

#### Air Decontamination

### by Dr Rahul Doshi Immediate Past President BACD



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The information contained in this research paper is for general information purposes only and does not form a position. The information provided in this research paper is an amalgamation of thoughts and comparisons made by a voluntary group of individuals and groups to develop a working resource for a comparison of various Air Filtration units.

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I / we do not express an opinion on the scientific position on the use and the requirement or the suitability of any Air Filtration Unit. I/ we have not been able to obtain sufficient appropriate evidence, or personal inspection of any units to provide a basis for an any opinion.

The information provided in this research paper is information only and not advice, it is provided solely to enable you to make your own decision. Please carry out your own research on all scientific papers and configuration of various units to create and form your own opinion. If you need specific advice, please seek advice from a professional who is licenced to provide such advice. I/We shall not be liable or be held liable for any consequence in reliance of this research paper.



# Scientific Thought



# Multiple Articles showing no real evidence of Aerosol Spread

https://dentexhealth-

my.sharepoint.com/:f:/g/personal/rahul\_doshi\_dentex\_health/EpGvpRFoJEVApiN\_JPjN43gBeMi\_dPmPWeoBZNFXF 10QZQ?e=6JODMf

### Science Paper 1



#### Aerosol and Surface Stability of SARS-CoV-2 as Compared with SARS-CoV-1

SARS-CoV-2 remained viable in aerosols throughout the duration of our experiment (3 hours), with a reduction in infectious titer from 10<sub>3.5</sub> to 10<sub>2.7</sub> TCID<sub>50</sub> per liter of air. This reduction was similar to that observed with SARS-CoV-1, from 10<sub>4.3</sub> to 10<sub>3.5</sub> TCID<sub>50</sub> per milliliter

https://www.nejm.org/doi/full/10.1056/NEJMc2004973?query=featured\_coronavirus



www.dentexhealth.co.uk

A Titers of Viable Virus Cardboard **Stainless Steel** Aerosols Copper Plastic Titer (TCID<sub>50</sub>/ml of medium) Titer (TCID<sub>50</sub>/liter of air) 104-104-104. 104 SARS-CoV-2 10 SARS-CoV-1 103 103 103. 103-10 102 102-102 102 102------101 101 101 101 10 10 100 0 1 4 8 24 48 72 96 8 24 48 72 96 0 1 4 8 24 48 72 96 1.0 2.0 4 8 24 48 72 96 0 0.5 3.0 0 1 0 4 Hours Hours B Predicted Decay of Virus Titer Cardboard Copper Stainless Steel Plastic Aerosols Titer (TCID<sub>50</sub>/ml of medium) Titer (TCID<sub>50</sub>/liter of air) 104-104-104. 104. 104 103-103. 103 103 103 SARS-CoV-2 102-102. 102 102 102 ---0----0---101 101 10 101 101 ..... 100 10 2.0 1.0 3.0 Ó 20 40 60 80 20 40 60 80 20 40 60 80 Ó 20 40 60 80 0 0 0 Titer (TCID<sub>50</sub>/ml of medium) 104 104-104-104-Ó 103-103-103-103-102. SARS-CoV-1 10<sup>2</sup>-102 102-101 101 101. 101 100 100 100 100 1.0 2.0 3.0 Ó 20 40 60 80 20 40 60 80 20 40 60 80 Ó 20 40 60 80 0 0 0 Hours Hours



DENTEX



### Science Paper 2

Research Published: 15 October 2010

A pilot study of bioaerosol reduction using an air cleaning system during dental procedures

C. Hallier, D. W. Williams, A. J. C. Potts & M. A. O. Lewis

British Dental Journal 209, E14(2010) Cite this article

2895 Accesses 6 Citations 1 Altmetric Metrics

https://www.nature.com/articles/sj.bdj.2010.975



From: A pilot study of bioaerosol reduction using an air cleaning system during dental procedures



Level of bioaerosols (colony forming units per cubic metre,  $cfu/m^3$ ) at base line and during four types of dental

treatment



#### <u>Opinion</u>

#### This is a study where evidence is poor.

- 1. Clinic comparisons were poor. 1&2 open plan. 3 single surgery
- 2. Trial 8 patients only
- 3. They used a pump to draw 100l/min air over the collection plates. This is not trivial. Suction has to be 250l/min in UK.
- 4. This is not necessarily oral contamination. It could be from disinfected dental unit waterlines. There is no description of what measures were in place to control disinfected dental unit waterlines. They accept they did not check the contamination within each unit.
- 5. Why was there a reduction in bioaerosol with extraction and the blower over the no blower control? Why is the difference seen larger than the ultrasonic scaling?





There are two types of air cleaning systems that we can see from the peer reviewed literature there are, both mostly a Class 13 high efficiency particulate air (HEPA) filter which can remove 99.95% of particulates.





The **first** are free standing directional units that are large high-volume suction units placed about 1 m from the dental team (Hallier et al., 2010; Yamada et al., 2011). Both units reduced bacterial counts by about 30%. It should be noted that in Hallier and co-workers paper there was no statistical differences in bacterial counts created prior to the clean air system being activated between, history and examination, ultrasonic scaling with high volume suction (HVS), and tooth extraction. Cavity preparation was an outlier, the authors did not mention the use of HVS during this procedure unlike the scaling, as the bacterial count dropped by approximately 80% it suggests the use of normal HVS might be the significant factor here.





The **second** type of clean air system acts as a general air filter. There are two systematic reviews available, Eckmanns looked at mortality in highly immunosuppressed patients, and McDonald looked at asthma symptoms (Eckmanns et al., 2006; McDonald et al., 2002). The overall summary estimate for both reviews weakly favoured the use of HEPA filters, but the results were not statistically significant using a random effects model (See Table 1).





#### Table 1

Summary Estimate for systematic reviews Systematic review Study type Effect size 95%Confidence interval McDonald et al 2002 RCTs (4) WMD = -0.76 -2.17 to 0.65 Eckmanns et al 2006 RCTs (6) RR = 0.86 0.65 to 1.14 Eckmanns et al 2006 Non-RCTs (4) RR = 0.87 0.60 to 1.25 RR – relative risk WMD – weighted mean difference

There is no direct evidence regarding UVC in air filters being able to kill Covid-19 (Narla et al., 2020; Shirbandi et al., 2020).





Dental procedures create bioaerosols that are a potential vector for transmission of infection in the dental surgery.

The use of an air cleaning system both before and during dental treatment can reduce the size of bioaerosols and therefore reduce the risk of aerosol spread of infection.

Air cleaning systems may have a useful role to play in the treatment of patients, in particular those who may be immune-compromised.





#### Conclusion

As with many of the rapid reviews and studies available regarding Covid-19 there is no direct evidence of the benefits of free-standing clean air systems in dental practice. Indirect evidence suggests a small but non-significant benefit that might easily by outweighed by their functionality in a working environment.



### Summary of other papers

From BAPD – Return to Work Position Paper - www.bapd.org.uk



- Impractical for dentistry
- The ventilated headboard is not a filtration system in itself, rather, it is a special inlet system designed to provide a strategically-improved air intake for a corresponding highefficiency particulate air (HEPA) fan/filter unit. Together, the ventilated headboard and HEPA system can provide surge isolation capacity in either traditional healthcare facilities or alternate care sites.
- Eliminates 99% of the patient-source aerosol within 20 seconds, and not allowing aerosol to escape the canopy or expose the HCW
- With the canopy retracted, the ventilated headboard lost its local control of the aerosol and failed to prevent exposures to the HCW.





