

Impact of Air Quality on Human Organs – Report January 2020

There have already been a numerous publications and warnings about the impact of air pollution on human health. These include the lung, respiratory diseases and asthma in children.

In recent years, new finding has identified that many other organs in human body are affected by air pollutants. This comes, as a result of an unprecedented number of premature deaths.

Air pollution is directly connected to the diseases of central nervous system (CNS). For example, stroke, Parkinson's disease and neurodevelopment disorders. The Neurodevelopmental disorders are the result of a damage, which affects the growth and development of the brain and CNS.

It includes the disorder of the brain, ability to function the emotion learning, self control and memory. The Attention-Deficit - Hyperactivity Disorder (ADHD) of childhood, mental retardation, Cerebral Palsy, impairment of vision and hearing are also the result of the impact of air pollutants on human health.

The individuals are at risk of mental health consequences of being exposed to air pollution. These are fairly new findings, which are controversial. The recent studies indicate that the exposure to airborne pollutants can result in neurodegenerative disease processes from childhood onwards. This case is more severe, when people are chronically exposed to the pollutant.

The British Heart Foundation (BHF) claims that Particulate Matter - PM_{2.5} and less than 2.5 microns, can enter blood stream and remain there for 3 months. It is responsible for build up of fat, cause blood clots and effects the normal electrical functioning of the heart. It adds, no matter where you live poor air quality affects everyone.

The Alzheimer's society warns that there is a link between air pollution and dementia, Alzheimer and cognitive impairment. The Telegraph recently (November 2019) informed that air pollutant particles may damage the blood vessels in eyes and cause glaucoma leading to blindness, especially, in smoggy areas. This includes red eye and dry eye syndrome.

What constitute air pollutants

Let us now look into the components of Air Pollution. The old types of pollutants have been already identified, but there are some other types that have been named to be the serious cause of much human organ damage, which now

needs to be assessed. The Particulate Matter (PM) and ground level Ozone, which are produced from Nitrogen Dioxide and Volatile Organic Compounds (VOC) are found harmful. The atmospheric PM and some constituents such as Salt (NaCl) are harmless. Other component such as carbon monoxide, sulphur oxide and nitrogen oxide (NOx) are in harmful category. Among these, toxic metals such as vanadium, lead, Nickel, Copper and manganese are harmful components too.

The statement from i News (inews.co.uk) researcher indicate that vehicle brake dust is a major source of air pollution and can weaken the immune system.

The fifth of the total particulate matter and dust is from scraping of the vehicle brake pads. The findings explain that severe presence of tiny particles from roadside is coming from wear and tear on tyres, clutch scrapings and general road dust.

Air pollution in the recent years is responsible for the diseases of the Central Nervous System (CNS). This includes Alzheimer's and Parkinson's disease.

Ultrafine Particles (UFPs) are less than 0.1 micron and these can be produced by internal combustion engines, incinerators and power plants. They can carry soluble organic compounds, oxidised transition metals and they are

dangerous due to not able to be filtered through nose and bronchioles and therefore are able to go deep into the lung and finally into the blood circulation and in all parts of the body.

These fine particles are also responsible for neuroinflammation and neurodegeneration in the CNS system (reference: Journal of Toxicology - hindawi.com).

The Guardian in December 2019 stated that according to a Systematic review of global data, people living with air pollution have higher rate of depression and suicide.

The World Health Organisation (WHO) says that there is a silent public health emergency due to burning fossil fuel in vehicle, home and the industry.

Non exhaust traffic emission

European commission publication states that Particulate Matter generation can be the result of non exhaust emissions. There are particle pollutants, which come from tyres, brake pads and road surface wear. There are other sources, such as clutch and engine wear, abrasion of wheel bearing together with corrosion of street furniture, crash barriers and other materials deposited on the road surface.

The information comes as a result of thorough studies of the air pollutant, which are not related to the vehicle exhaust

emission. These pollutants are in some cases more dangerous than some of the vehicle exhaust emission type. That is, because they have been treated and removed via catalytic converter some of which can now be updated with a new technology, which is added for treatment of almost all pollutant in especially diesel engines vehicles now.

The metal content of brake pads can reach 65% of total mass and the metals are: steel, copper fibres and iron powder. During braking a large frictional heat generation occurs, which results in wear of linings. High concentration of brake wear particles is observed near junctions, crossings and traffic lights as a result of forced decelerations of the vehicles.

Climate Emergency

Climate Emergency requires major changes to overcome damaging pollution level by high reduction in pollutants and waste.

Some international companies now coming with solutions that until now was not possible to pursue. For example, Lithium ion battery recycling is now possible on a 100% basis this new technology is now available to recover. Among these businesses, American Manganese inc. is able to do it successfully. They claim “the recycling of spent lithium-batteries is certainty possible thanks to the new legislation

that aims to combat the environmental threat of disposing spent batteries in landfill or high-heat smelting operation.” The materials that need to be recovered are: Plastic, aluminium and copper and also, from the black mass, lithium, manganese, cobalt and nickel, which are very difficult to recover, but all of them can be recycled.

BBC reported in November 2019 that UK has technology for Zero carbon target and rising to climate change emergency. The report added that the solar power is the possible method to eliminating green house gas emissions in the UK. In January 2020 the report was about carbon neutral target by 2030, by most British cities; it also added that Glasgow is hosting the United Nation climate change Summit in November 2020. The question is how can it be done and how quickly it is possible to meet this target.

Ali Reza Ziarati MSC