Air purification indoors is needed

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Scientists around the world are struggling to grasp the impact of air pollution on health. With every study reported there are significant risks and last year the European ESCAPE- study including 100 000 individuals followed for 11 years saw a 13% increased risk for heart problems with every 5 ug/m^3 increase in PM2.5. Although alarming, this finding was not totally unexpected. The real surprise came when the scientists were unable to identify the European recommended level of PM2.5 of 25 ug/m^3 as safe!

For the pregnant women, her fetus and children, the situation is by no means better. Even the comparatively clean air in Stockholm has been found to cause an increased risk for asthma and allergy in the more than 4000 children born in Stockholm and included in the BAMSE study. This study has also shown that the functioning of the lungs become impaired if the baby had been exposed to air pollution from traffic during the first year of life.

All these data are based on ambient air pollution from fine particulate matters but recent research has shown that the ultra-fine particles may be an even greater risk. These particles are less than 100 nano meters in size and generated by the diesel engine. Their nano-size means that the immune system is unable to capture them and they are transported from the lungs via the blood to all organs of the body, including the brain.

What can be done to protect ourselves and our families?

The only air we can control is the indoor air or the air in the car we drive. The problem is that staying indoors is not enough as the indoor air may become even more risky and fine and ultra-fine particles will enter indoors as well. Therefor some sort of air purification is required unless we do what people did 100 years ago - choose to spend time in the mountains or by the sea-side just to recover from air pollution.

An alternative is to install air filtration units at home but these are complex to operate, expensive to run and require regular maintenance. However, Danish researchers has shown that when this high-tech technology was used in homes of 60+ year old healthy people living in Copenhagen, their ability to regulate the blood flow improved already after 48 hours and this improvement was related to a reduction in the ultra-fine particles. Now that we what to target, perhaps there is an alternative to the standard air filtration technique?

Could a controlled electrostatic field operating in the room become an alternative?

This was the question scientists and clinicians working at the University of Plymouth, UK headed by Prof. Karl Rosén asked themselves some 20 years ago. After a combination of basic and applied research studying what happened to the chemistry of the air when electrons were released to generate a negatively charged electrostatic field and tests in schools and offices in the UK and Sweden, the basis was laid for the development of the AirRevival technology by a Swedish company, Neoventor AB working in close collaboration with the researchers.

Electrons may be used for many different purposes. In the body, the role of oxygen is to capture electrons released when energy is generated. In the air, the same thing happens and a small amount of hydrogen peroxide is generated when vapour is added. We produce ourselves H_2O_2 when the immune system has to fight against microorganisms and it could be demonstrated that the AirRevival technology could reduce the bioload of the air by "starving" moulds indoors. Already in the first study in Swedish Daycare centres published in 1999 a more than 60% reduction in particles could be demonstrated by the electrostatic air cleaning (EAC) technology and most importantly, the non-attendance rate was reduced by 55% i.e. the children had less viral infections. Not only was it possible to purify the air from particles generated by the traffic as well as those generated by the activity of the children but is was also possible to reduce the bioload indoors and have healthier children. However, further work on design and documentation on efficacy was required.

This has now been completed in that independent tests has documented the ability of one AirRevival unit applied to a window to produce 96.6 m^3 of air free from the most hazardous 100 nm size particles per hour when the air is circulating. The energy requirement I only 0.6W per unit and the only maintenance required is to wipe the black sooth from the easy to clean (window glass or plastic board) surface on where it sits.

The most important outcome of the work done so far has been the ability of the modern AirRevival technology to achieve the same outcome as previously noted in pre-schools. Recently Karl Rosén and collaborators could demonstrate a reduction in days being sick from 12 to 5 days per year.

A year ago, the Lancet in its editorial on air pollution in China had the closing statement: "Clean air should be the expectation of all, not the luxury of some". It seems as if electrostatic air purification and the AirRevival technology may provide some help.