INTEGRUM 3D

Essential tips to know before you buy

EXTRAORAL VACUUM ASPIRATOR (EOVA)

BUYING GUIDE

PureAir Xchange 2000X

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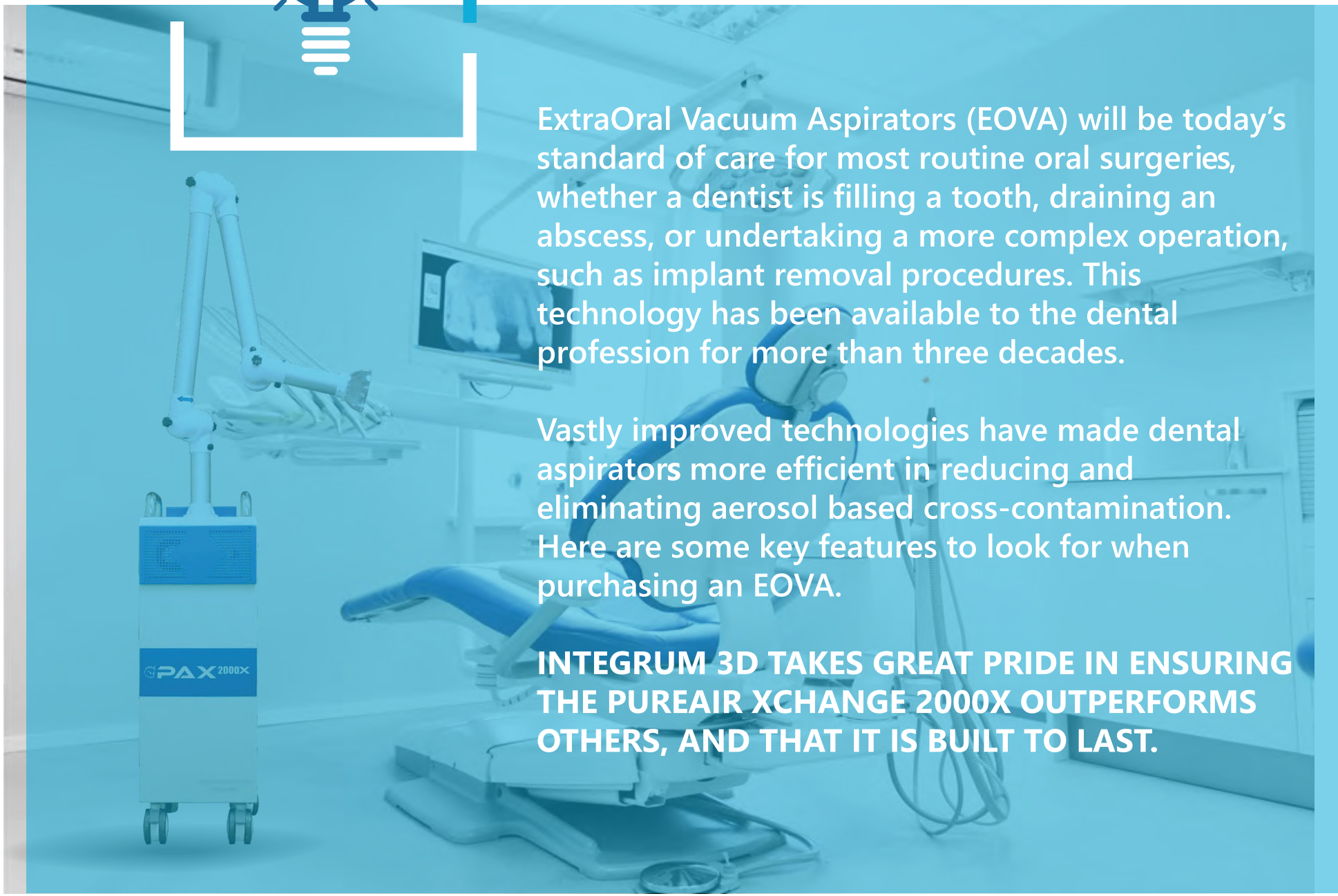
INNOVATION



ExtraOral Vacuum Aspirators (EOVA) will be today's standard of care for most routine oral surgeries, whether a dentist is filling a tooth, draining an abscess, or undertaking a more complex operation, such as implant removal procedures. This technology has been available to the dental profession for more than three decades.

