



August 2013

Effects of Air Pollution on the Cardiovascular System by Erwin Diener, Ph.D., FRSC

This is the first of a two part series on the effects of air pollution on the cardiovascular and pulmonary systems by Dr. Erwin Diener, Professor Emeritus, Immunology, Faculty of Medicine, University of Alberta

A strong correlation between air pollution of particulate matter (P.M. 1/1000 mm) and heart disease is undisputed. P.M pollution significantly enhances the progression of arterial plaque formation as well as the systemic complications associated with this condition.

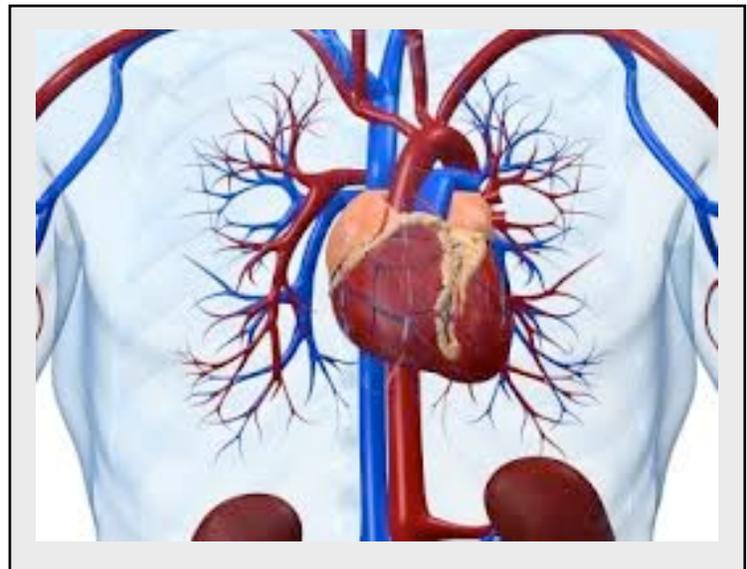
Cholesterol, at high levels considered as bad for the cardiovascular system, is produced by the liver and is required to help stabilize optimal degrees of fluidity and permeability of cell membranes. Cholesterol is the raw material from which cells synthesize steroid hormones like cortisone, estrogen, progesterone, testosterone, etc. Bile is synthesized from cholesterol by the liver. It is also a vital component for the formation of synaptic connections between brain cells....and for much more.

The frequently mentioned relationship between high density lipoproteins (HDL) and low density lipoproteins (LDL) refers to their role as carriers of cholesterol. Conventional wisdom has it that HDLs are considered good, and LDLs are considered bad. This distinction is highly relevant for understanding the risk assessment for cardiovascular disease.

LDL is the vehicle that delivers cholesterol in bulk to all cells in the body. Once the carrier protein has docked at its specific receptor on the cell surface, the cell swallows the entire lot: the transport vehicle

stuck to its receptor together with the delivery goods, the cholesterol.

Quite in contrast to LDL, HDL is the transport vehicle that collects excess LDL from the blood, transporting it to the liver for disposal. Under normal circumstances, the body maintains a subtle balance between demand and supply of cholesterol. Once the demand for cholesterol reaches saturation, cells stop making receptors for LDL. This is the time when HDL becomes active in removing excess LDL from the blood stream.



However, in individuals whose LDL/HDL ratio is tilted in favor of LDL, excess LDL remains in the blood long enough to become oxidized, a process that renders it sticky for arterial walls. The adherence of LDL to arteries of the vascular system, including the brain, marks the beginning of arteriosclerosis, hence the increased risks of heart disease and stroke.

Oxidized LDL also makes its presence known to cells that are members of the immune system, the macrophages. These cells, commonly known as scavengers of dead cells and bacterial debris from inflamed sites, gobble up LDL particles in large numbers. For this reason, they congregate on arterial walls in locations where oxidized LDL plaques are being formed. In doing so, the cells release substances that attract other immune system cells otherwise known to deal with infections. The affected sites become chronically inflamed.

This condition is further aggravated by the release of factors from immune cells that activate the release of platelets which tend to aggregate on sites of arterial inflammation where they set in motion the enzymatic cascade that results in blood clots. The consequences are hardening of the affected arterial wall, obstruction of blood flow, detachment of debris from arterial plaque and release into circulation - events that dramatically increase the probability of serious cardiovascular disease and stroke.

Unfortunately the hydrocarbons carried by particulate matter (P.M.) enhance the progression of arteriosclerosis particularly in persons with a genetic predisposition for the disease for the following reasons:

- *P.M. pollution causes the increases in the production of LDL.*
- *P.M. hydrocarbons ingested along with LDL by plaque-seeking macrophages enhance the recruitment of immunologically active cells to sites of arteriosclerosis.*

- *P.M. hydrocarbons cause the chemical modification of "self", thereby enhancing the inflammatory process associated with arteriosclerosis.*
- *The chemical reactivity of P.M. derived hydrocarbons within the plaque enhances the inflammatory process by the recruitment of immune cells, which release tissue destructive proteases thereby accelerating the destruction of the arterial wall.*
- *There exists a correlation between P.M. pollution and an increased tendency of plaque-rupture, hence increased probability for sudden massive bleeding and thrombosis.*

Burn Wood Efficiently

The Pender Harbour Wildlife Society will host a presentation on how to burn wood efficiently in wood stoves on Tuesday, October 15th at 7:30 pm at the Pender Harbour High School.

