coronaviruses on different types of surfaces has been investigated and the results of 22 studies about SARS, MERS, HCoV viruses were discussed in a recent paper.[15] The authors concluded

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that the studied viruses persist on metal, glass or plastic surfaces.[15] Table 1 shows the stability of the studied viruses on different surfaces.

Table 1. Persistence of coronaviruses on different types of inanimate surfaces[15]

Type of surface	Virus	T (°C)	Persistence
Steel	MERS-CoV	20	48h
		30	8-24h
	HCoV	21	5d
Aluminum	HCoV	21	2-8h
Metal	SARS-CoV	RT	5d
Wood	SARS-CoV	RT	4d
Paper	SARS-CoV	RT	4-5d
Glass	SARS-CoV	RT	4d
	HCoV	21	5d
Plastic	SARS-CoV	RT	4d
	MERS-CoV	20	48h
	HCoV	RT	2-6d
PVC	HCoV	21	5d
Disposable gown	SARS-CoV	RT	Min 1 h-max 2 day [a]
Ceramic	HCoV	21	5d
Teflon	HCoV	21	5d
Surgical glove (latex)	HCoV	21	8h≥

[a]Depending on the amount of virus titer
MERS = Middle East Respiratory Syndrome; HCoV = Human coronavirus; SARS = Severe Acute Respiratory Syndrome; RT = Room Temperature.

SARS-CoV-2 persistence on surfaces and in aerosols has been compared with SARS35-CoV-1 and the results revealed a high similarity between the stability of the compared viruses. Viral aerosols have been detected up to 3 hours after being suspended in airborne particles.[14] It has been suggested that the SARS-CoV-2 behaves such as an airborne virus during the critical care procedures.[15] The average half-life of SARS-Cov-2 is about 13 hours on steel and about 16 hours on polypropylene. The virus particles can survive after they leave the host and the virus stability in the air and on the surfaces may directly affect the transmission rate. Table 2 shows the comparative half-live of SARS-CoV-2 on aerosols and different surfaces.[14]

Table 2. The comparative half-life of SARS-CoV-2 in aerosols and on different surfaces[14]

Average half-life(hour)	Materials
2.74	Aerosol
3.4	Copper
8.45	Cardboard
13.1	Steel
15.9	Plastic

SARS-CoV-2 remains viable and infectious in aerosols for significant time interval. Accordingly, the transmission of SARS-CoV-2 via aerosol and fomite is probable.14 SARS-CoV-2 survives on the studied surfaces from at least 3.4 hours to 15.9 hours. Its survival time on the metals like copper is significantly lower than plastic.

According to Table 1 the contamination of cosmetics packages such as cardboard boxes, paper brochures, plastic tubes or glasses is possible and can cause cross-contamination. Besides, according to Table 2, suspended aerosols or mucus of carrier individuals could contaminate tester cosmetics used in shops. The World Health Organization's guideline on the Laboratory Safety for Covid-19 warns to avoid using cosmetics in the laboratory environment.[16] Taking these considerations and facts together, we need to get evidence based answers for the following questions:

1- Does makeup consumption by healthcare staff during work time increase the likelihood of virus transmission?
2- Is it necessary to discard the tester cosmetics in beauty shops and replace them by single use products?
3- Is it necessary to discard the cosmetics that the infected people were using during the period of illness?
4- Is it safe to use solid soaps in public places?
5- Is it necessary to revise the safety protocols and procedures in beauty salons?

Beauty salons are utilizing shared cosmetics and make up preparations for their customers. Moreover, the discarding of the products before its complete consumption is not usual. It seems that the consumption of shared cosmetics should be forbidden during pandemics. In addition, preparation of single use aliquots of the products for each costumer could prevent cross contamination. Cleaning of all the shared tools before each application based on a suitable safety protocol may also decrease the chance of cross contamination. Application of disposables or self-provided products and tools could help as well.

There is no evidence about the persistence of SARS-CoV-2 on cosmetics, while the overall understanding of the reported transmission roots of SARS-Cov-2 and the available knowledge about its persistence on the surfaces suggest that the secondary contamination from the cosmetics is plausible. It would be highly recommended to consider the necessary caution until to find enough evidence confirming or declining the possibility of secondary and cross-contamination with SARS-CoV-2 via cosmetic products.

Conflict of Interest

The authors declare they have no conflict of interest.

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