Vastly improved technologies have made dental aspirators more efficient in reducing and eliminating aerosol based cross-contamination. Here are some key features to look for when purchasing an EOVA.

INTEGRUM 3D TAKES GREAT PRIDE IN ENSURING THE PUREAIR XCHANGE 2000X OUTPERFORMS OTHERS, AND THAT IT IS BUILT TO LAST.

TIP #1: POWER

You may wonder how to determine the power when looking for a strong EOVA. Here is a quick guide to help:

- Ampere (amp) is a measure of power coming into the EOVA from your outlet. The maximum number of amps that can be drawn from most office outlet is 12, so look for a motor with a full 12 amps of draw.

- Wattage is what you get when you multiply amps and the voltage draw.

- Air watts is probably the best indicator of an EOVA's power capability because it factors in resistance to suction — if an EOVA shows anything with more than 1000 air watts is a good indication it will have the power you need for aerosol vacuum aspiration.

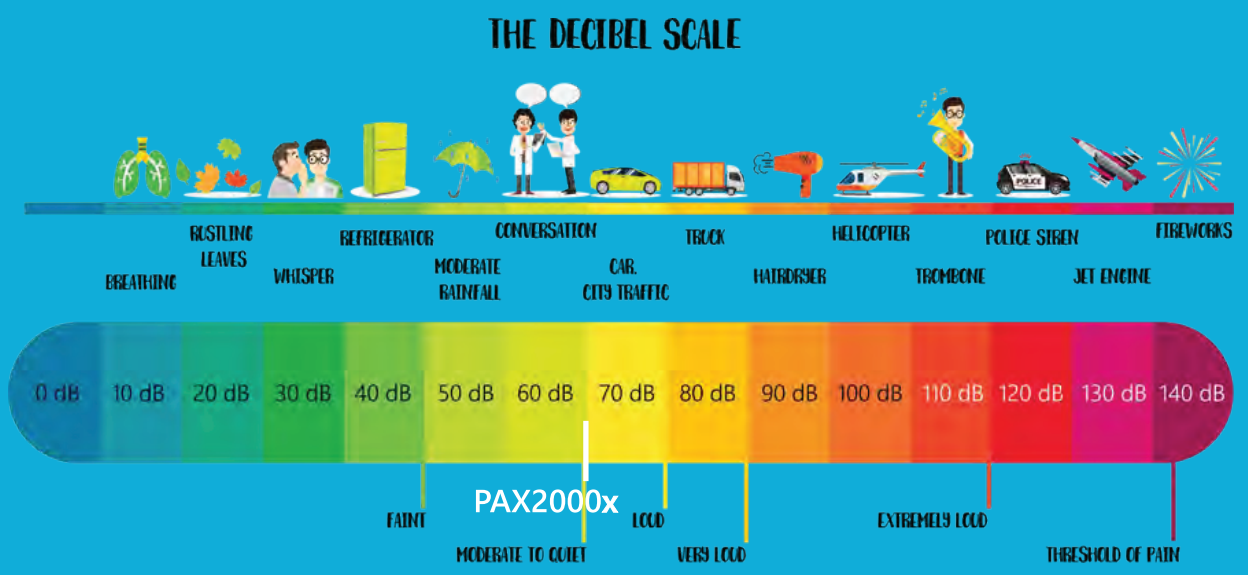
PAX 2000X

Power Supply
220 V

Watts
1600 W

TIP #2: NOISE

The best way to compare noise levels is to check the product specifications or ask an advisor for the decibel level (dB). An EOVA with a decibel level in the 60-**70** dB range will be reasonably quiet. While a vacuum with a decibel level in the 70's **is** comparable to a kitchen garbage disposal.



