

14 February 2003

Dear Heart:

Another Valentine's Day! Another February! Another Heart Month! But a 'Heart Month' that started with the disintegrating Space Shuttle. With the knowledge that the Shuttle's protective tiles could be damaged at the launch. Damaged to an extent that the vehicle and crew were already doomed to destruction at re-entry.

The loss of the shuttle carries a very relevant message to "Heart Month". Forget about the annual advice of "Don't smoke", "Eat right", and "Be active". That has not PREVENTED Canadians from a yearly increase in obesity, inactivity and arterial disease. Instead think about protective tiles. All human beings - all animals - have protective tiles that line the walls of their arteries. Arteries are supply lines that carry oxygen and nutrients from the heart to every cell in the body including the heart itself. These one cell tiles that line arteries are called "Endothelium". If you were able to strip them away from all the arteries in an adult person you would be carrying 9 pounds of protective tiles!

The lesson for "Heart Month" is that Endothelial tiles are damaged early in the launch of many human lives so that an explosion is inevitable when they enter middle age.

One fifth of these explosions, or Coronary Thromboses/Heart Attacks, results in loss of life and in another two-fifths in inevitable disability. As in the shuttle the damage to human endothelium leads to exposure of the underlying surface, (arterial intima). In humans this leads to the gradual buildup of plaque over the damaged intima with slow blockage of the arterial stream over the intervening years. Just like a sandbar in a river.

Autopsies on twenty year old soldiers - in first-class physical shape - killed in action in Korea and Vietnam showed that many already had advanced artery damage. A famous study in Louisiana, The Bogalusa Heart Study, showed that teenagers killed in accidents already had 60% of their arterial surface damaged if they had smoked cigarettes and had high levels of blood cholesterol or blood pressure. With this type of significant early damage to the artery wall it is inevitable that Arterial Disease will attack the individual in later years.

The cause of damage to endothelium tiles is not so different from the tiles of the Shuttle. The Shuttle has been compared to driving behind a gravel truck that is dinging your car: so is the endothelium exposed to the debris of cigarette smoke, bacteria, viruses, pesticides, chemicals and also molecules formed from unnatural fats created in food processing. However the tiles of the Shuttle were at least created with space in mind. God created endothelial tiles about 200 million years ago: there is very little difference between human endothelium and the endothelium of early insectivore/vegetarian mammals. Even primate apes with identical arteries to ours go back 7.5 million years/300,000 generations. (Overall there is only a 1% genetic difference between human beings and gorillas - who are vegetarian).

Compare that to cigarette smoking 4 generations ago; fast food engineering 2 generations ago; inactivity created by the combustion engine 5 generations ago and you will see that our endothelial tiles have had no chance to reinvent themselves.

One of the difficulties for modern humans lies in our genetic make-up. DNA dating traces us back to an early ancestor in East Africa about 150,000 years/6000 generations ago. Survival of the fittest, (ie. the ones that passed on their genes), in those days required survival on very few calories of food: everything you did not metabolize was stored as neutral fat against foodless days ahead. It also required very efficient wound healing if you were injured and needed to keep up with the group. And very rapid clotting when bleeding from saber-tooth tiger bites. In some cases it also rewarded those who could absorb fat more efficiently: fatty acid is the fuel that human muscles burn when traveling long, slow distances from camp to camp. (Blood sugar is used up in ten seconds and muscle glycogen is used up in a couple of hours - hence "hitting the wall" in a marathon). It also defined our reaction to "stress": raised heart rate and pressure, release of angiotensin, adrenalin and other stressors, increase stomach acid, increased blood clotting etc. All designed to help our brains, hearts and muscles fight or flee. As a Canadian, Hans Selye, proved many years ago our cellular reaction to stress is identical no matter what the cause. A saber-tooth tiger and a bad boss produce the same chemicals. 150,000 years ago we ran away. Today we seethe, damage our endothelial tiles some more, and build sandbars.

