

## The Dangers of High Blood Glucose

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In a previous article, I discussed some of the myths associated with “high” cholesterol. This was just a snapshot of the evidence stacked up against the idea that cholesterol causes heart disease.

With so much focus on cholesterol, our blood glucose levels have shot through the roof. In this article, I will explain some of the reasons why this increase in blood glucose should be of more concern to us and our clients than cholesterol. I will highlight important studies from the medical literature and explain some of the mechanisms by which high blood glucose causes cardiovascular disease.

All of science is governed by a basic scientific process: a hypothesis is proposed and this hypothesis is tested in order to determine if it is true or not. The cholesterol hypothesis has become more complex in recent years, but in essence, it is proposed that people who have an increased cholesterol level are more likely to develop heart disease.

Whenever we test the cholesterol hypothesis, we find it to be false.

For example:

- The UK has one of the highest rates of heart disease in the world<sup>1</sup>, but the average cholesterol level for women in the UK is the 12th lowest on a scale of 45 European countries; a similar pattern is found for men in the UK, who are the 15th lowest on the same scale<sup>2</sup>.
- Men in Glasgow have lower cholesterol levels than men in Switzerland, but the rate of heart attacks in Glasgow is more than two and a half times greater.
- Between 1994 and 2006, the percentage of men in the UK aged 65 to 74 with “high” cholesterol decreased from 87 to 54 percent (2). Despite this, the rate of heart disease for this age group stayed about the same<sup>3</sup>.

In addition, a study published in the *Journal of the American Medical Association* analyzed the data for 122,458 patients enrolled in 14 international clinical trials<sup>4</sup>. The authors compared the frequency of various risk factors in people who had heart disease. They found that only 39 percent of all men and 34 percent of all women who had heart disease had “high” cholesterol or high triglycerides. If cholesterol was assessed independently of triglycerides, this percentage is likely to be even smaller.

If we look at the data provided in the above study for different age groups, we can also see that just 20 percent of men aged 75 years and above with heart disease had “high” cholesterol. This shows that most people who have heart disease have an average or a low cholesterol level, not “high” cholesterol.

Yes, many other factors most certainly have a role to play, but cholesterol is the main focus of global efforts to reduce heart disease, and around US\$29 billion is spent each year on lowering cholesterol. If “high” cholesterol really is as dangerous as we are led to believe, then surely we would see at least some correlation with the rate of heart disease.

There is much more evidence against the cholesterol hypothesis. However, I would like to now turn this discussion to something that is in fact a real and significant risk factor for heart disease: blood glucose.

The medical literature provides an abundance of evidence to show that high blood glucose causes cardiovascular disease. Commercial interests in the cholesterol hypothesis have prevented this information from reaching us and our clients, and this information also provides a significant challenge to the prevailing dietary advice.

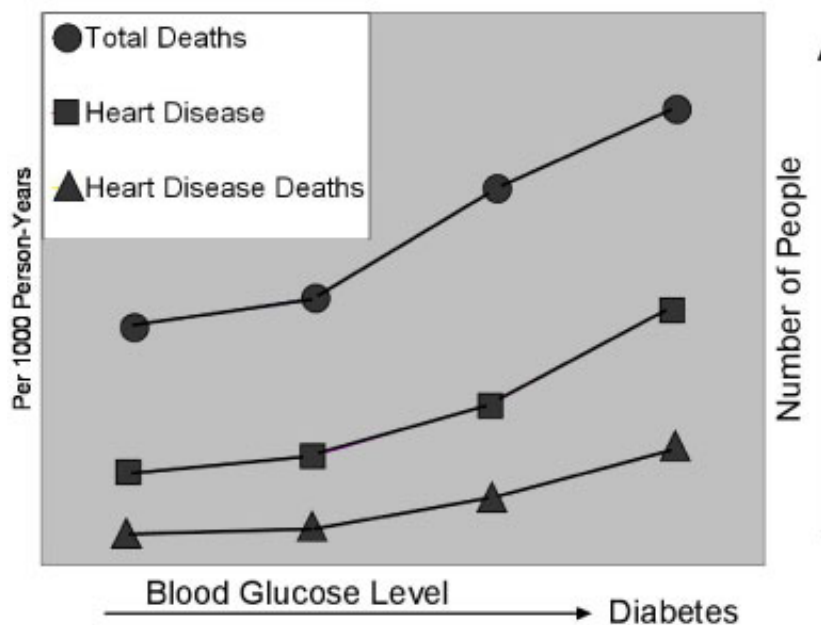
Most readers will be aware that the presence of diabetes (a condition characterized by high blood glucose) increases the risk for cardiovascular disease. For example, women in the UK with diabetes are three to five times more likely to have heart disease than the general population<sup>5</sup>. However, of particular significance is the fact that high blood glucose increases the risk for cardiovascular disease in people who do not have diabetes as well as those who do have diabetes<sup>6-17</sup>.