TIP #3: REMOVING AEROSOLS

Without a strong EOVA suction, cooling spray from fast-running and ultrasonic instruments can cause an aerosol cloud to spread throughout the entire treatment room. An aspirator performance of at least 3000 L/min can result in efficiently reducing the risk of infection. It is important that the spray mist becomes aspirated within the patient's mouth, so that no aerosol can be emitted in the first place; thus, we recommend using the EOVA along with a strong intraoral suction system. Because what does not leave the mouth, does not have to be eliminated afterwards. Thus, using the correct intraoral suction along with an effective EOVA, it makes an important contribution to infection protection for the dentist, the surgery team and the patient.

TIP #4: FILTERS

What is a HEPA filter?

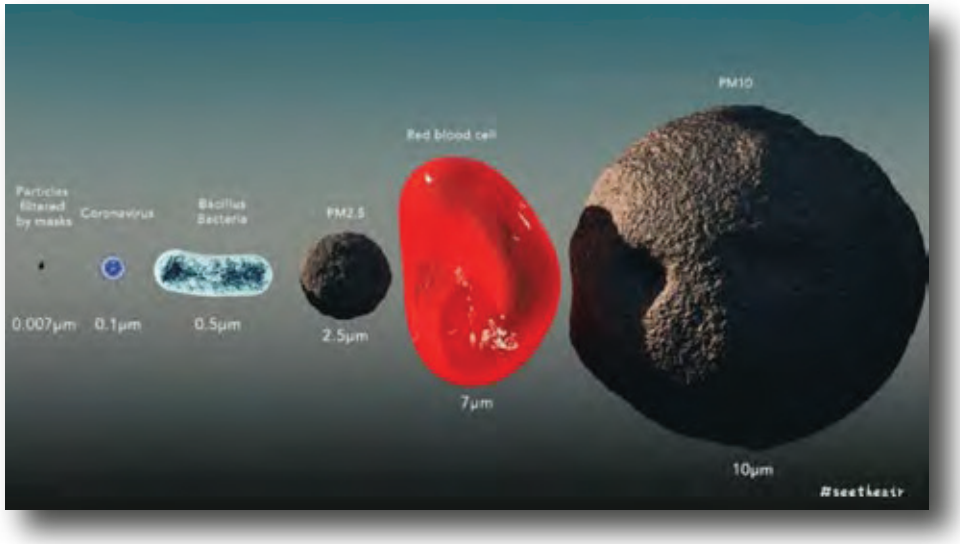
HEPA is a type of pleated mechanical air filter. It is an acronym for "high efficiency particulate air [filter]" (as officially defined by the U.S. Dept. of Energy). This type of air filter can theoretically remove at least 99.97% of dust, pollen, mold, bacteria, and any airborne particles with a size of 0.3 microns (µm). This information was sited and can be found on the US EPA website at www.epa.gov. HEPA filters are made from fiber glass or filter paper and form mini folds to increase the filter surface. It has the ability to retain the microparticles with a scattering effect. It captures particles and slows inertia.

There are different levels of HEPA filters. H14 filters like the one used for the PAX 2000X are the highest grade of HEPA filters and can filter 99.995% down to 0.1 µm particles.

HEPA Filter Grades: (The higher the number following "HEPA", the higher the level of filtration.)

HEPA H14: pass up 0.005% of 0.1 micron particles per liter of air.
HEPA H13: pass up 0.05% of 0.1 micron particles per liter of air.
HEPA H12: pass more than 0.5% of 0.1 micron particles per liter of air.
HEPA H11: pass a maximum of 5% of 0.1 micron particles per liter of air.
HEPA H10: pass more than 15% of 0.1 micron particles per liter of air.

MICRON COMPARISON	
Spores	3 - 40 µm
Mold	3 -12 µm
Bacteria	0.5 - 5 µm
Virus	0.125 - 0.5 µm

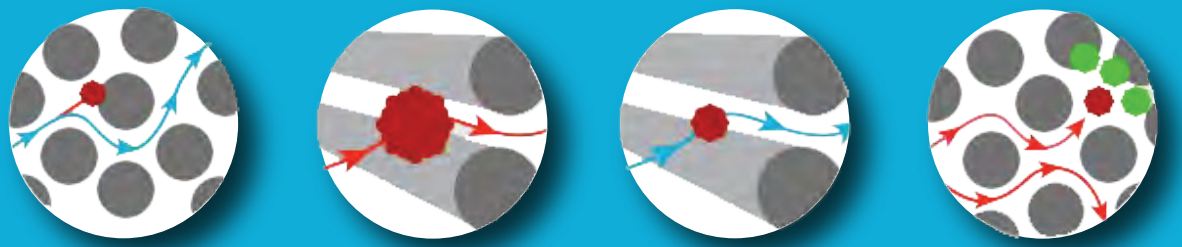


TIP #4: FILTERS (continued)

What are HEPA filters made from and how do they work?

