CORONAVIRUS AND UVC

WHAT IS UVGI ?

UVGI (Ultraviolet Germicidal Irradiation; UVGI) is define as the use of Ultraviolet (UV) wavelengeths of light in germicidal range (200-320 nm) for disinfection of air water and surface.

Primary Bands of Ultraviolet radiation

UVA band wavelength between 320 - 400 nm

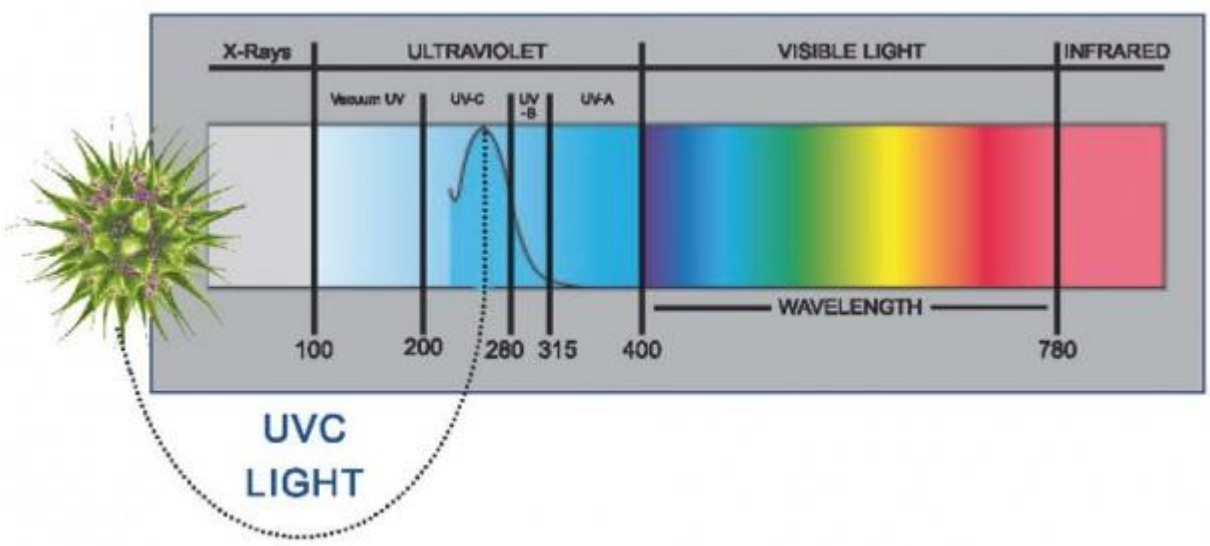
UVB band wavelength between 280 - 320 nm

UVC band wavelength between 200 - 280 nm

UVV band wavelength between 100 - 200 nm

(W.Kawaski, Ultraviolet Germicidal Irradiation Handbook)

HOW DOES UVC WORK ?



UVC lamp are designed to emit radiation strongly at wavelength of 253.7 nm that greatest disinfection ability.

When exposing microorganism to UVC light, The light penetrates thought their cell wall and disrupts the structure of their DNA molecules, inability to reproduce and Cell Death

Source and Spread of the Virus

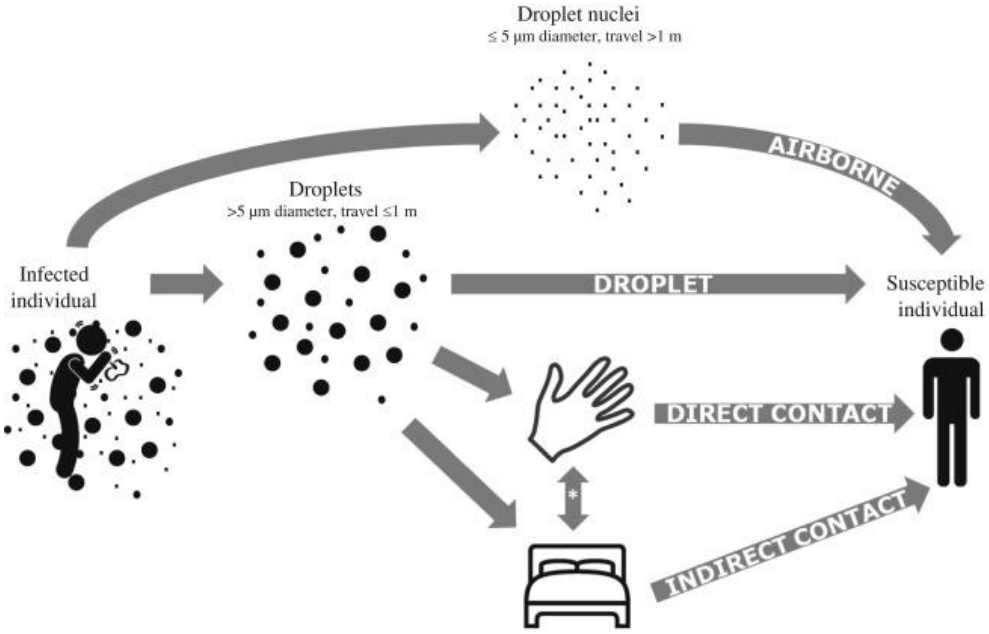
Coronaviruses are a large family of viruses that are common in people and many different species of animals, including camels, cattle, cats, and bats. Rarely, animal coronaviruses can infect people and then spread between people such as with MERS-CoV, SARS-CoV, and now with this new virus (named SARS-CoV-2).