Expedient Methods for Surge Airborne Isolation within Healthcare Settings during Response to a Natural or Manmade Epidemic (In-Depth Report)

- Non-localised systems will fail to respond to cough
- A single cough generated about the same number of droplets as thirty seconds of talking and the same number of airborne droplet nuclei as five minutes of talking. Perhaps even more important was the observation that almost half (49 percent) of the cough-generated droplet nuclei remained suspended more than thirty minutes following their generation, as opposed to only 6 percent of the talk-generated droplet nuclei over the same time period.
- The expedient airborne isolation configurations discussed in this research were all constructed and evaluated within traditional hospital facilities [accept should have been tested in other settings]
- Most provide better real-time source protection from infectious aerosol than that expected to result from an N95 respirator. In several cases, the protection is several times better. These findings are not intended to replace the respiratory protection guidance provided to healthcare workers; however; the additional reduction in contaminant concentrations will lessen the dependence upon the N95 as the last line of airborne defense.
- Only contained negative ventilation system. Impractical for dentistry.



Model

- Comparison the use of ultraviolet germicidal irradiation (UVGI) with increased ventilation flow rate to minimize the risk from airborne bacteria in hospital isolation rooms.
   Results show that the number of particles deposited on surfaces and vented out is greater in magnitude than the number killed by UV light
- The number of viable particles in the room is generally lower for high exhaust systems compared with low exhaust system cases for the low to medium ACH values considered
- Impractical for dentistry negative ventilation system





Review

- Ventilation plus recirculating air filtration could reduce droplet nuclei concentrations with 30%–90% effectiveness
- Recirculating air through the UV radiation unit can be very effective to disinfect the air. Equipment within the ventilated space close to the ceiling, where human exposure is minimal. Ceiling mounted units do not exist in dentistry
- The effect of occupancy on ventilation of health care functional spaces has not been researched in detail
- Many models become probabilistic with simplifying assumptions (e.g., single hit model) to quantify risk. Any experimental infection test is valid only for the particular setup of the experiment and is difficult to generalize
- Models are extremely sensitive to initial and boundary conditions. Some of this uncertainty is irreducible. For example, people cough or sneeze with unpredictable directions, strengths, and locations



From BAPD – Return to Work Position Paper - www.bapd.org.uk

	u	Y, Leung GM, Tang JW etal	Systematic Review
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- There is strong and sufficient evidence to demonstrate the association between ventilation, air movements in buildings and the transmission/spread of infectious diseases such as SARS-CoV-1.
- There is insufficient data to specify and quantify the minimum ventilation requirements in hospitals, schools, offices, homes and isolation rooms in relation to spread of infectious diseases via the airborne route





From BAPD – Return to Work Position Paper - www.bapd.org.uk

#### Summary

Demonstrated technology not practical for dentistry

Off the shelf commercial products will not manage single explosive event like a cough or sneeze

Models are theoretical and cannot be applied to dentistry



# Types of Air Decontamination units in market

(All costs shown of various units are estimated costs)



#### Other TYPES Hydrogen Peroxide

#### Ozone

These methods cannot be carried out in the presence of humans.

During chemical cleaning, typically the space in question is required to be out of commission for a period of time

#### Air Changes

The time required for clearance of aerosols, and time after which the room can be entered without a filtering face piece (class 3) (FFP3) respirator, can be determined by the number of air changes per hour (ACH) as outlined in WHO guidance; in general wards and single rooms there should be a minimum of 6 air changes per hour

A single air change is estimated to remove 63% of airborne contaminants, after 5 air changes less than 1% of airborne contamination is thought to remain. A minimum of 20 minutes, that is 2 air changes, in hospital settings where the majority of these procedures occur is considered pragmatic

True ACH will depend on the unit, the settings on your unit and room size

#### Air Changes

CADR rating very important when considering machines. i.e. we need to clean up the air in the Surgery between patients. One hour is about 120 CMH

https://en.wikipedia.org/wiki/Clean\_air\_delivery\_rate

#### **Design Thought**

#### Size , type of room and Filtration Techniques

https://www.cedengineering.com/userfiles/HVAC%20Design% 20for%20Cleanroom%20Facilities.pdf UV-C

Jenact – GRU-V

#### Ionisation/Plasma KSG Health - Genano 350 Woodpecker - Q3

HEPA IQ Air – Cleanroom 250

#### Combined

Bryant Dental – DentAir Radic-8 - VK401 Air Purifiers - Airvia Pro 150 Quoris3d - Jade Air SCA5000C



# HOCL

HOCL-Spray - Hypochlorous Acid (HOCI)
Kills 99.99% of viruses and bacteria
Does not irritate the skin or eyes
Used by hospitals for disinfecting and sanitising
Alcohol free

•Water based hand sanitiser and surface disinfectant



The cumulative load of the inhaled agent plus the oxidative damage to the equipment and surfaces, asthma provocation

Potential that HOCl contributes to the tissue injury associated with inflammation

https://pubmed.ncbi.nlm.nih.gov/11327319/



www.dentexhealth.co.uk

### Nevoa Video

e.g. of air disperser

3





# UV- C

UVC has not been widely tested against Covid-19 to date but can be effective against other coronavirus including SARS

UVC has been used increasingly within air purifiers, that contain a highly reflective chamber filled with UVC lamps. As the air passes through the chamber, micro-organisms suspended in the air are destroyed.

The effectiveness of these chambers depends on the number and strength of the lamps.

UVC technology can be effective.

Applications of ultraviolet germicidal irradiation disinfection in health care facilities: Effective adjunct, but not stand-alone technology.



# UV- C

UV-C defined as UV radiation with wavelengths between 100 and 280nm. Typical UV low pressure lamp emits at 253.7nm – resonant to DNA. DNA is disrupted and destroyed.

Effective on bacteria, viruses and mould spores when appropriate dose is delivered and can penetrate to DNA. Viruses are small and easier to disinfect with UV-C

UV-C has been used since 1930s for disinfection. Data on dose required for different pathogens is extensive and can be reliably modelled. UV can be measured to international standards.


# UV- C

UVC limitations:

Exposure time – the exposure time required for the pathogens to be affected can not be realised in real patient environments.

Line of sight – bacteria traveling in clusters can promote shadowing; bacteria on the outside of the cluster will protect those on the inside, which cannot be detected by the UVGI source. The bacterial spores can stack on surfaces, making them extremely difficult to destroy.

Mutagenic effect – short-term exposure to UVC has been proven to mutate the structure of bacteria and viruses, making them even more dangerous.

## phs Biozone



#### Did you know?

FACT 1 The BIOZONE works 24 hours a day.FACT 2 Destroys 99.9% of bacteria in the air and viruses on surfaces.

FACT 3 Tackles the cause of malodours rather than masking them.

#### How do they work?

The **BIO**ZONE works when air is drawn into the units' air purification chamber, where it is exposed to intense levels of germicidal and UV light that destroys micro-organisms.

