

## How Safe is Your Air?

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Picture from [blog.windycityparrot.com](http://blog.windycityparrot.com)

I plunged into the wild and wonderful world of air cleaners because I was boarding and fostering a lot of birds, besides having my own birds. I knew the health status of my own birds, of course, and I typically knew the health of boarding birds because Wildwood Veterinary Hospital clients owned them, and I would not board a bird unless it had had a recent exam plus a Chlamydia test. If the birds were sick, I knew that beforehand, and could make provisions for proper quarantine and care.

Birds that came to me via Mickaboo Companion Bird Rescue, on the other hand, often were a medical unknown, and so required strict quarantine.

Quarantine at my house involved housing in a separate room. For *true* quarantine, I had to ensure that, as much as possible, airborne pathogens would be removed from the air. This was for the well being of the bird

housed in the quarantine room, and to reduce accidental exposure for any bird housed there later.

Among the airborne pathogens that could be shed by a sick bird are: avian TB (*Mycobacterium avium*), *Chlamydia psittaci*, and the Circoviruses, including Psittacine Beak and Feather Disease. Ambient airborne molds (such as *Aspergillus*), or incidental fumes or smoke, could also negatively affect a bird with a compromised immune system.

My interest in air cleaners and air sterilizers was for the purpose of avian disease control. I was not concerned about airborne allergens for myself, although air cleaners and sterilizers that are medically useful are the good ones, and will help with pollen control as well.

I launched my usual obsessive investigation into these products, reading about manufacturers' claims and a whole host of technical tests. What follows is a brief summary.

## AIR CLEANERS

### Significance of Particle Size

Air cleaners remove small particles from the air, and some can even remove some gasses. Airborne particles are solids or liquid droplets, or a combination of them, suspended in the air. The size of contaminants and particles are measured in microns, a metric unit of measure:

One micron = 1 millionth of a meter (1/1,000,000 meter) or 1/24,500<sup>th</sup> of an inch.

By comparison, a red blood cell is 5 microns in diameter, and the eye can generally see particles greater than 40 microns in size.

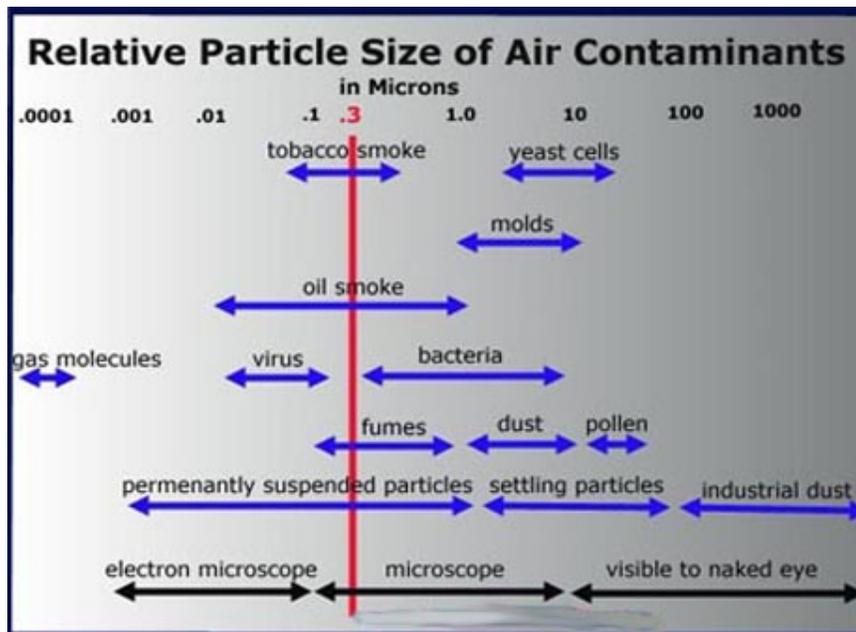
**Large Particles** are those larger than 100 microns -- The larger the particle, the faster it settles out (to the carpet, floor, furniture, walls etc.) and therefore the less likely it is to be filtered out by any air cleaner, unless the cleaner is positioned right next to the source. These include insect debris and room dust. I would expect feather dander to fall into this category.