The SARS-CoV-2 virus is a betacoronavirus, like MERS-CoV and SARS-CoV. All three of these viruses have their origins in bats. The sequences from U.S. patients are similar to the one that China initially posted, suggesting a likely single, recent emergence of this virus from an animal reservoir.

Early on, many of the patients at the epicenter of the outbreak in Wuhan, Hubei Province, China had some link to a large seafood and live animal market, suggesting animal-to-person spread. Later, a growing number of patients reportedly did not have exposure to animal markets, indicating person-to-person spread. Person-to-person spread was subsequently reported outside Hubei and in countries outside China, including in the United States. Some international destinations now have ongoing community spread with the virus that causes COVID-19, as do some parts of the United States. Community spread means some people have been infected and it is not known how or where they became exposed. Learn what is known about the spread of this newly emerged coronaviruses.

https://www.cdc.gov/coronavirus/2019ncov/about/transmission.html

How COVID-19 Spreads?



* Transmission routes involving a combination of hand & surface = indirect contact.

Definition of Droplet and Droplet nuclei from Annex C : Respiratory droplets ,in Natural Ventilation for Infection Control in Health care Setting, Atkinson J., et al.,Editors.2009:Geneva

Person-to-person spread

The virus is thought to spread mainly from person-to-person.

- Between people who are in close contact with one another (within about 6 feet).
- Through respiratory droplets produced when an infected person coughs or sneezes.

These droplets can land in the mouths or noses of people who are nearby or possibly be inhaled into the lungs

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The studies that have been performed on Coronaviuses under UV exposure

and also shows the genomic prediction of the UV rate constant in the final row. The last two studies (Kariwa 2004 and Darnell 2004) seem to be anomalous but it is unclear from the data why these results indicate such an unusually high UV resistance, but have been included for completeness. All the data in Table 1 except for the Duan (2003) study were used in the development of the genomic model of ssRNA viruses shown in Figure 2. Based on the ssRNA genomic model the UV rate constant for SARS Coronavirus computes to be 0.3289 m^2/J and this gives a D90 value of 7 J/m^2, which is in fairly good agreement with the first three studies shown in Table 1.

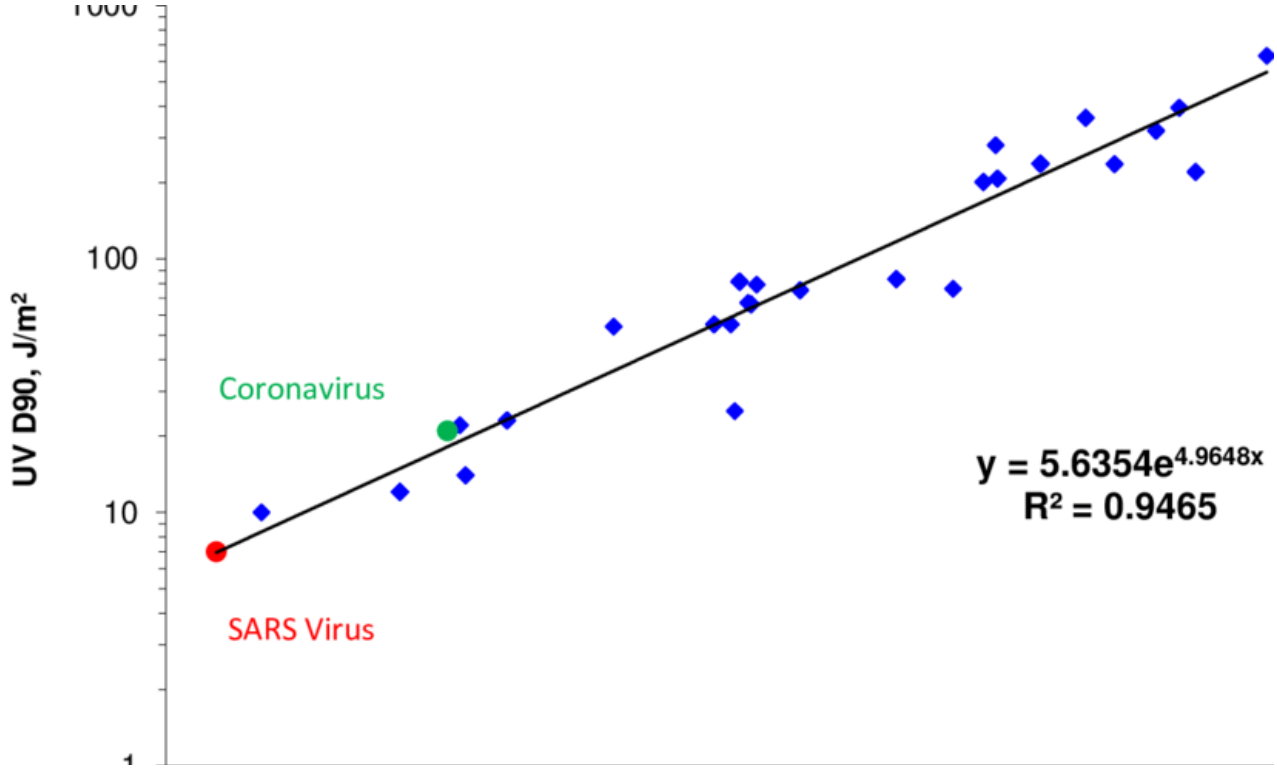

Figure 2: Genomic model of 27 ssRNA viruses representing 62 data sets (Kowalski et al 2009). The SARS virus (NC_004718) is highlighted in red and the average of the four Coronavirus studies are highlighted in green

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