Most modern HEPA filters consist of interlaced glass fibers that are twisted and turned in myriad directions to create a fibrous maze. As particles traverse this web, they are taken out of circulation in the following ways:

- Direct Impaction: Large contaminants, such as certain types of dust, mold, and pollen, travel in a straight path, collide with a fiber, and stick to it.
- Sieving: The air stream carries a particle between two fibers, but the particle is larger than the gap, so it becomes ensnared.
- Interception: Airflow is nimble enough to reroute around fibers, but, thanks to inertia, particles continue their path and stick to the sides of fibers.
- Diffusion: Small, ultra-fine particles move more erratically than larger ones, so they're more likely to hit and stick to fibers.



DIRECT IMPACTION SIEVING INTERCEPTION DIFFUSION

Where are HEPA filters used?

Like in the Manhattan Project, HEPA filters were originally intended to be used in lab and factory settings. Today, they are used in shops, salons and they've also made their way into consumer products, including cars, vacuum cleaners, and—you guessed it—air purifiers. Another place where HEPA filters are found most often is in hospitals. Bio-Medical HEPA grade filters like those found in PAX 2000X suction systems (H14) are a critical item to have for every hospital. A medical grade HEPA filter will be able to filter out 99.995% of all airborne contaminates. Hospitals will also usually install a UV light system with the HEPA filter to kill the other .005% that may make it pass, which can also be found as part of the PAX systems. At any time, airborne contaminates could escape a room in a hospital if they do not have these types of HVAC systems installed. Again, like the PAX systems, they will also have multiple HEPA filters in place not only for clean air throughout the hospital but also for any air that is exhausted outside the hospital. Typical mold and bacteria have a micron size of about 1-5 microns in diameter, so almost every single one of them gets trapped in the filter very easily.

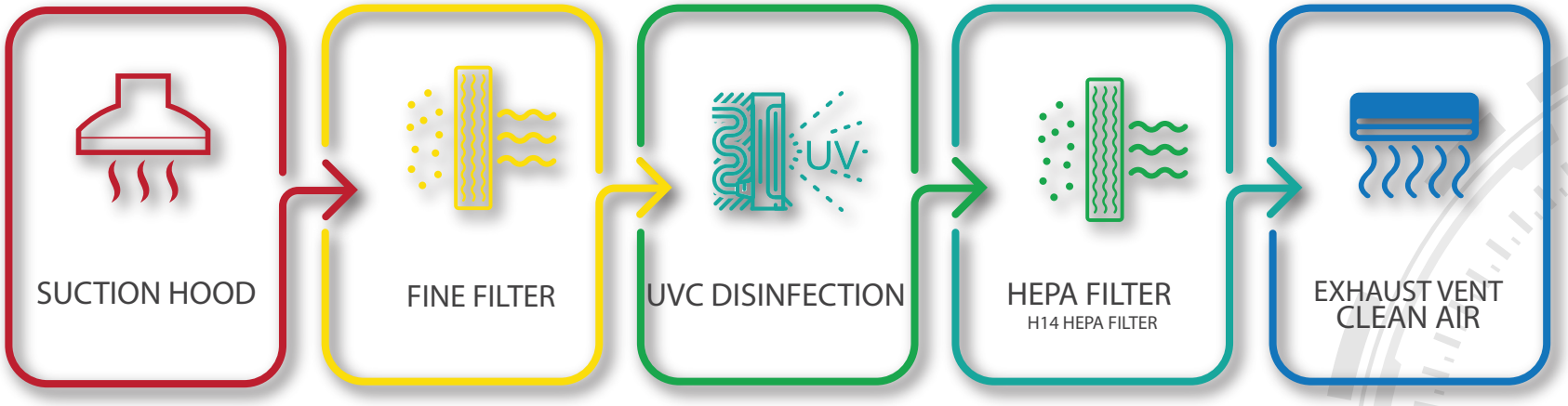
TIP #4: FILTERS (continued)