**Medium Particles** range from 1 – 100 microns. They settle out slowly, and include pollen, hairs, large bacteria, windblown dust and small dust. If airborne, particles of 100 microns or less will enter the nose and mouth. Those that are 10 microns or less will pass through the nose and throat and enter the lungs. Particles less than 2.5 microns in diameter are considered hazardous.

**Small particles** are less than 1 micron. Because of their small size, they stay airborne much longer, and if the air is turbulent they may never settle out, though they can be washed out by rain or water. These include viruses, small bacteria, and most kinds of smoke, fumes and soot. These are the most dangerous as they can penetrate into the gaseous exchange part of the lungs and cause serious disease. On the chart below, they are labelled “Permanently Suspended Particles” to the left of the 0.3 micron red HEPA line because they are smaller than 0.3 microns. Obviously, a cleaner that can remove particles smaller than 0.3 microns will capture more potentially dangerous particles, depending on how the filter is rated.

The chart below, from [www.air-purifier-power.com](http://www.air-purifier-power.com), illustrates the relative sizes of household airborne contaminants.

Many HEPA filter air cleaners say they remove 99% of airborne particles which are 0.3 microns or larger, so the chart uses this as a dividing line. Remember, however, that many larger particles settle out of the air before they ever reach your air cleaner, so good vacuum cleaning and washing of sheets and other fabric, dusting with dust grasping cloths, and good ventilation, are all essential components of capturing large particles out of your air.



Appearances deceive, as gas toxins and fine particulates we cannot see remain airborne.

Note the significant health threats to the left of the red HEPA line.

### How Portable Air Cleaners Remove Airborne Particles

Fans draw air into the machine and through the filters. The size rating of the air cleaner (i.e., 0.3 microns, 0.1 microns, 0.003 microns etc.) speaks to the ability of the filter to capture particles down to that size.

The fan needs to be strong enough, and the machine needs to have sufficient capacity, to draw enough air through fast and hard enough to actually make a difference in the air quality of the room.

This issue of room size is very important to consider in buying an air cleaner - the size of the room that an air cleaner's marketing says it will clean is a generally optimistic statement of what it will do with the fan running at top speed. Since most of us do not run air cleaners at top speed because it is too noisy, it is better to buy one that says it cleans a larger room than the one you want to use it for. (So that inexpensive cleaner that says it cleans a room size of 167 square feet, for example, will in reality clean a closet when operated at medium speed.)

Most machines use mechanical filters to capture particles that are pulled in by the fan. Pleated filters offer more surface area than flat filters. HEPA (“high efficiency particulate air”) filters use an extended surface usually made of submicron glass fibers with a texture similar to blotting paper, and are even better than pleated filters at removing the small particles. Well made cleaners using HEPA filters ensure that the seal is tight so no air escapes around the edges of the filter.

The best machines often have a pre-filter that air goes through before the main filter, which functions to capture larger matter, thus extending the life and efficiency of the main HEPA filter. Some machines have 3-4 filters.

Some machines use electronics to put a charge on particles, causing them to adhere to nearby surfaces (including walls or furniture). They can also produce ozone as a by-product, which is highly toxic. Do not use any air cleaner that says it utilizes or produces ozone. These have been deemed to be dangerous (some of the old Sharp Image cleaners produced ozone).

Some models boast that they kill viruses and other pathogens by also exposing the air to an Ultra Violet ("UV") light. But residential units do not use strong enough lights, nor is the air in front of the UV long enough, to actually function as a disinfectant, so that is mostly marketing fluff.

For an air cleaner to remove any gasses or odors, it has to be equipped with a heavy absorbent material like carbon. This is an additional, separate, feature.