The UV light reacts with the air and produces a purifying plasma that contains reactive oxygen species such as tri-atomic oxygen, hydroxyl radicals and ozone, which destroy bacteria, viruses, fungi, yeast, mould, algae and other harmful micro-organisms as well as unpleasant odours.

#### MINI POWERZONE for those smaller infected areas

As the MINI **POWER**ZONE is portable, powerful and chemical free, it's easy to transport for purer air where you need it.

#### For further information please contact us on :

United Kingdom: 029 2080 9090 | productinfo@phs.co.uk | phs.co.uk Republic of Ireland: 01 643 4680 | productinfo@phswashrooms.ie | phswashrooms.ie



Mini Powerzone

# R- Filter



## UVC PHOTOCATALYTIC DISINFECTION AND DEODORIZER DEVICE

£1500 -£2500

- Synergistic effect of photooxidation and photocatalysis
- Kills bacteria and viruses
- Odour molecules are transformed into water and carbon dioxide
- No filter required
- Stainless steel house, no risk of corrosion
- Low energy consumption, programmable cycle time
- Minimal maintenance effort







![](_page_42_Picture_0.jpeg)

9

1

....

![](_page_42_Picture_1.jpeg)

![](_page_42_Picture_2.jpeg)

GRU-V

![](_page_42_Picture_3.jpeg)

![](_page_42_Picture_4.jpeg)

![](_page_42_Picture_5.jpeg)

![](_page_42_Picture_6.jpeg)

![](_page_43_Picture_0.jpeg)

Our GRU-V units have fans inside that suck the air in and push it along inside the unit and out at the top. The UV lamps will disrupt the DNA/RNA in the viruses and so 99.99% disinfection is achieved on the air that leaves the unit.

Ozone can have residual effect outside the unit in the room but this is inadvisable if people re-enter in a short time. Carbon filters can remove ozone and it breaks down naturally.

If UV were to be considered as a solution to this issue I would apply in two ways:

1. Suitably sized GRU-V style UV 'tube' to attain 4 log reduction on viruses sucked through it.

2. UV flood lamps for the general area between patients. These will sanitise surfaces AND the air in the room at the same time.

![](_page_43_Picture_6.jpeg)

# Strerilair

![](_page_45_Picture_0.jpeg)

## Sterilair PRO

The new air biological treatment system.

**Sterilair PRO** drastically reduce bacteria and virus, thus eliminating all the microorganisms, including the spores.

The air is driven into the system's chamber, which eliminates the total microbial load present in the air by irradiation. This device can operate continuously even in the presence of personnel, without creating health risks for the operators.

Sterilair PRO is simple, very quiet and ergonomic.

Sterilair PRO can treat 120 m<sup>3</sup> air/hour, with bacterial reduction of 90% within 3 hours of continuous use.

Available as a wall-mounted unit or on a mobile stand.

UV-C tubes must be changed every 9000 hours.

AiHeolthcore Dental | Medical | Veterinary

#### Table 4.3 Average UV rate constants for animal viruses and phages

		Water		Surface		Air - Lo RH		Air Hi RH	
Virus	Туре	D <sub>90</sub>	UVGI k	D <sub>90</sub>	UVGI k	D <sub>90</sub>	UVGI k	D <sub>90</sub>	UVGI k
Adenovirus	dsDNA	903	0.00255	Unit	111/0	49	0.04700	34	0.06800
Adenovirus type 1	dsDNA	322	0.00714						
Adenovirus type 15	dsDNA	396	0.00581	-	1 1		1 1		-
Adenovirus type 2	dsDNA	324	0.00711	400	0.00576		1 1		1
Adenovirus type 4	dsDNA	921	0.00250				1 1	-	
Adenovirus type 40	dsDNA	546	0.00422	300	0.00768			-	
Adenovirus type 41	dsDNA	515	0.00447	236	0.00976		1 1		-
Adenovirus type 5	deDNA	522	0.00441	200	0.000.0			-	-
Adenovinis type 6	deDNA	305	0.00583	-	1 1			-	-
Avian Influenza vinis	SERNA	25	0.09140				1 1	-	-
Avian Leukosis vinus (RSA)	SSRNA	631	0.00365	-		1	+ +		-
Avian Sarcoma vinis	SSDNA	220	0.01047		-		1 1	_	-
B subtilis phane 029	dsDNA	70	0.03289		-		1 1	-	-
B subtilis phage SP02c12	deDNA	100	0.02303				1 1		-
B subtilis phage SPD1	deDNA	105	0.01181		+ +		+ +		-
Bacterionhage B40.8	deDNA	137	0.01679		1 1		+ +	-	-
Bacteriophage Expecific	deDNA	202	0.00780				+ +		-
Bacterionhage MS2	ISS PNA	182	0.01268	-		5	0.42400	7	0.34400
Bacterionhane Oli	CODNA CONT	225	0.00200	-	-	9	0.42400		0.34400
Barne vinite	SEPAIA	230	0.00960		-			-	-
Denne wrus	SSRIVA	13	0.10420	_	-		-		-
BLV	SSRIVA	394	0.00564			1	1 1	_	-
Borna wrus	SSRINA	79	0.02920	_		-	+ +	_	-
Bowne Caliciwrus	SSUNA	95	0.02420	_				_	
Bowne Parvowrus	SSUNA	35	0.06580	_					
Canine Calicivirus	SSRNA	67	0.03450	_	-				
Canine hepatic Adenovirus	dsDNA	265	0.00869			1			-
Cholera phage Kappa	dsDNA	634	0.00363		1	-		-	-
Coliphage 12	SSRNA	310	0.00743	-	-	1			
Coliphage fd	SSDNA	23	0.09940	-				-	1
Coliphage <sub>6</sub> X-174	SSDNA	25	0.09292	1		3	0.71000	4	0.53000
Coliphage lambda	dsDNA	78	0.02953			1			
Coliphage PRD1	dsDNA	20	0.11500	87	0.02650		-		1
Coliphage T1	dsDNA	14	0.16257		1				
Coliphage T2	dsDNA	9	0.25243	1000				_	-
Coliphage T3	dsDNA	10	0.23100	-	1	11 2 13			-
Coliphage T4	dsDNA	13	0.17575		1	A contract of			Number of
Coliphage T7	dsDNA	28	0.08152	1	1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.	7	0.33000	10	0.22000
Coronavirus	ssRNA	21	0.11059			6	0.37700		
Coxsackievirus	SSRNA	81	0.02834			21	0.11100		
Echovirus	SSRNA	83	0.02786						
Encephalomyocarditis virus	SSRNA	55	0.04220				1	-	
Epstein-Barr virus (EBV)	SSDNA	162	0.01420			1			
Equine Herpes virus	dsDNA	25	0.09210			1		1	
Feline Calicivirus (FeCV)	SSRNA	64	0.03610	1.00	1.0	1			-
Friend Murine Leukemia v	SSRNA	320	0.00720						
Frog virus 3	dsDNA	25	0.09210			i			
Hepatitis A virus	dsDNA	66	0.03513			1		-	
Herpes simplex virus Type 1	dsDNA	36	0.06325			1			
Herpes Simplex virus Type 2	dsDNA	35	0.06569	_					
HIV-1	SSRNA	280	0.00822						
HP1c1 phage	dsDNA	40	0.05760						
HTLV-1	SSRNA	20	0.11510	1				-	
Human Cytomegalovirus	dsDNA			93	0.02478				
Influenza A virus	SSRNA	23	0.10103			19	0.11900		
Kemerovo (R-10 strain)	dsRNA	230	0.01000	12			1		
Kilham Rat Virus (paryovirus)	SSDNA	30	0.07650		1 1	1	1	-	
Lipovnik (Lip-91 strain)	dsRNA	299	0.00770	-	1	1	1		
Measles vinis	SSRNA	22	0.10510		-		1 1	_	-
Mengovinis	dsRNA	162	0.01420		1 1		1 1	-	-
THUT MONTHUG	1 10111111	104	U VITEUI						