Not All HEPA Filters Are Created Equal!
HEPA filters are graded as H10, H11, H12, H13 and H14. H14 HEPA filters like the ones found in the PAX2000X are the highest grade filters available. How much air bypasses the filter is important - HEPA tight means that all seals are tight, letting nothing pass by the filter. Below is a list of HEPA filter grades and their filtration efficiency.

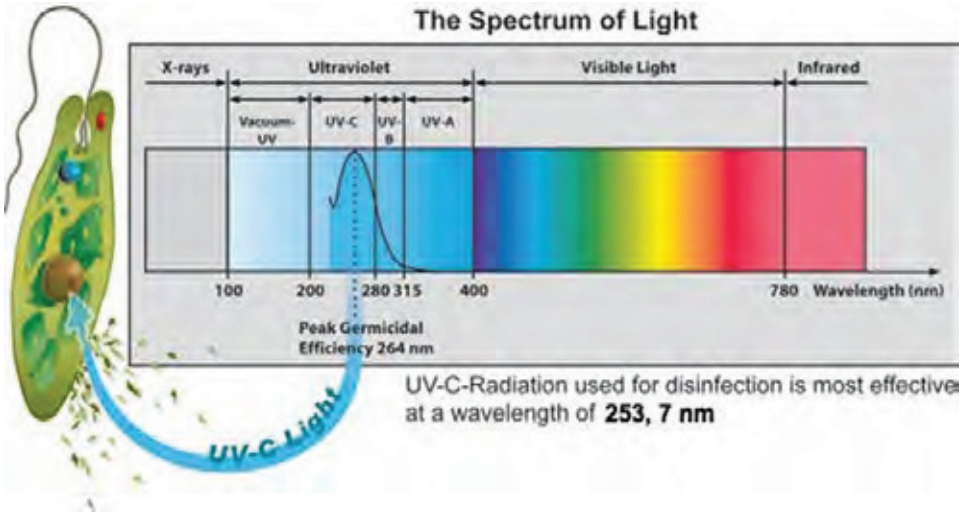
HEPA Grade	Filtration Efficiency
H14	99.995%
H13	99.95%
H12	99.5%
H11	95%
H10	85%

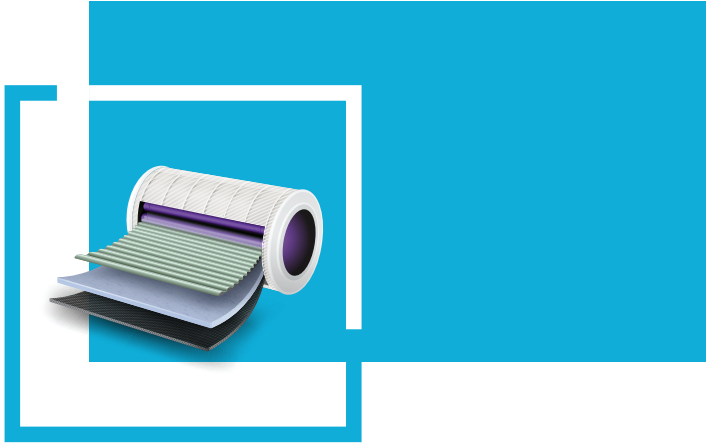
A difference of 0.005% may seem like a small amount, but when we are dealing with such minuscule particles it can make a world of a difference. H14 HEPA filters outperform all the others, including filtering particles as small as 0.1µm.

PAX2000X AIRFLOW



TIP #5: STERILIZATION





What is UV-C?