A study published in *The Lancet* in 2006 collated data on blood glucose and cardiovascular disease from 52 countries. In addition to the 959,000 deaths directly assigned to diabetes, 1,490,000 deaths from heart disease and 709,000 deaths from stroke were attributable to high blood glucose. The total number of deaths related to higher than optimum blood glucose was comparable to the number of deaths from smoking<sup>13</sup>.

Another investigation found that high blood glucose levels (still lower than the threshold for a diagnosis of diabetes) are associated with a 27 percent greater risk for cardiovascular disease<sup>12</sup>.

High blood glucose kills people. A study published in the journal *Diabetes Care* included a national sample of 3,092 American adults. After the 16 year follow up period, people with high blood glucose had a two-fold increased risk of dying. High blood glucose increased the death rate for all causes and cardiovascular causes<sup>7</sup>.

Overall, there is an almost linear progression in the risk for heart disease, cardiovascular disease and death as blood glucose levels increase<sup>15,16</sup>. This is illustrated in Figure 1, which shows the effects of increasing blood glucose levels on heart disease, heart disease death rate and total death rate from all causes<sup>15</sup>.



**Figure 1**

### A Current Problem

This evidence concerning the risks associated with high blood glucose is extremely important. Many countries have changed their diet in line with recommendations based on the food pyramid (a low fat/high carbohydrate based diet). For example, in the UK, there have been significant reductions in the amount of fat that is eaten and an increase in carbohydrate. One of the most striking changes is associated with a huge increase in the amount of pasta, rice and other cereals that are eaten. These foods have a high glycemic index and cause blood glucose levels to rise rapidly. The consumption of these foods went from an average of 236 grams per week in 1987 to 507 grams per week in 2001<sup>18</sup>.

In 2009, the consumption of grains and cereals is likely to be even higher than in 2001.

These dietary changes cause the glycemic load of our diet to be much higher than it ever was before. The consequence can only be higher blood glucose levels and an increased risk for cardiovascular disease in the general population.

It is ironic that the low fat/high carbohydrate diet has been chosen to prevent many of the things that it actually causes.

### Heart Disease

There is direct evidence that high blood glucose can cause cardiovascular disease. The same cannot be said about cholesterol. The idea that cholesterol causes heart disease is just that, an idea, and this idea has not been proven. On the other hand, high levels of blood glucose are known to cause damage to the arteries and blood vessels.

Our blood vessels and arteries are dynamic. They are in a constant state of change and adapt to the demands that are put upon them. The changes that occur are controlled by endothelial cells. These cells line the inside wall of the blood vessels and arteries and perform a wide range of different tasks. They generally keep everything within vessels and arteries balanced and under control. The presence of too much glucose in the blood can actually impair the normal functioning of the endothelial cells<sup>19-23</sup>. In particular, high blood glucose can prevent blood vessels from dilating (widening). This, of course, has very important implications for the flow of blood and oxygen through the blood vessels to the heart.