#### Features to Look for When Shopping for an Air Cleaner

1. How small a particle does it remove 99% of in the environment?
2. What is the maximum room size it will clean twice an hour, operating at maximum fan speed?
3. What is the recommended room size it will clean 5 or 6 times an hour, operating at low or medium fan speed?
4. How often do the various filters need to be changed? How much do they cost?
5. A good quality name brand machine from a reputable sales source. Many air cleaners are made in China. They are prone to malfunction, are of poor quality, and are fitted with filters that can be difficult or impossible to replace. This is not a product where generic knock offs are worth the "savings".

#### Places to Shop for Air Cleaners

[www.air-purifier-power.com](http://www.air-purifier-power.com) has detailed and helpful critiques of the major brands. It is not a sales site.

I have bought several air cleaners and air sterilizers from the [Allergy Buyers Club](#). This company does independent expert testing of everything they sell, and they do not sell junk. Their prices are competitive, and there is free shipping. They post a great deal of truly useful information about each product. They also have experienced and helpful staff. I spoke to one of their people during my research and explained that I needed an air cleaner for a medical quarantine room, so I needed something that could clear viruses and bacteria. He told me I needed an IQAir cleaner – it's used in hospitals.

IQAir cleaners take out 99+% of particles down to 0.003 microns in diameter. This is 100 times smaller than most "good" air cleaners, which go down to 0.3 microns. This means that it will capture, for example:

- Chlamydia psittaci - 0.4 – 0.6 microns (highly airborne and contagious)
- Avian Borna Virus - +/- 0.1 microns (though this virus is not airborne and requires close contact)
- Psittacine Beak & Feather Circovirus - 0.003 microns (this virus is extremely contagious, pathogenic, and almost impossible to kill in the environment)
- Molds, dust, pollens, spores

IQ Air Cleaners are expensive (\$800-\$900), but well worth it if you can afford it, in my opinion. They are made in Switzerland.

Other air cleaners that do a good job are: Alen, Austin, Blueair (down to 0.1 microns, made in Sweden), and QuietPure (0.1 microns). I bought Blueair and QuietPure for non-quarantine rooms and am happy with them. They are very quiet, attractive, and do a good job. Austin's tend to be priced a bit lower than the others and still provide good air cleaning.

Sample air cleaners and pricing:



Alen BreatheSmart Fit50 Air Purifier, \$574



Austin Air HealthMate Plus Jr Air Purifier, \$469



Blueair PRO M Air Purifier, \$840

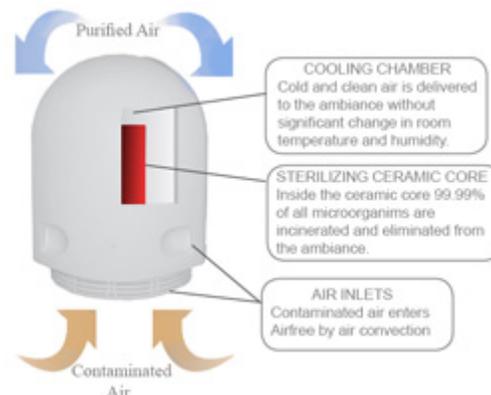


QuietPure Home Air Purifier, \$949

### AIR STERILIZERS

Air sterilizers do not have a fan. They are totally silent, energy efficient, and require no maintenance. They consist of a small furnace inside a heavily insulated casing, which silently draws air in to the bottom by convection, then channels the air up through the 400-degree furnace, allowing the purified air to escape back into the room.

Because there is no fan, they clean more slowly than an air cleaner, so it is good to use both. The Onix Air Free Air Sterilizer (from AllergyBuyerClub.com), made in Portugal, burns up ALL particles (molds, bacteria, viruses etc.), yet uses very little energy so it is cheap to operate. And even though the core furnace is 400 degrees, the insulation is so good that you can comfortably rest your hand on top. If a bird were to land on top of one it would not burn (the item is smooth and round on top, so it does not offer an attractive perch anyway). They turn off automatically if they fall over. I have two of these, and I put one next to the cage of any bird I was concerned about, with the other elsewhere in the room near the IQ Air cleaner. They cost between \$200-300 depending on room size capacity.



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High quality air cleaning is an investment in your birds' health. Personally I felt that this was part of good quarantine procedures, as well as good long-term bird care.