UV-C is one of many electromagnetic frequencies emanating from the sun. Like other of these waveforms, its properties are unique to its wavelength. To synthesize this frequency, a glass tube is evacuated and refilled with argon at far below atmospheric pressure. Added to this is a small amount of mercury. When the mixture is energized (excited) it creates a glowing plasma of electrons that pass through the mercury vapor. As they strike mercury atoms, a mercury electron is liberated at a frequency representative of mercury's spectral line, which is 253.7nm. The dominant emission (>90%) from these lamps is UV-C energy. The "C" frequency of the electromagnetic UV family has, amongst other things, germicidal effects. This was so important that Westinghouse quickly commercialized the low-pressure mercury vapor "germicidal" lamp in the early 1930's. Its humanitarian value has had worldwide success since.

Is UV-C harmful?

We're exposed to parts of the UV spectrum while outdoors. Generally, excessive UV exposure can produce adverse effects depending on wavelength, type and duration, and UV response differences between individuals.
The three basic wavelengths:

- UV-C - includes the germicidal wavelength of 253.7nm and is used for air and water disinfection. Human overexposure causes temporary skin redness and harsh eye irritation, but no permanent damage, skin cancer, or cataracts.
- UV-B - is a narrower but more dangerous band of UV. Prolonged exposure has been associated with skin cancer, skin aging, and cataracts (clouding of the lens of the eye).
- UV-A - is more predominant outdoors than the other two. It helps to tan our skin and is used in medicine to treat certain skin disorders. It is generally a harmless wavelength. UV-A, B and C will damage collagen fibers and accelerate skin aging. Generally, UV-A is least harmful; UV-B contributes to DNA damage and cancer. It penetrates deeply but does not cause sunburn. Because of no reddening (erythema) it cannot be measured in SPF testing. There's no good clinical measurement of UV-B blocking, but it is important that sunscreens block both UV-A and B. UV-C however, penetrates superficially and has not been associated with long term tissue effects.

TIP #5: STERILIZATION (continues)

How does it affect germs?
Microorganisms are simple organic structures that readily absorb the UV-C wavelength, causing photo-disassociation (destruction). A microbes DNA
(deoxyribonucleic acid, is first to be adversely effected due to its weaker molecular bonds. In hundredths of a second it suffers irreparable damage. The subsequent loss of genetic instructions causes cell death and/or the inability to replicate, rendering them harmless. Continuous exposure causes uninterrupted degradation, such as the sun does, only significantly faster

Does it work?
Yes, scientific and anecdotal references abound for UV-C's efficacy both in literature and in reports of field applications. Of the government reports, NIOSH, OSHA, CDC, GSA, EPA are the most notable. Science in the public forum comes from the University of Cincinnati, Tulsa University, University of Colorado and McGill University (Canada) to name a few.
For microorganisms, the filters goal is to provide a reduction in the total number of viable microbes per "unit volume of air" downstream of it. Fortunately, some filters can also be utilized with UV-C in an approach referred to as "catch and kill". With the proper filter, UV-C can kill and/or degrade what the filter has caught. Thus, for a given microbe and its products, the filters effect can be an integral part of decontaminating a given area.

Historical Use of UV Light for Disinfection

For the past 100 years science has recognized the bactericide effects of the ultraviolet area of the
electromagnetic spectrum. Below are some key contributions over the years:

1855 Arloing and Daclaux demonstrated sunlight killed Bacillus anthracis and Tyrothrix scaber
1877 Downes and Blunt reported bacteria were inactivated by sunlight – violet blue spectrum
most effective
1889 Widmark confirmed UV rays from arc lamps were responsible for inactivation
1892 Geisler used a prism and heliostat to show sunlight and electric arc lamps are lethal to
Bacillus Typhosus
1903 Banard and Morgan determined UV spectrum 226-328 nm is biocidal
1932 Ehris and Noethling isolated biocidal spectrum to 253.7 nm
1957 Riley proves effectiveness for Tb control
1994 CDC acknowledges UV effectiveness for Tb control
1999 WHO recommends UVGI for Tb control

TIP #6: Price

Integrum3D.com

"One stop shop for the PAX systems and all replacement parts"

The PAX2000X is our best performing and most powerful model:

- High 1600w for increased suction power and performance.
- Uses H14 Medical Grade HEPA filters opposed to most systems which use lower performing H13 filters.
- Exceptionally powerful USA-Made Motor.

