

# **Investigation of Aerosol Stability of SARS-CoV-2 Alpha, Beta and Delta Variants of Concern at Low, Medium and High Relative Humidity (RH)**

By

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- Recent studies have investigated the stability of artificially-generated aerosols of early SARS-CoV-2 Variants.
- Virus particles can remain viable for at least 90 minutes at 21-23°C and medium RH (40-60%) or high RH (68–88%).
- At medium RH, aerosol persistence is between 3 and 16 hours.
- Half-life of SARS-CoV-2 aerosols under medium conditions RH is 1.1 – 1.25 hours.
- **Is increased transmission of recently emerged VOC a consequence of increased aerosol persistence?**

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CORRESPONDENCE

### Stability and Viability of SARS-CoV-2

**TO THE EDITOR:** The letter by van Doremalen et al. (published March 17 at NEJM.org)<sup>1</sup> provides important information on the viability of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2, the virus that causes Covid-19), and the implication that the virus remains viable in aerosols is likely to influence infection-control practices. The authors used a three-jet Collision nebulizer to generate artificial particles that, because of their small size (<5 μm) remained suspended in aerosols.

This letter was published on April 13, 2020, at NEJM.org.

1. van Doremalen N, Bushmaker T, Morris DH, et al. Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. *N Engl J Med*. DOI: 10.1056/NEJMc2004973.
2. Tsai Y-H, Wan G-H, Wu Y-K, Tsao K-C. Airborne severe acute respiratory syndrome coronavirus concentrations in a negative-pressure isolation room. *Infect Control Hosp Epidemiol* 2006; 27:523-5.
3. Booth TF, Kournikakis B, Rastien N, et al. Detection of airborne severe acute respiratory syndrome (SARS) coronavirus and environmental contamination in SARS outbreak units. *J Infect Dis* 2005;191:1472-7.

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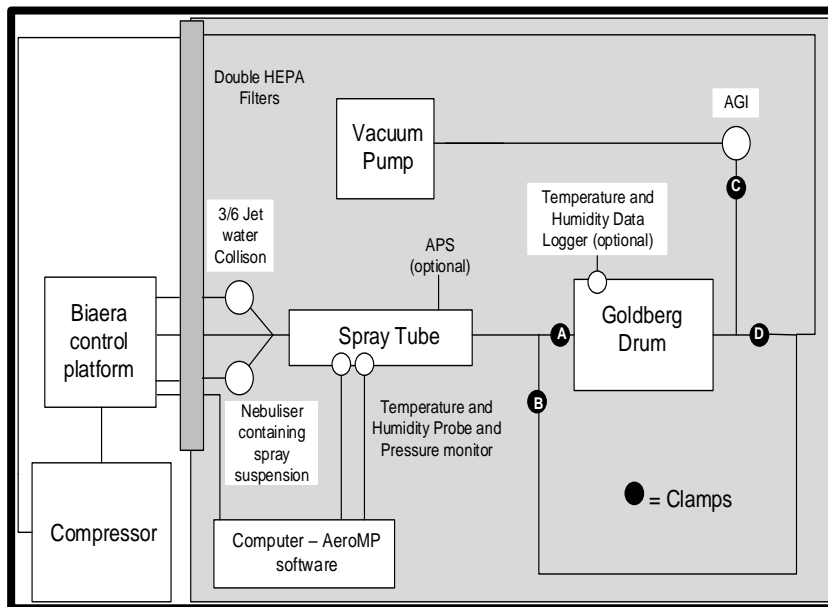
### Experimental aerosol survival of SARS-CoV-2 in artificial saliva and tissue culture media at medium and high humidity