## **Documented UV Rates**

UV dose to obtain 90% killing rate			UV dose to obtain 90% killing rate		
Bacieria	Dase		Yessex	Dase	k
Bacillus anthracis	45.2	0.051	Bakers' yeast	39	0.060
B. megatherium sp. (spores)	27.3	0.084	Brewers' yeast	33	0.070
B. megatherium sp. (veg.)	13.0	0.178	Common yeast cake	60	0.038
B. parathyphosus	32.0	0.072	Saccharomyces cerevisiae	60	0.038
B. suptilis	71.0	0.032	Saccharomyces ellipsoideus	60	D.038
B. suptilis spores	120.0	0.019	Saccharomyces sp.	80	0.029
Campylobacter jejuni	11.0	0.209			
Clostridium tetani	120.0	0.019			
Corynebacterium diphteriae	33.7	0.069	Hould saures	-	-
Dysentery bacilli	22.0	0.105	Aspereillus flavus	600	0.003
Eberthella typhosa	21.4	0.108	Aspergillus glaucus	440	0.004
Escherichia coli	30.0	0.077	Aspergillus niger	1320	0.0014
Klebsiella terrifani	26.0	0.089	Mucor racemosus A	170	0.013
Legionella pneumophila	9.0	0.256	Mucor racemosus B	170	0.013
Micrococcus candidus	60.5	0.038	Oospora lactis	50	0.046
Micrococcus sphaeroides	100.0	0.023	Penicillium digitatum	440	0.004
Mycobacterium tuberculosis	60.0	0.038	Penicillium expansum	130	0.018
Neisseria catarrhalis	44.0	0.053	Penicillium roqueforti	130	0.018
Phytomonas tumefaciens	44.0	0.053	Bhizopus nigricans	1110	0.002
Pseudomonas aeruginosa	55.0	0.042	the second s	1007	0.000
Pseudomonas fluorescens	35.0	0.065			
Proteus vulgaris	26.4	0.086	(Marca)	-	
Salmonella enteritidis	40.0	0.058	Manual Control of Cont	77	0.035
Salmonella paratyphi	32.0	0.072	Hepaulus A	73	0.032
Salmonella typhimurium	80.0	0.029	MS 2 Collabora	30	0.004
Sarcina lutea	197.0	0.012	P-II-2 Comprise	100	0.012
Seratia marcescens	24.2	0.095	Polici virus	38	0.040
Shigella paradysenteriae	16.3	0.141	Rotavirus	01	0.028
Shigella sonnei	30.0	0.077			
Spirillum rubrum	44.0	0.053			
Staphylococcus albus	18.4	0.126	Protection	1	
Staphylococcus aureus	26.0	0.086	Cryptosporidium parvum	25	0.092
Streptococcus faecalis	44.0	0.052	Giardia lamblia	11	0.209
Streptococcus hemoluticus	21.6	0.106			
Streptococcus lactus	61.5	0.037			
Streptococcus viridans	20.0	0.115			
Sentertidis	40.0	0.057	Algasi		
Vibrio chlolerae (V.comma)	35.0	0.066	Blue Green	3000	0.0008
Yersinia enterocolitica	11.0	0.209	Chlorella vulgaris	120	0.019
Virus			and the second		
Hepatitis A			73 0.032		
Influenza virus			36 0.064		
MS-2 Coliphase			186 0.012		

58

81

Polio virus

Rotavirus

0.040

0.028

![](_page_46_Picture_4.jpeg)

## Ultraviolet purification application information

![](_page_46_Picture_6.jpeg)

Public Health England

\$

BDI/

![](_page_47_Picture_0.jpeg)

## **Technical Information**

Flow rate	120 m³/h				
Noise level	32 dB				
Lamps	n. 4 UV-C tubes 25W G13T8 (7 W UVGI)				
Wavelength	253,7 nm				
Ultraviolet energy	69 μW/cm <sup>2</sup> at 1 m (per lamp)				
UV-C radiation external emission	none				
Equipment	Dustproof filter; Electronic programmer				
Reflectors	Aluminium				
Lamp duration	9000 hours (1 year: 24 hours x 365 dd)				
Germicidal lamp control	Anti UV-C light guide				

Flow rate 120CMH

is low

=

I hour for air change for small room

AiHealthcare

![](_page_47_Picture_8.jpeg)

![](_page_48_Picture_0.jpeg)

# lonisation (Plasma)

Plasma Air technology produces a natural bio-climate rich in positive and negative oxygen ions.

The negative ions contain an extra electron while the positive ions are missing an electron resulting in an unstable condition.

In an effort to restabilize, these bipolar ions seek out atoms and molecules in the air to trade electrons with, effectively neutralizing particulate matter, bacteria and virus cells, odorous gases and aerosols, and VOCs.

![](_page_48_Figure_5.jpeg)

## Woodpecker

![](_page_50_Picture_0.jpeg)

Woodpecker High-pressure Plasma Air Purifier

![](_page_50_Picture_2.jpeg)

Tens of thousands of volts electric field Effective antivirus

![](_page_50_Picture_4.jpeg)

dander

smell

smoke

#### Woodpecker High-pressure Plasma Air Purifier

## Protect your health and the health of your patients.

In the oral diagnosis and treatment, a large number of water mist and aerosols produced in the cavity access, scaling, preparation and teeth separation will float in the air for hours!

Everyone has more than 350 kinds of bacteria in their mouths, and exposure to biological aerosols for a long time will cause infections!

![](_page_50_Picture_9.jpeg)

![](_page_50_Picture_10.jpeg)

![](_page_51_Picture_0.jpeg)

Airdog X5 Non-Filter Air Purifier for Allergy and Asthma,14.6nm/0.0146 microns Level/Beyond HEPA, Ultra Quiet, Washable&Energy-Saving by Airdog ★★★★☆ × 43 ratings

#### Currently unavailable.

We don't know when or if this item will be back in stock.

- CLEAN AIR: Reusable Filter for Allergen, Dust, Pet, Odor, Smoke, Mold and Germ (14.6nm Level Beyond HEPA)
- ECO-FRIENDLY: No Filter Replacement/ Washable
- SMART FEATURES: Smart Design (6 Operating Modes/Child Lock/V-0 Fire Proof Material)
- DESIGNED WITH YOU IN MIND: Low Noise / Build-in Sensor (real-time date)
- EFFECTIVE: Large Room up to 400 Sq Ft

#### □ Report incorrect product information.

#### PUREMATE

Removes 99.97% of airborne allergens and p... PureMate 5 IN 1 Multiple... £139.99 **√prime** 

![](_page_51_Picture_13.jpeg)

Ad feedback 💭

![](_page_52_Picture_0.jpeg)

The woodpecker product is simply a rebadge Airdog domestic air purifier from China and a domestic product.

https://www.amazon.co.uk/Airdog-Non-Filter-Purifier-Washable-Energy-Saving/dp/B06XKW1N23

The filter efficiency which reduces as soon as its used and potential cleaning hazards should be considered.