Louis Legal, a Director with the Clean Air Society and a retired meteorologist, will give the talk. Fall is coming, and the P.H. Wildlife Society asked if the Clean Air Society might have tips for getting a clean burn with little smoke. Should be a good talk. No charge.



Tobacco Cessation

by Caitlin Etherington,
Regional Tobacco Reduction Coordinator
Vancouver Coastal Health



Smoking in public is a hot issue on the Coast. That is the first lesson Vancouver Coastal Health (VCH) has learned from our smoking bylaw survey – before even reading the feedback! The response has been tremendous – including weekly phone calls with complaints, gratitude, stories and suggestions.

There are two main reasons to push for more restrictive smoking bylaws. The first is second hand smoke, which is unsafe at any level. The second is a shift in culture so it is easier to quit and more likely that young people will not start. The end goal of both is to save lives, the lives of mothers, fathers, children and grandparents. Smoking remains the number one preventable cause of disability and death – stronger bylaws are one of the most effective things we can do to stop it.

Provincial law already bans smoking within three meters of any public building. Many B.C. communities now have “enhanced bylaws” that extend this ban to six meters and/or include all restaurant patios, beaches, parks and trails. VCH’s survey is intended to better understand how Coast residents would feel about similar enhancements. The survey is available at the library, recreation centers and town halls in Gibsons and Sechelt, The Gumboot Café in Roberts Creek and the health center in Pender Harbour.

Now that the data is almost all in, we are looking for Coast residents to join a Tobacco Task Force that will look at next steps. For more information about the survey or the Tobacco Task Force please contact Caitlin Etherington, VCH Regional Tobacco Reduction Coordinator at 604 885 8708 or caitlin.etherington@vch.ca

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<http://cleanaironthecoast.com>

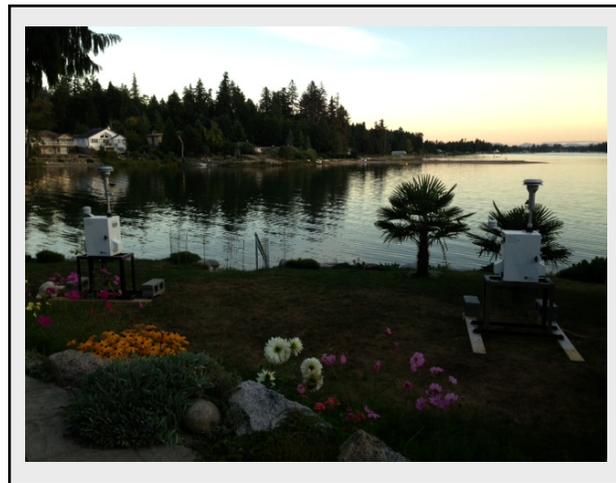
Update on the Air Quality Monitor

by Peter Wooding

We had to replace the dual sensing monitor with two single sensing monitors at the East Porpoise Bay site due to some reliability problems. A bit clumsier but still sensing particulate matter within the same parameters. No changes at the Trail Bay Mall site.

The program looks like it will go through the planned 12 months. No official findings to date and none expected until completion of the analysis of the data following the completion of sampling.

Some increase in particulate matter has been observed during our drier weather but nothing extreme at either site.



Almost a Bylaw

Half Moon Bay almost has a bylaw to prevent back yard burning. This bylaw passed the SCRCD Board of Directors in May of this year. It remains for the Province to approve the bylaw. According to Garry Nohr, Director for Half Moon Bay, approval by the Province should be expected about three months after the SCRCD adopted the bylaw. That could be any day.

So far improving air quality by eliminating or restricting back yard burning has taken effect in Gibsons, Sechelt, and Roberts Creek. Hopefully Half Moon Bay will soon be a community where the air is cleaner.

One goal of the Clean Air Society is to make the Sunshine Coast free of back yard burning thus improving the air we all breathe. More needs to be done to encourage composting and taking green waste to Salish Soils for free by residents in all our communities..

Lawnmower Raffled

In celebration of Clean Air Day this year, the Clean Air Society raffled off a push lawnmower that had been donated by Lee Valley. The winner was drawn from those who entered to win by liking us on our Facebook page.

Push lawnmowers don't add to air pollution, give you another good reason to exercise, and take about the same amount of time as other lawn mowers.



Our Mission Statement:

To educate our community on the importance and benefits of clean air and thus to enhance the quality of life for future generations.