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Opinion Regarding the Safety and Efficacy of AtmosAir Bipolar Ionization:

Firstly, the point is that ions already exist and abound in nature!

Normal healthful unpolluted air typically falls between 300-1000 ions/cm³. In "fresher air" there is approximately 2000-3000 total ions per cu cm, and in air near waterfalls or higher elevations can have as much as 5000 ions/cm³.

In typical urban indoor settings air falls between 200-300 ions/cm³. BPI simply provides a boost in range of ions between 1200 and 1500 ions/cm³ which maintains a fresh air environment, and which provides continuous disinfection.

Secondly there is the matter of Conflation.

There have been numerous investigatory reports on biologic effects that ions, both positive and negative, have on animals and humans. It is clear that many such studies were poorly constructed while others show possible relationship between ions and physiological outcomes without any definitive causal link or connection. In other words, there are no definitive scientifically established associations between charge and moods, diseases, or energy levels or any other bizarre claim. Note: unfortunately, there is **enormous conflation of information** on ozone generators, portable ionic devices (like ionic breeze) and a myriad of others, which either poorly work or do not work at all, in comparison with Whole Building Central BPI systems like AtmosAir, which do, in fact, work.

Thirdly, In addition, AtmosAir equipment is not an ozone device. It has been tested and found to be acceptable in that there is **no significant level of ozone** that has been found. Atmos Air has received UL2998 certification.

Fourth, the Superoxide radical produced by AtmosAir is the main way the human body fights off infection. The superoxide radical (O_2^-) is quantitatively *the most important radical* formed in humans. Human cells constantly produce superoxide as an antibiotic against invading microbes. Superoxide also acts as a signaling molecule, along with NO_2 , to regulate many cellular processes. To reiterate the superoxide radical anion is quantitatively the most important radical formed in human cells (a 70Kg adult synthesizes at least 10 Kg per year). Ninety-eight % of oxygen consumed by respiring mitochondria is converted into water in human cells but the remaining 2% results in superoxide formation as an antibiotic (antimicrobial) against invading microbes. Hence it is natural to the body.

Fifth, it is most important to understand the remarkable difference between **microbial and human cells** and why the effect of ionization is also different on such cells primarily harming microbes but not humans. The answer lies in the differences between bacterial and human cells:

DIFFERENCES BETWEEN BACTERIA VERSUS HUMAN CELLS

	Bacteria	Humans
1.Type of Cell	Procaryotic (primitive)	Eucaryotic (advanced)
2. Mitochondria	ABSENT	PRESENT
3. Cell Walls	PRESENT	ABSENT
4. Ribosomes	70S system	80 S system
5. Nucleus	ABSENT	PRESENT
6. Membrane Bound Nucleus	ABSENT	PRESENT
7. # of Chromosomes	1	MANY
8. Golgi apparatus	ABSENT	PRESENT

9. Plasma Membrane		
with cholesterol	ABSENT	PRESENT
10. Cell Size	1-10 um	10-100 um
11. Number of cells	single cell	Multicellular
12. Endoplasmic		
Reticulum	ABSENT	PRESENT

This is only a partial list of differences and there are others. These differences play a significant role in the different effects that air ionization has on these different cell types. This situation is reminiscent and analogous to the reason why antibiotics primarily act on the bacteria cell but not the human cells when applied properly. The reason is that the reaction displays what is called **selective toxicity** to the more primitive cell type (procaryotes) than to the advanced cell type eucaryotes. And viruses are even more primitive.

Sixth, BPI creates an energy field which produces 4 dioxygen states namely positive and negative ions including: O₂ dioxygen, O₂⁺ dioxygen cation, O₂⁻ superoxide anion, and O₂^{- -} peroxide dianion. Only Superoxide O₂⁻ is the most stable and least reactive oxygen species. When reacting with water it produces hydrated clusters of hydroxyl radicals [OH⁻] which are formed on the surface of microbes, are short lived (half life about 2 seconds) and remove H from the proteins of microbial cell thereby inactivating microbes. This process ultimately produces H₂O as an end product. **Hydroxyls have a half-life of up to 2 seconds.** Hence they do not remain in the air stream as they are produced de novo on surfaces of microbes.

Seventh, the positive ions produced are unstable and they tend to combine with excess negative ions neutralizing them. In the spreadsheet of nature there is always a balance towards net neutrality of particles.

Eighth, The second possible reaction of BPI is that oppositely charged ions cause these reactive particles to attract to other particles, or themselves becoming bigger and heavier, by the **process of agglomeration** which allows them to fall to the ground by gravity thusly taking them out of the breathing

space. Alternatively, the increase in size of particles by agglomeration allows the particles to be better trapped by the filters, which now can remove these larger particles.

Ninth, As far as exposed skin is concerned **BPI does not affect residential normal flora** which is embedded within and below the layer of desquamated (dead) cells, nor does it affect the bulk of our “good” flora, which exists primarily in our intestinal tract.

Tenth, an **addendum in proof** was offered by a human and animal study of the safety of air ionization on humans and animals after the use of ionization equipment for between 4 and 5 years. The study was offered by Dr Hans Hurni of Ciba-Geigy in Basel Switzerland wherein he observed no negative or deleterious effects of ionized air on people or the following animals: mice, rats, guinea pigs, rabbits, cats and dogs (verified by microscopic histologic pathology examination of organs of hundreds of animals).

In addition to the 10 reasons stated above regarding the safety of BPI, I add the following:

The amount of reactive oxygen species (ROS) presented by BPI is relatively small and is controlled. As such the presence of any free radicals may cause only a small change in the redox potential of a cell, and that cells' antioxidant system is stimulated and thereby protects from any ROS damage. That is the normal way we humans prevent any damage. An imbalance between oxidants and antioxidants is the underlying basis for oxidative stress. Oxidative stress can occur when the free radicals are too numerous for antioxidants to adequately neutralize them. Antioxidants counteract the actions of free radicals by donating an electron without destabilizing their structure. Though this stabilization, antioxidants prevent damage to healthy cells. The human body has numerous controls against oxidative stress such as the enzyme superoxide dismutase, vitamins, minerals, etc. Most people get their antioxidants by diet, for example, most fresh fruits and vegetables provide a natural source of antioxidants. In addition, they can also be provided by supplements such as

Vitamin C, E, A, minerals like selenium and other products, like green tea, etc. Also simple exercise stimulates the enzymes that tackle effects of oxidative stress. As an interesting aside, in studies of the nematode *C. elegans*, scientists found a correlation between oxidative stress and increased lifespan. Further studies show that low level exposure to oxidants actually increased lifespan, while increased intracellular ROS actually produced an anti-aging effect! The bottom line here is that as far as I am aware, there is no study showing that controlled levels of BPI ions create any significant negative effect in humans nor are deleterious.”

Sincerely,

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