![](_page_52_Picture_4.jpeg)

![](_page_53_Picture_0.jpeg)

![](_page_54_Picture_0.jpeg)

![](_page_54_Picture_1.jpeg)

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![](_page_55_Picture_0.jpeg)

	99.999% of cont 99.97% of con	aminants 0.12 µm or la taminant particles 0.3 µm Bag Filter Bag Filter -EU5	irger in diameter - ULPA in diameter - HEPA -EU7	Removal of ul	tra-fine particles	
	Rendo	ers inert 99.5% of cor	ntaminants 0.005 μm c	or larger in diameter	–elixair– by GEN	ANO
Settling Time	Minutes	Hour	rs	<1 µm May Never	Settle	
Nanos	5000 nm	2000 nm	500 nm	50 nm	15 nm	5 nm
Microns	5 - 100 µm	2 µm	0.5 µm	0.05 µm	0.015 µm	0.005 µ
	Pollen	Mould	Bacteria	Viruses	DNA	

![](_page_55_Picture_2.jpeg)

www.dentexhealth.co.uk

![](_page_56_Picture_0.jpeg)

# HEPA

The majority of ratings you will suggest 99.95% at 0.3um and greater - this is the typical way of classifying HEPA

Filters according to European Standard EN 1822-1.

All HEPA-rated filters can filter sub-micron particles and this not exclusive to any one particular technology.

Study shows almost any HEPA rated filter will capture sub micron particles such as nCov-19 and other viruses.

![](_page_57_Picture_0.jpeg)

# HEPA

### **Filtration Mechanisms**

![](_page_57_Figure_3.jpeg)

 $\bigcirc$ 

# HEPA

![](_page_58_Figure_2.jpeg)

![](_page_59_Picture_0.jpeg)

# HEPA

COVID-19 is approximately 0.125 micron (125 nanometers) in diameter.

A high-efficiency filter may load with dust and particles requiring more frequent change. If filters are not replaced, this may result in diminish the amount of air supplied into the environment, making the filters less effective.

The HEPA filter does not kill bacteria or viruses it simply collects them and as a result there is colonisation in the filters.

![](_page_60_Picture_0.jpeg)

# HEPA

Filters fitted to remove hazardous substances from the air are classed as hazardous waste and should be handled and disposed of accordingly

(see Health Technical Memorandum 07-01 – 'Safe management of healthcare waste').

https://www.thefirstprinciple.co.uk/single-post/Air-Purifiers-COVID-19

![](_page_61_Picture_0.jpeg)

![](_page_62_Picture_0.jpeg)

![](_page_62_Picture_1.jpeg)

![](_page_62_Picture_2.jpeg)

![](_page_63_Picture_0.jpeg)

#### **Powerful Performance**

The world's only domestic air cleaner that has a classified HEPA filter in accordance with EN 1822. EN 1822 is Europe's most stringent filter test standard for hospital and cleanroom filters.

The world's only domestic air cleaner which is individually tested and certified. Each IQAir HealthPro 100 is supplied with its very own hand-written certificate detailing the model's test results.

Only uses effective and approved filtration technologies (absolutely no ozone generation):

PreMax<sup>™</sup> – Pre-filter features a filter surface of 2.8 m<sup>2</sup>(class F8).

**HyperHEPA**<sup>®</sup> – Filter features a filter surface of 5.0 m<sup>2</sup> of hospital grade HEPA filter media (class H12/13).

Filtration efficiency of  $\geq$  99.97% at  $\geq$  0.3 microns and  $\geq$  99.5% for even the smallest particles (e.g. PM2.5, PM10, ultrafine particles and viruses).

![](_page_63_Picture_8.jpeg)

### Worldwide Reference List

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		1	1

Worldwide Reference List

IQAIr high performance air cleaning systems are used in over 80 countries worldwide in a great variety of indoor environments. The below Rist shows some of the leadth care facilities, government institutions and serporations that have chosen IQAir systems for their air cleaning requirements.

EIAI CERT	DIV .	Cattoritory	- Presently Type
laisth Street Elementary Schon	Gardena	US	Education
A.A. Radiminuv Diamonds (Asia) Ltd.	Hang Kang	HK	Manufacturing
Abacus Research AG	Wittenbach	CH	Engineering (Software
A88 Schweiz AG	Schatthausen .	CH	Mamufacturing
Acroasis - Putmonary Clinic	Athens	GR	Health Care
Acuamed	Madrid	ES	Government
Adidas China	Shanghai	CN	Manufactu/ing
Advance Eve Clinic	Karathi	PK	Health Care
AECID - Agencia Española de Cooperación Internacional para el Desarrollo	Madrid	ES	Government
Agilent Technologies	Berlin	DE	Manufactu/ing
Apriculture, Fisheries and Conservation Department	Hong Keng	HK	Government
Acropherm SA	Tuszyn	PL	Pharmaceutical
Ab Yat Abalone Restaucant	Bangkok	TH	Houpitality
Air Fourse Baseauch Site	Rome NV	18	Research
Al Amai Hospital, Osminny/Hematology Center	Deha	0A	Health Care
Al Jamera Natwork Training Center	Doha	04	Medla
Aliant Chihal Investor China Ind	Hone Knee	Line	Ening
American Consulate General Guanarchau	Guannthou	CN	Covernment
American Franze Services (AFS) Inc.	Reling	CN.	Energy (Ol) Cr
American Energy Services (AES) Inc.	peting	0.4	energy/Or/ods
American School of Dona	Minor	da la	Colication
Amsa S p.a.	mano	u.	Service
Amt für Hachbauten der Madt zurich	Zunen	NO I	Covernment
Analytical Laboratory "Militob"	Lodz	PL.	Besearch
Aneurin Bevan University Health Board	Newport Wates	UK	Health Care
AngeFs Gate Continuation School, San Pedro	Los Angeles, CA	05	Education
Apex International Clinical Research Co. Ltd.	Hong Kong	HK	Besearch
Apolio Hospital	Chennal	N	Health Care
Appleby Hunter Bailhache	Hong Kong	HK	Legal
Aqualia "Gestion imegral del Agua"	Almería	15	Garveniment
AR Baltic Medical UAB	Vilnius	IT.	Manufacturing
Archivo General de Ceuta	Ceuta	E5	Government
Areva Mongol	Ulaanbäatar	MN	Energy / Oil / Gas
Arizona State University (Animal Care)	Mesa, AZ	US	Education & Research
Astrazeneca Investment China Co. Ltd.	Shanghai	CN.	Finance
Aubium University	Auburn, AL	US	Education & Research
Auditorio Municipal "Maestro Padilla"	Almenia	IS	Culture
Augenzentrum Wen (Eye Centre)	Wien	AT	Health Care
Australian Embassy	Ulaanbaatar	MN	Government
Australian Trade Commission	Shanohal	ON I	Government
Austrian Embaury	Belling	CN	Government
Austrian Embassy	Hong Kong	HK	Government
Autoridad Portuaria	Mot/il	ES .	Government
Avalon High School Wilmington	Los Anaries CA	US	Education
Avery Despison Label Min. Inc.	Pasadena CA	115	Manufacturion
AVA Inuirance	Ilainit	1.0	Innicance
Assist ambanto da Almania	Almaria	10	Conservation
Annat and ante de Carboniero	Alimentia	10	Contentionent
Ayuntamiento de Cariboneras Asiando Considerato Registrato Registrato	Renteria.	0	Health Citte
Apenda dapedarela Reparto di Uncologia Pediatrica	Farma	11 110	Freikn Care
Randini Elementary school, san Peoro	Los Angeles, CA	105	Edimation
bangsos bans ruble Company Limited	Bangkok.	18	Pasance
Bank of China	Helei	CN .	Finance
Bank of Communication	Beijing	ON	Finance
Sangue du Liban	Berut	18	Finance
BAST Police Departement	San Etanosco. CA	US	Government
Barton Hill Elementary, San Pedro	Los Angeles, CA	1/5	Education
Base FX	Beijing	CN	Entertainment
Baxter AG	Orth/Donau	AT	Manufacturing
Bay Area Huspital	Coos Bay, OR	125	Health Care
Bayer China	Beijing	CN	Pharmareutical
Bayer China	Shanghal	CN	Health Care
BBC British Broadcasting Corporation	London	UK	Media
BBC Television China	Beling	CN	Media
Beiang Film Academy	Beijing	CN	Entertainment
BELEOD Austra Conhi	Wan	AT	Carvin
Badinar Warrachardisha	Beclin	00	Winter Dissel
actine trassereriege	1 merant	1 DE	Trater suppry