Those of us who inherited low-calorie-survival genes are doomed to overweight or obesity because of the huge surplus of high cal sweet, fatty food and fluid available today. Overweight is a fat storage disease created by an inherited genetic chemistry. Our only course is to go hungry much of the time or workout for HOURS every day. Of those who do become overweight, (see Body Mass Index below), 25% will go on to develop sugar impairment and then diabetes. Diabetes accelerates the damage to the artery wall tiles more than all the other risk factors combined.

Those who inherited accelerated wound healing will create excess plaque around damaged tiles. Those who inherited bloodless lacerations will form blood clots too easily and add to the plaque deposits. And those who absorb fat so efficiently will have high levels of fatty acid which travels in your blood as triglyceride and from which "bad" artery-hardening cholesterol, or Low Density Lipoprotein Cholesterol (LDLC) is made which helps to form the sandbar.

To put it simply if you smoke cigarettes when you are young - subjecting your endothelial tiles to driving behind a gravel truck with a Kalschnikof automatic rifle firing from the tailboard - and your genes express one of more of the above: then your shuttle is on schedule to explode with the stresses of middle age.

Unlike the shuttle you can abort the trip and land somewhere else. Many people do this at the first sign of arterial disease - usually chest pain - by having the sandbars removed from their arteries by By-pass Graft Surgery or Balloon Angioplasty. Others find out in middle age that they are at high risk and start on a pill, called a statin, that pushes LDL Cholesterol out of their bloodstreams through the liver. And/or start on low-dose aspirin every night to prevent clot formation and lower blood pressure. And/or start on an antihypertensive pill that further reduces the stress on the damaged artery. And/or start vitamin B supplements especially B6 B12 and folic acid which reduce some of the other chemical debris in the bloodstream. And/or start brisk walking for 45 minutes a day which does all of the above just as it did when you were fleeing from the saber tooth tiger.

These "after the event" initiatives have definitely reduced the level of Cardiovascular Disease in Ontario in the last 25 years. But 75% of this reduction has been in secondary prevention: CPR, paramedics, PAD defibrillators in fire-engines, ER clot-busters, ICU drugs, cardiac rehab., surgery, lifelong "heartpills". And at quite a cost: Cardiovascular Disease costs Canadian taxpayers \$20 billion a year which is 15 ½% of the total health care budget. That represents \$300 million a year to the Niagara Health System. With the development of newer non-invasive imaging such as Myocardial Perfusion Scanning and Cardiovascular MRI the demands for invasive surgical corrections on younger, asymptomatic individuals is going to escalate to an even more expensive level in a few years.

Yet the number of FIRST - TIME 'heart attacks' / coronary thromboses in Niagara Hospitals have continued to rise since Heart Niagara started keeping figures 25 years ago. And the ages of referrals to the Heart Niagara Cardiac Rehab programme are younger each year. So all the money you donated to 'Heart Month' in the past 25 years has certainly come to your rescue once you fell into the coronary stream. But it has not stopped you from picnicking at the brink on your living room couch with chicken wings and cigarettes.

This is not surprising when you look at the Niagara Schools' Healthy Heart Project. This Grade 9 partnership of Heart Niagara with the School Boards, The Regional Health Unit and Brock University was started in 1987 to give adolescents and their parents enough awareness of their genetic makeup to help them choose the correct behaviours to ensure future heart and artery health. Grade 9 was chosen because it was the last year of mandatory Phys Ed but we quickly found out that the process should begin years earlier: at present the project is in Grade 7 to 9.

Over the last 15 years Niagara children entering Grade 9 have become more overweight, less active, less fit and have higher blood pressures and blood cholesterols. Without the sort of intervention that the Schools' Healthy Heart Project provides our children will be doomed to increasing cardiovascular disease in the years to come.