Sophie J. Smither, Lin S. Eastaugh, James S. Findlay & Mark S. Lever

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## Experiment Set Up



## Experiment Set Up

Set up at  
required  
environmental  
conditions



Filling of 75L  
Goldberg  
drum

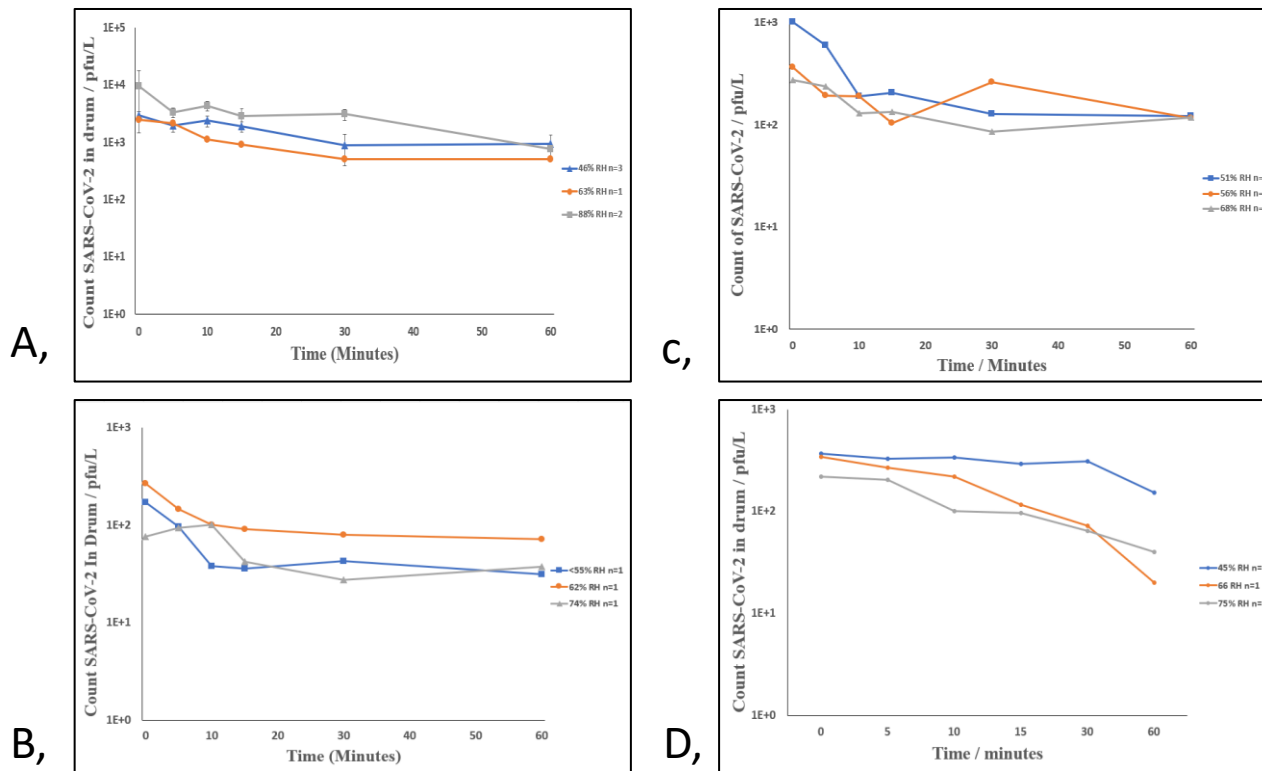


Sampling at predetermined  
timepoints (0, 5min, 10min,  
15min, 30min, 60min)

Variant	RH (%)	Number of Runs
England 02/2020	46	3
England 02/2020	63	1
England 02/2020	88	2
Alpha	<55	1
Alpha	62	1
Alpha	74	1
Beta	51	1
Beta	56	1
Beta	68	1
Delta	45	1
Delta	66	1
Delta	75	1

**Experimental Run Conditions**

## Results



**Figure: Aerosol stability of SARS-CoV-2 Variants Over Time.** A, English 20/2020 strain. B, Alpha variant. C, Beta variant. D, Delta variant.

Counts were adjusted for dilution effect caused sampling. 'n' represents number of runs under each environmental condition.

**Results**

Strain	46 RH%	63 RH%	88 RH%
England 02/2020	0.51	0.69	2.02
	<b>&lt;55 RH%</b>	<b>62 RH%</b>	<b>74 RH%</b>
Alpha Variant	0.74	0.57	0.31
	<b>51 RH%</b>	<b>56 RH%</b>	<b>68 RH%</b>
Beta Variant	0.92	0.50	0.37
	<b>45 RH%</b>	<b>66 RH%</b>	<b>75 RH%</b>
Delta Variant	0.38	1.23	0.74

**Table:** Log reductions for SARS-CoV-2 Variants in Goldberg Drum after 60-minute duration

### Conclusion & Next Steps

- Under the conditions investigated, all four variants remained viable for over 60 minutes and at the different relative humidities investigated.
- Future work will involve the inclusion of replicate runs to determine statistical significance for the various conditions tested.
- Increased duration of study to determine at what point viability is lost with any of the variants studied.
- Close monitoring of RH levels in spray tube and Goldberg drum will be compared.
- Study will be extended to include other variants of concern.

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### THE TEAM



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