JOAR Clent	City	Count	y Industry Type
Berufsfachschule für biologisch-tecknieche Assistenten	Straubing	DE	Education
Bealities Jimmaitik Kolübü (Premier Division Socter Club)	littinbul	TR	Sports Association
Best Western Hotel "La'di Moret"	Udine	П	Hospitality
Bhagaipur Middos) College and Hospital (BMCH)	Bhagalpur	IN .	Health Care
BHD Italia Szi.	Fiorenzuola D'Arda	n	Manufatzuring
Blamed Instytut Blatechnologii Sarawic i Serzeplanek	Krakow	FL	Research
Blackrock Clinic	Blackrock	Æ	Health Core
Blantyre Adventist Hospital	Biantyre	MW	Health Care
BMW Brillinne	Strenyarig	CN	Manufacturing
6MW Gmup	Briling	CN	Manufacturing
6MW Group	Shanghai	CN	Manufacturing
Boohringer Ingelheim Phorma GmbH & Co, KG	Biberact/Riss	DE	Pharmaceutical
Boeing China Inc.	Seging:	CN	Manufacturing
Boeing China Inc.	Chenada	CN	Manufacturing
Blase State University	Boise 10	US	Education & Research
Spremar Hospital	Seoul	KR	Health Care
Bosch (China) investment Ltd.	Beima	CN	Manufacturing
Roston Consulting Group	Beijung	CN	Consulting
Boston University	Boston MA	US	Education & Research
Botnia Pulos Shanofuli Representative Office	Shanghai	ON	Manufacturing
RP (China) Holdings, Limited	Reison	CN	Enterny / Oil / Gas
Breition Nordic	Data	SE	Manufacturing
British American Tohacco (Holdings) Ltd	Southampton	THE	Manufacturing
Armah American Tribacos Company Pakinan	hismahard	PK	Manufacturing
Rebut American Tabarra 5.4	L hungering	CH	Manufartuina
British International Concell of Busile London	Kings Literation	All	Education
Britan international School of Rulla Lumpur	Kuala Lumpul	NT	Education
broad Avenue cementary school, wilmington	Los Angeles, CA	05	Consultan
projula, rechologias de la imprimación	Parna de Mailorca	0	consulting & Service
sundesamt für säuten	Bern	101	Government
cabrilo Avenue Elementary, San Pelbra	Los Angeles, CA	05	Ensucation
Cabrilo EEC, San Pedro	Los Angoles, CA	US	Education
Carobury Wedel (Microbiology Lab)	Warszawa	PL	Food MBeverages
Cahulla Desert Academy	Coachelia CA	US	Education
Cajo flural intermediterranea	Barcelona	.E5	Finance
Caja Rural intermediterranea	Atmenta	ES.	Finance
Cajir Bural InternetSterritoria	Milliga	ES.	Finance
Caja Rural Intermediterranea	Murcia	ES.	Finance
Cajamar Banco. Oficina de Adra	Almenia	ES	Finance
California Highway Patrol	Sacramenta, CA	US	Government
California State University (CSU)	5an Bernardino, CA	1/5	Education & Research
Canakkale State Hospital	Cannakkale Bogati	TR	Health Care
Canossa Hespital	Hong Kang	HK	Health Care
Capio Medocular	Gotebarg	SE	Health Chre
Capio Mediocular	Jónkapina	SE	Health Care
Cardarelli Hospital	Naples	п	Health Care
Cardiovascolar Research Center	Hanolulu, HI	US	Research
Carlton Singapore Hotel	Singapore	SG	Hospitality
Camer Henry Kong) anded	Hours Dung	HK	Englishment
Carino da Libao	bunkt	10	Leicure
Calino Mutan	Africal	OH	Leisore
Casaro Hym	Restore	Cel .	Lesole
Child Print Inc.	Defing	CN	Madia
Contraction and	being	CR	Health Core
Centraterospital	Guarna	LN	mearch Care
Lenva pospaa	Foznan	PL	Health Care
Centre For Health Protection (CHP)	Hong Kang	HK	Health Care
Centrum Alergologii, Allergy Clinic	Lodz	PL	Health Care
Centrum Pediatria) Onkologia im. Dr. E. Hankego	Choraow	PL	Health Care
(ERN (European Organization for Nuclear Research)	Geneva	-04	Research
Chai Wan Families Clinic	Hong Kong	HK	Health Care
Changi General Nospital	Singapore	SG	Health Care
Charité Berlin, Klinik für Rheumatologie & klinische immunologie	Sector	UE	Health Care
Chartenet Semi-Conductor	Singapure	SG	Electronics & Computer
Cheju National University Hospital	Cheju	KR	Health Care
Chelsea and Westminster Hospital	Londao	UK	Health Care
Chengdu International School	Chengdu	CN	Enfocation
Chester Animal Hospital	Chester, L	US	Veterimacy
Chevron China En	Eletting	CN	Energy / Da / Gas
Chevron Texaco China Energy Co.	Chevendu	CN	Energy/Od/Gas
Children Canoer Hospital	Karachi	PK	Health Care
Childrane Handhal of San Diano	Sao Darm Ct	115	Health Care
China Eve Morental	Mong Keng	UV.	Health Chee
China Ein sector European European	Hong Kang	Chi	Fighting
unina rinamuai rutures tachange	Snanghai	-CN	r stance
Unitia Lite insurance	Beiling.	CN	ruschanice
Cinna Merchants Bank	Beijing	ON	Fillance
uninesische Botschaft in der Schweiz, Wirtschafts-& Handelsabt.	Muri bei Bern	01	Government
Chonbuk National University Hospital	Neonju	KR	Health Care
Channam National University Hospital	Stearul	KR	Health Care
Chonnam National University Hospital	Gwang Ju	KR	Health Care
Chocun University Hospital	Gwang Ju	KR	Health Care

a 2014 The IBAr Draw Note: The presence particular of this us, in its ansats of the usy atomic of a animalie of term is not permitted

c) INTR Pair (QAIr Doug), Male The parents) promotion of this full projection projection projection of a second distance of the parents of the second projection of the second distance of the second second second distance of the second second second second distance of the second second