Many surveys of 'Heart Health' express dismay at the low scores demonstrated by Ontario adults on what causes Heart Disease. Why the dismay? Ontario adults would probably score about the same on causes of myxomatosis in bats!! We assume that people will pick up correct information on health issues by some form of osmosis. Even though most of what they receive as adults is ambiguous, contradictory and often delivered by agencies with very self-serving interests.

It has been shown that very young children (7-9) can be smoke-proofed against later school peer pressure to smoke cigarettes. Yet every child asks, "Well you're a grown-up why do you allow it to be sold?" There seems no difficulty in controlling the sale of beer; it would be a lot easier to smoke-proof children if we also controlled the sale of cigarettes. Not put it in the same store as the candy bars and the pop and the comics. But Government seems quite prepared to go on backing cigarette sales. Even the gesture of including Zyban or Nicotine Replacement Systems on the Drug Benefits Programme would show some commitment to the need to treat this addiction: especially to low income victims of the disease.

There is only one group in the community who do not have established arterial disease: Children! And there is only one group who are 100% available for vaccination with behavioral change: Children! And there is only one group who are provided with built-in professional educators, and youth connection nurses, trained to deliver unambiguous, research based facts on heart health issues: Children. And there is only one group who can enroll young parents: Children!

For many individuals - especially in the higher risk, lower socioeconomic groups - their school years are the last opportunity they have to acquire information about their own 'heart health'. That is until, decades later, if and when they survive a 'Heart Attack'. Even if the efforts of Heart Niagara to acquaint children with their genetic and physical make-up produces a reduction in CVD in the Niagara Region we will not see that reduction for another 20 years. Today's 'heart attacks' are in the graduating classes of the '60s and 70s who never heard of the word CHOLESTEROL at school.

Much attention is paid to gene mapping in the near future. While establishing a risk for Breast Cancer requires a single gene; genetic risk for CVD is convoluted that it may not tell us more than we are able to get from physical measurements and blood tests that are available at the present time. (See Blood Tests with Genetic Implications).

The bottom line of all this is that many of today's Canadians were designed for a lifestyle that was last available at the end of the 19th Century. Their cellular metabolism is not equipped to deal with 21st Century stress and pollution. To avoid arterial disease they need to take antidotes to cellular poisons from an early age. Aspirin as an antidote to clotting; drugs called statins as antidotes to blood cholesterol; ACE inhibitors drugs as antidotes to angiotensin: but starting them in our twenties, not our sixties! The other antidote to endothelial tile damage is vigorous activity: just keeping your fitness level above 8 METS halves the risk of coronary explosions compared to fitness levels below 5 METS (see METS and activity).

Our society appears to have 3 options:

- Keep on advising people every February to stop smoking, eat right and be active **and pay an increasingly expensive bill for CVD**
- Outlaw the sale of cigarettes and adulterated food; legislate the dairy industry back to grazing and free-range; make activity a mandatory part of the workforce, Welfare, and SOcial benefits. Pay for all smoker and all overweight and inactive people to receive free aspirin and statins. **Through attractive to some, this is not a practical option.**
- Build heart health into the elementary and high school curriculum including genetic and physical assessment for children and parents. Make the individual choose a 45 minute recreational activity program mandatory in every school day. Provide smoking cessation counselors for each high school. Include outcome reviews in high school to assess what works and what does not work.

Heart Niagara, the Niagara Regional Health Unit and many of the physical education teachers in the Niagara District School Board and the Niagara Separate School Board would strongly endorse OPTION THREE!!! Heart Niagara at present has to raise all the funds to maintain this project, (from donations which are few and from fund-raising events which burn up even the most dedicated volunteers). For the government to fund the Niagara Schools' Healthy Heart Project top to bottom would cost about \$100 000 per year. \$100 000 of preventative medicine set against a present NHS expenditure of \$300 million per year. Or \$2 million province-wide set against an annual expenditure of \$5.5 BILLION on CVD: 2% of the gross domestic product!!

At a critical time for those looking for good long term investments: Option Three looks like a promising choice.

Dr. Stafford W. Dobbin
Medical Director