

# UVC lights and airborne microorganisms: a step further in air disinfection

Ultraviolet C (UVC) radiation treatment is an established technology for disinfection that has been extensively applied since 1910, when it was discovered that it can neutralise microorganisms, such as bacteria, viruses, moulds and yeasts.<sup>1</sup> Hundreds of studies have been conducted in the past decades, showing the efficacy and safety of UVC lights in disinfection.<sup>2,3</sup>

Ultraviolet radiation is a range of electromagnetic radiation with a wavelength shorter than that of the light visible to the human eye, and immediately longer than that of X-ray light. UVC light has the shortest wavelength of all types of ultraviolet light, from 100 to 280 nm (Fig 1). At 253.7 nm, UVC light has been shown to cause inactivation of microorganisms due to UVC absorption by the microorganisms, and subsequent photochemical damage to their DNA and RNA, eliminating their ability to replicate, and thereby neutralising them.<sup>1,4</sup>

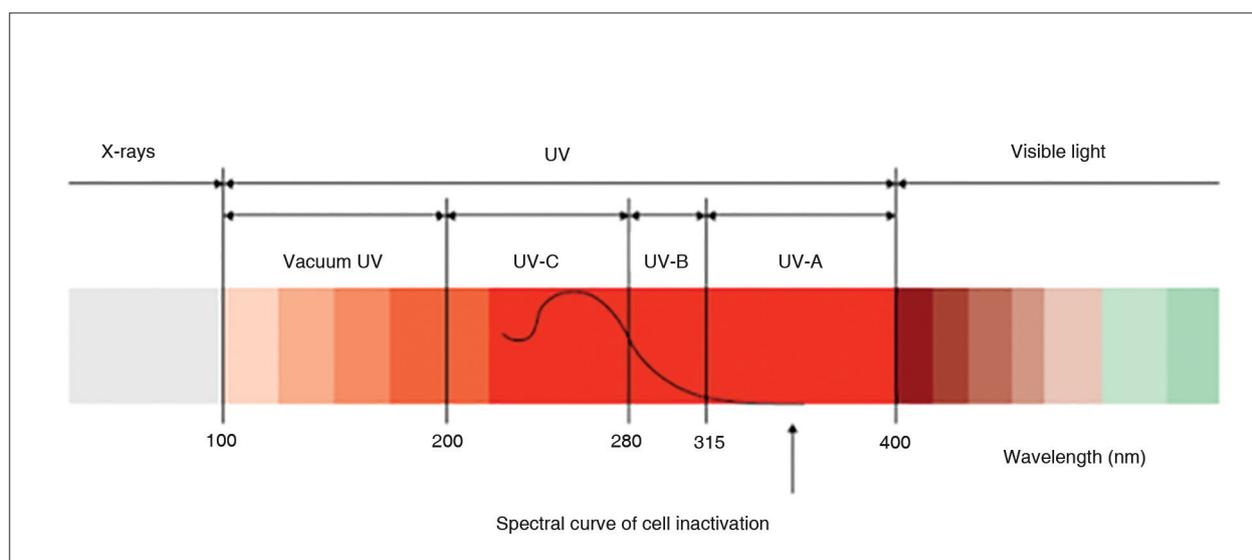
With the COVID-19 pandemic, the concern about keeping indoor environments and surfaces disinfected has grown, and the use of UVC light-based devices has been an important strategy to reduce airborne contamination, and the spread of this and other pathogens.<sup>5</sup>

The FagronLab UVGI-80 Air Steriliser is a device developed by the Fagron Group – a global pharmaceutical company present in more than 30 countries around the globe – to perform a full cleanse of contaminated environments, eliminating airborne microorganisms. The UVGI-80 consists of a dynamic air circulation system, with a constant airflow of 800 m<sup>3</sup>/h. The device pulls the air through a bilateral inlet, causing small particles, such as airborne microorganisms, to be directly exposed to five double UVC lamps, and then safely conducts the clean air back into the environment. The device has been designed so that all the UVC lamps are enclosed in its core, thus avoiding direct exposure to the eyes or skin, and making it safe for use in rooms in which people are present. Tests have confirmed that the device has no radiation leakage.



## The FagronLab UVGI-80 Air Steriliser performs a full cleanse of contaminated environments, eliminating airborne microorganisms

The UVGI-80 is suitable for disinfection of air in potentially contaminated sites, such as hospitals, pharmacies, and medical waiting rooms, as well as places with high circulation of people, such as schools, universities, restaurants, offices, and commercial stores. The evidence for its ability to neutralise airborne microorganisms is supported by data on the usage and efficacy of UVC lights from several internal scientific studies. The outcomes of two of the tests are shown in Figure 2.



**Figure 1. Relationship of wavelength of light to cell inactivation**

### Test with *Staphylococcus albus* (bacteria)

First test was performed in a temperature of (20–25 °C), and relative humidity of (50-70)% RH. The steriliser has an effect of 99.90%, 99,92%, and 99.90%, respectively, in terms of the disinfection rate of *Staphylococcus albus*, after 60 minutes of operation.

Experimental data of quantitative test on air disinfection effect								
Tested strains	Working for (min)	Test No.	Control group			Test group		
			Number of colonies before the test (cfu/m <sup>3</sup> )	Number of colonies after the test (cfu/m <sup>3</sup> )	Natural decay rate (%)	Number of colonies before the test (cfu/m <sup>3</sup> )	Number of colonies after the test (cfu/m <sup>3</sup> )	Apoptotic rate (%)
<i>Staphylococcus albus</i>	60	1	8.06x10 <sup>4</sup>	6.35x10 <sup>4</sup>	21.22	8.55x10 <sup>4</sup>	65	99.90
		2	9.17x10 <sup>4</sup>	7.37x10 <sup>4</sup>	19.63	8.31x10 <sup>4</sup>	53	99.92
		3	1.10x10 <sup>5</sup>	8.36x10 <sup>4</sup>	24.00	1.06x10 <sup>5</sup>	82	99.90

### Test on airborne microorganisms

The second test confirmed that the steriliser has an effect of 90.42%, 90,56%, and 92.17%, respectively, in terms of decay of airborne microorganisms, after 120 minutes of operation.

Experimental data of the identification test on air disinfection effect					
Tested strains	Working for (min)	Test No.	Test group		
			Number of colonies before the test (cfu/m <sup>3</sup> )	Number of colonies after the test (cfu/m <sup>3</sup> )	Apoptotic rate (%)
Airborne microorganisms	120	1	2.40x10 <sup>3</sup>	2.30x10 <sup>2</sup>	90.42
		2	1.95x10 <sup>3</sup>	1.84x10 <sup>2</sup>	90.56

**Figure 2. Efficacy of the Fagron UVGI-80 vs *S.albus* and other airborne microorganisms**

When choosing a safety product, it is critical to ensure that the specifications are validated, and that claims are proven – FagronLab's UVGI-80 has the data available to enable rational comparisons to be made with comparable devices, and to justify investments in protective strategies.

The use of the UVGI-80 requires minimal maintenance; only cleaning and lamp replacement is required periodically, depending on the frequency of usage of the device. The device can be utilised according to a wide range of disinfection strategies, and is suitable for both continuous or occasional operation.

For further information and quotations, please contact Fagron South Africa at [www.fagron.co.za](http://www.fagron.co.za) or e-mail [fagronlab@fagron.co.za](mailto:fagronlab@fagron.co.za)



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