TIP #7
SERVICE & SUPPORT

- Network of US dealers throughout the States
- US based: Located in sunny city of Orange County, California
- Warranty: 1 year Peace-of-Mind Comprehensive warranty on parts and labor
  - o Optional additional warranty

ASPIRATION TO BE THE BEST

So, here's our TKO: Total Knowledge Offered

The PAX2000X is designed to effectively remove and kill bacteria, viruses, VOCs, odors, and harmful particles. Featuring 1600w of power, H14 HEPA filters, and a USA-made motor, this exceptional system is ideal for keeping providers, patients and staff safe. The PAX2000X is designed to operate continuously for up to 8 hours. So when presented with options to protect you, your patients and staff, you can feel confident in knowing you've been Packed with PAX FACTS.

AN EOVA IS A VITAL PIECE OF EQUIPMENT IN EVERY DENTAL OFFICE. THE RIGHT EOVA DELIVERS CONSISTENT, RELIABLE SUCTION FOR BOTH ROUTINE AND EMERGENCY CARE!

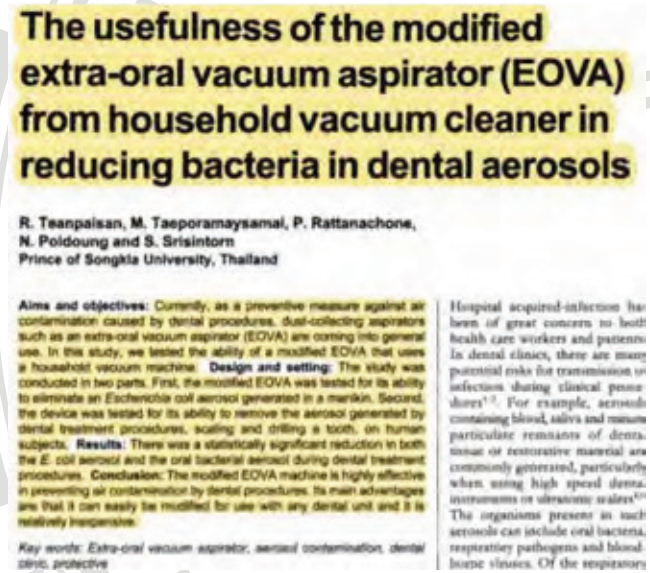
DOCUMENTATION

PUBLISHED BY FDI WORD PRESS
STUDY FROM PRINCE OF SONGKLA UNIVERSITY

Aims and objectives: Currently, as a preventive measure against air contamination caused by dental procedures, dust-collecting aspirators such as an extraoral vacuum aspirator (EOVA) are coming into general use. In this study, we tested the ability of a modified EOVA that uses a household vacuum machine. Design and setting: The study was conducted in tw parts. First, the modified EOVA was tested for its ability to eliminate an Escherichia coli aerosol generated in a manikin. Second, the device was tested for its ability to remove the aerosol generated by dental treatment procedures, scaling and drilling a tooth, on human subjects.

Results: There was a statistically significant reduction in both the E. coli aerosol and the ora bacterial aerosol during dental treatment procedures.

Conclusion: The modified EOVA machine is highly effective in preventing air contamination by dental procedures. Its main advantages are that it can easily be modified for use with any dental unit and it is relatively inexpensive.



The usefulness of the modified extra-oral vacuum aspirator (EOVA) from household vacuum cleaner in reducing bacteria in dental aerosols

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Prince of Songkla University, Thailand

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Key words: Extra-oral vacuum aspirator, aerosol contamination, dental clinic, protective

Hospital acquired-infection has been of great concern to both health care workers and patients. In dental clinics, there are many potential risks for transmission of infection during clinical procedures[1,2]. For example, aerosols containing blood, saliva and minute particulate remnants of dental tissue or restorative material are commonly generated, particularly when using high speed dental instruments or ultrasonic scalers[3,4]. The organisms present in such aerosols can include oral bacteria, respiratory pathogens and blood-borne viruses. Of the respiratory

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