Endothelial cells synthesize a substance called nitric oxide. This substance actually causes blood vessels to widen so that blood can flow through more easily<sup>20</sup>. High levels of blood glucose can actually inhibit the ability of endothelial cells to manufacture nitric oxide<sup>20, 22, 23</sup>. Furthermore, nitric oxide is also involved in a number of other functions that protect against heart disease<sup>20</sup>.

Overall, problems with the functioning of endothelial cells form a key step in the progression of heart disease<sup>23</sup>. It is well established that people with diabetes have an impaired endothelial cell function<sup>24</sup>, but studies have also shown that these problems can occur in people who have just slightly high blood glucose levels, considerably lower than the levels associated with diabetes<sup>23</sup>.

### What to Do About It

If the level of blood glucose drops below 40 mg/dl (or 2.2 mmol/l), coma, seizure or death can occur<sup>25</sup>. Less severe low levels of blood glucose are associated with adrenal fatigue and a range of undesirable physical symptoms.

On the other hand, levels exceeding about 180 mg/dl (or 10 mmol/l) are associated with kidney failure<sup>25</sup>.

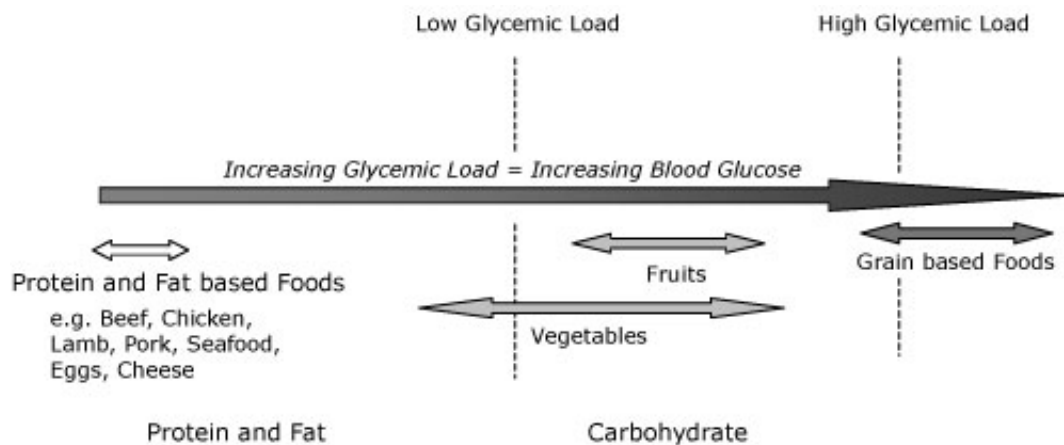
It is clear that the amount of glucose in the blood stream has to be regulated as a priority. The best way to facilitate the body in its efforts to do this is to match the macronutrient ratio to each individual person's metabolism.

Many readers will be familiar with the glycemic index (GI) diet, a nutrition program based on selecting carbohydrates that have a lower GI value.

A number of diet books and cook books have been written for the GI diet, one of the more popular ones has been written by Rick Gallop<sup>26</sup>. In some ways, the GI diet is a step in the right direction. However, there are serious limitations with it.

The most significant problem is that the GI diet promotes a low fat diet that is very high in carbohydrate. Choosing carbohydrates that have a lower GI value can help to reduce blood glucose levels, but for many people, the only way to gain control over their blood glucose levels is to reduce their overall carbohydrate intake and consume more protein and fat. Figure 2 provides an overall representation of the effects that different food groups have on blood glucose levels<sup>27</sup>.

Substituting one carbohydrate based food for another type of carbohydrate that has a lower GI value is helpful, but increasing the intake of protein and fat based foods has much more of a desirable effect of stabilizing blood glucose.



**Figure 2**

Different people will react very differently to the same amount of carbohydrate in a meal due to differences in intermediary metabolism. It is a simple fact that each person has his own unique metabolic individuality. Therefore, each person must establish his own correct "mix" of carbohydrate, protein and fat. This can best be achieved through metabolic typing.

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