## https://youtu.be/ZBk8MZRk9UI

EN 1822 Standard. Absolute Filters (EPA, HEPA and ULPA)

EN 1822 Standard. Absolute Filters (EPA, HEPA and ULPA)

Filter Classification

To HEPA and ULPA Filters, the classification is based on Eurovent 4/4 standard which defines 5 types of Filters: EU 10, EU 11, EU 12, EU 13 and EU 14.

https://www.generalfilter.com/en/norms/en-1822/

![](_page_66_Picture_0.jpeg)

# HEPA + UV-C

By combining HEPA with UVC there can be added reassurance towards the efficacy of the unit as well as overall more efficient system design as the HEPA reduces the overall strain on the system.

Without HEPA, particulate matter would continue to circulate as UVC or Ionisation alone cannot remove this.

An important consideration is the intensity of the UVC.

![](_page_67_Picture_0.jpeg)

![](_page_68_Picture_0.jpeg)

![](_page_68_Picture_1.jpeg)

## Meet, Jade.

Surgically Clean Air's Jade Air Purifier is a Medical Grade Air System that is One of the Most Advanced on the Market.It is designed with premium in mind, in its beautiful contemporary styling on the outside, its sophisticated technology on the inside, and its airflow performance throughout.

![](_page_69_Picture_0.jpeg)

## **TESTING METHODOLOGY**

Chamber Air Cleaner Tests were performed for each organism measuring the natural decay rate and the decay rate with the SCA301F operating on medium speed. The method is a modification of the Association of Home Appliance Manufacturers (AHAM) Standard AC-1, "Measuring Performance of Portable Household Electric Cord-Connected Room Air Cleaner".

## **TESTING RESULTS**

The impact of the Surgically Clean Air (SCA301F) is readily visible on the graphs as the decay rate with the unit on significantly decreased in under 15 mins.

## VIRUS 99% REMOVED <15 MINS

![](_page_69_Figure_6.jpeg)

## FUNGUS 99% REMOVED <15 MINS

![](_page_69_Figure_8.jpeg)

## BACTERIA 99% REMOVED <15 MINS

![](_page_69_Figure_10.jpeg)

## 6 STAGE FILTRATION PROCESS:

![](_page_70_Picture_1.jpeg)

![](_page_71_Picture_0.jpeg)

## STAGE 1: ANTI-MICROBIAL PRE-FILTER

![](_page_71_Picture_2.jpeg)

The antimicrobial pre-filter captures and removes large particles before they enter the remaining highly sophisticated filters. Large particles like dust, hair, dirt not only contaminate the air, they can also damage the more sophisticated filters inside your purification unit.


### STAGE 2: DUAL STAGE ELECTRONIC CELL



The dual stage electronic cell creates high voltage static electricity to remove moderately sized dust particles and bacteria. The electronic cell can absorb particles of dust, bacteria ad smog that are smaller in size than that of a single human cell to clear the air of toxins that are harmful to your respiratory system



### STAGE 3: DUAL ACTIVATED CARBON FILTER



Dual activated carbon filter removes chemicals and odours. The carbon filter acts as a molecule sieve that traps and absorbs gases, liquids and vapours



### STAGE 4: POWERFUL DUAL UV-C LIGHTBULBS



The Dual UV-C light bulbs destroy the DNA of micro-organisms such as viruses, bacteria, mould and allergens, rendering them harmless. The unit uses two intensive UV lights that operate at the most effective UV-C wavelength.



### STAGE 5: PHOTOCATALYTIC KILL CHAMBER



The Photocatalytic kill chamber incorporates titanium to help destroy odours, organic chemicals (VOC's), mould, allergens and bacteria. This stage utilises a titanium honeycomb structure that works in conjunction with the UV-C to create a kill chamber that destroys harmful organic chemicals, bacteria and and mould.



### STAGE 6: NEGATIVE ION GENERATOR



The negative ions revitalise and re-energise the air as it leaves the unit. The negative ion generator creates negative ions within the air as it passes through the final stages of filtration. These negative ions help your lungs better absorb clean air into your body leaving you feeling more energised.

### Jade Video



## 3 stages of filtration before the UV 'virus killing stage' happens.

# The potential collection, storage and breeding of harmful particles can be huge.





### Pricing

Units	Price				
1	£1,950				
2-6	£1,800				
7-10	£1,700				
11+	£1,600				

#### Fliters

Hepa £80 Carbon Filter £70 UV Bulb £50







### VK 401

The perfect air purifier and steriliser for medium to large rooms. Combining pre filter, HEPA filter, activated carbon and the reactor cell of 8 super UVC lamps with 40 TiO<sub>2</sub> hexagon filters makes it the ultimate solution for spaces up to 60 square meters.





#### **TEST RESULTS AND REPORTS**

#### Inactivation of major airborne viruses

Kangwon National University (KNU)

Date of test: 2004

#### Coronavirus

To test if the Viruskiller technology could neutralise the virus, it was used a 10<sup>6</sup> Plaque Forming Unit (PFU) of Coronavirus DF2 into a 50ml PBS (liquid solution). The experiment was conducted three times.

The concept of PFU of viruses is equivalent to the concept of bacteria colony formations.

Each of the four viruses tested belongs to one of the four main respiratory virus group types. We therefore can claim 99.9999% efficiency on ALL respiratory viruses

Kind of virus		Quantity of virus used	Results	Remarks		
Polio Virus	Experiment 1	106 PFU/ 100ml	None detection (99.9999%)			
	Experiment 2	10º PFU/ 100ml	None detection (99.9999%)			
	Experiment 3	10º PFU/ 100ml	None detection (99.9999%)			
	Experiment 1	10º TCID <sub>50</sub> / 100ml	None detection (99.9999%)			
Influenza Virus	Experiment 2	10 <sup>6</sup> TCID <sub>50</sub> / 100ml	None detection (99.9999%)	Test by Institute of Medical Science & Department of Microbiology, School of Medicine		
	Experiment 3	10 <sup>6</sup> TCID <sub>50</sub> / 100ml	None detection (99.9999%)			
	Experiment 1	10 <sup>6</sup> TCID <sub>50</sub> / 100ml	None detection (99.9999%)	National Kangwon University		
Adeno Virus	Experiment 2	10 <sup>6</sup> TCID <sub>50</sub> / 100ml	None detection (99.9999%)			
	Experiment 3	10º TCID <sub>50</sub> / 100ml	None detection (99.9999%)			
Corona Virus	Experiment 1	10 <sup>6</sup> PFU/ 50ml	None detection (99.9999%)			
	Experiment 2	106 PFU/ 50ml	None detection (99.9999%)			
	Experiment 3	10 <sup>6</sup> PFU/ 50ml	None detection (99.9999%)			



- Radic8 VK401 air purification is based on 8 UV light (2W) and several filters
- VK401 has both washable and replaceable filters
- Available from Henry Schein (UK)





### **VK401** - wall mounted unit. It should complete a full air exchange in 4-6 minutes. They are also suitable for small/medium sized waiting rooms. It has a flow rate of 141CF/min. They will cover a room up to approximately 60m2.

c£1200

**VK103** - stand alone tower unit with a much higher flow rate (up to 358CF/min) and will cover an area of up to approximately 100m2.

c£2200



www.dentexhealth.co.uk

### Radic8 Video



#### The high-performance AIRVIA Medical Air Purifier



### An innovative design with 360° air intake

The AIRVIA Medical Air Purifier was designed to offer you optimal efficiency. Thanks to its cylindrical shape and its **360° air intake system**, it is both stylish and efficient. The air intake system consists of several concentric ducts and is capable of extracting air **in all directions**, even from a long distance, in order to make it healthier. The air in your room is **quickly and efficiently** refreshed and purified.



#### Eight steps to a purified air

AIRVIA Medical is an **air purification device** that combines eight different technologies to provide you with clean air free of nanoparticles and allergens.





### Dentair by Bryant



### c £900 inc VAT

#### Filter replacement £48 - changing between 6 - 12 months

https://dentexhealthmy.sharepoint.com/:w:/g/per sonal/rahul\_doshi\_dentex\_he alth/EVd8SkT0O3hLgfadSRbCvkBL2vLgbW\_P-0NOZSZg6mpSg?e=OcA09z



- Omnidirectional

- Largest Pre-filter, 67 m2 HEPA surface area (H13) and Active carbon filters, designed to remove particles of 2.5 microns.

- 4 x 5w UVC photocatalytic oxidation chambers with titanium dioxide catalyst

- Anion production (Air Ionisation)

- ReAKT - Reactive Air Kinetic Technology, is a laser monitoring system that detects air quality, and automatically adjusts the parameters of the unit relevant to the size of your room.

- 600m3/h of air flow. This large capacity means that it is suitable for even large surgeries. The average surgery will only require the unit to be running at 20-30% of capacity.

-This means efficient running with minimal noise pollution (<40Db). The unit running at full power is only c 60Db.

- 360 surround air intake with Venturi outlet, giving unparalleled air movement within your surgery

- U.K. assembly and repair facility and 5 year warranty



### Comparison of Options







### Air Filtration

	Novaerus	Photocatalytic Oxidation	UVGI Cleaner	Sanitization Misting	HEPA Filtration	Ozone	Laminar Air Flow	Carbon Filtration
Harmful byproducts	NO	YES <sup>1</sup>	YES <sup>2</sup>	YES	NO	YES <sup>3</sup>	NO	NO
Prevents filter colonization	5	3	4	1	1	1	1	1
24/7 bacteria load reduction	5	3	3	1	5	1	1	5
24/7 viral load reduction	5	3	4	1	1	1	1	1
24/7 fungal & bacterial spores reduction	5	3	4	1	5	1	1	5
24/7 odor & VOC neutralization <sup>4</sup>	5	3	1	1	1	1	1	5
Operating costs for maintenance	LOW	HIGH	HIGH	HIGH	MEDIUM	HIGH	LOW	MEDIUM
Removal of ultra/fine particulates <sup>4</sup>	5	1	1	1	5	1	1	3

I. PCO can produce formaldehyde. 2. At high levels, UV can create noxious gases and is mutagenic. 3. High levels of ozone is unsafe to humans. 4. Defend 1050 only







www.dentexhealth.co.uk

Radic-8 Virus Killer VK-401

IQ Air Clean Room 250

#### SIZE of HEPA COMPARISON





Woodpecker Q3

Radic-8 Virus Killer VK-401 SIZE of CARBON FILTER COMPARISON IQ Air Clean Room 250





www.dentexhealth.co.uk

### Comparisons

### Video of Particulate Test for various Units (Courtesy of Anglian Dental) <u>https://www.youtube.com/watch?v=LaNpeG-TUas</u>



#### Comparison of various Air Filtration Units

#### Some of the data in the next two comparison slides are estimates.

Not all manufactures have been forthcoming about the actual specifics of their units.

It is prudent to probe and verify the data with each manufacturer if considering purchase of a unit.



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IQ Airclean 250 HEPA H13 moves 5.5 m2 (actual) Radic8 VK401 has HEPA (type ??) - c20m2 ??(surface area – not actual ) JADE has HEPA H13 - 55-60m2 (surface area – not actual ) Dentair has HEPA H13 - 67m2 (surface area – not actual )

> Radic8 VK 401 UV-C– perhaps 16w ?? Jade UV-C – 10w Dentair UV-C – 4 x 5w = 20mw

IQ Airclean 250 moves 450 CFM Radic 8 VK401 moves 240 CFM JADE moves 650 CFM Dentair moves 600 CFM

Radic8, Jade, Dentair machines have Ti02

JADE, Dentair has the additional benefit of Negative Ion production





Company	Product	Type	Cartification	IN-C	Pate	Noise	Mount	Manufactured location	Maintenance	Purchase Price (exc
company	Product	Type	Certification	00-0	nate	Noise	Wount	Wanuactured location	Wantenance	VAIJ
GSK Health	Genano 350	Ionisation	N/A	N/A	300 m3/hr	circa. 45 dBA	Floor	Finland	None	£5,200
Woodpecker	Q3	Ionisation	N/A	N/A	340 m3/hr	circa. 50 dBA	Floor	China	None	£600
IQAir	Cleanroom 250	HEPA	5.5m2, EN1822 certified	N/A	450 m3/hr	47 dBA	Floor, castors, wall	Switzerland	Annual filter replacen	£1,199.00
Jenact	GRU-V	UV-C	N/A	2 x 55 Watt lamps	60 m3/hr	50 dBA	Wall, ceiling option	UK	None	£695.00
Bryant	DentAir	Combined	Not specified	4 x 5W lamp	600 m3/hr	circa. 45 dBA	Floor	Not specified	Annual filter replacen	£830
Radic8	VK401	Combined	Not specified	8 x (not specified)	240 m3/hr	circa. 40 dBA	Wall	South Korea	Weekly clean, annual	£1,200
Airvia Pro 150	Airvia Pro 150	Combined	4.3m2	1 x 5W	550 m3/hr	circa. 46 dBA	Floor	China	Monthly clean, annua	£740.83
Surgically clean air	Jade SC5000C	Combined	5.1m2, EN1822 certified	1 x 10 W lamp	650 m3/hr	circa. 40 dBA	Floor	China	Not specified	£1,700.00



### Thoughts for Consideration



Dental aerosol is fluid in the dental lines

#### Intubation aerosol is made of airway mucous and fluids dependant on viral load

# Indirect evidence suggests a small but non-significant benefit

### Risk reduction not mitigation

### Will any of these conform to SOP?

### Will the time between appointments have to follow SOP ?
## Rooms with AGP v Rooms with no AGP

## Records of inspection and maintenance should be kept for five years

## Air quality sampling including microbiological testing may help validate the efficiency of the device

## Patient/ Staff Perception

This information has been prepared by Dentex Healthcare Group Limited as a general guide only and does not constitute advice on any specific matter. We recommend that you seek professional advice before taking action. No liability can be accepted by us for any action taken or not taken as a result of this information.

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