

HEALING HONEY

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A Natural Remedy for
Better Health and Wellness

Dr. Lynne Chepulis



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*Healing Honey:
A Natural Remedy for Better Health and Wellness*

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About the Author

Lynne is a Nutrition Scientist who has been researching the health benefits of honey and other natural foods for nearly 15 years, and has amassed a number of publications in this area. She has worked with the Honey Research Unit at Waikato University in New Zealand for several years, during which she investigated the effects that honey can have on different aspects of health as compared to other sugars. Currently Lynne lives in Hamilton, New Zealand with her husband and daughter.

Foreword

After spending nearly 15 years, on and off, researching the health properties of honey, I came to realise that there is a lot of valuable, health-related information that is simply not reaching the public domain. This information could be useful, and even life changing, for many people, especially given the way that most of us seem to put little thought and effort into our every day health.

The role of a scientist is to come up with a good idea, to investigate that idea, and then to somehow get the results of that research out into the Scientific arena. Generally, this is achieved through publication in peer-reviewed journals. It can be a lengthy process, though, and only research that has been carried out thoroughly and is well written is generally accepted and published. However, unless the work involves something that is of general interest at the time, or it is particularly ground-breaking (like the cure for cancer or the common cold might be!) it tends to not get much attention from the more common media like newspapers and magazines. Because of this, a lot of the information that is accumulated in the scientific community never makes it out into the real world.

That said, there is generally a commercial aspect to science research these days, and very little is done purely for interest's sake alone. Instead, scientists often have to undergo lengthy and time consuming processes (involving lots of paperwork and red tape), fully justifying why the research should be done, and therefore why it should be funded (bearing in mind that research on even simple measures can literally costs 10's to 100's of thousands of dollars, especially if it involves animals or clinical trials). For this reason, the large companies that fund research (including drug companies and food manufacturers) often "sit" on the findings and results, instead using it for their

own commercial gain by producing products (including drugs and foods) that will ultimately increase profit margins for the company in question. Take a look on the supermarket shelves for example. We now have a whole range of food stuffs that have been fortified with this and that, other products which include health claims (like the spreads that will lower your cholesterol levels) as well as products that are promoted as being generally ‘more healthy’ than others. But were you ever aware of any of the work that was done to back up those claims?? Probably not! And more the matter, should you believe everything that is printed on the side of a food label?

Food regulations are becoming increasingly strict world-wide, and as a general rule a food product cannot have a particular health claim on its label unless it has been thoroughly investigated and proven. But the labels can be misleading, and honey is a great example of this. For several years now, it has been publicised, and well recognised, that Manuka honey from New Zealand has special antimicrobial activities that can be helpful in wound healing and for other external uses. As a result, several companies have been selling Manuka honey, both in New Zealand and overseas, at *very* premium prices. However, not all Manuka honeys contain these magical ingredients, and even those that do can range in activity levels from very low through to very high (the higher levels being the best). Laboratory tests were developed several years ago, and Manuka honey samples can now be simply and routinely tested for their level of antibacterial activity, each sample being given a UMF (unique Manuka factor) rating ranging from 0 to about 25. This information is fairly common knowledge now to those who are active users of honey as an external remedy but what the honey producers often don’t tell you is that your Manuka honey needs to have a UMF rating of *at least* 10 for it to be of any use! Beware buying Manuka honeys that have a UMF rating of 5, for example, as it’s a mixture of active and inactive honey. You’ll almost certainly pay at least 3 times the price of the non-UMF honey sitting on the shelf beside it, but it will

still be good for little more than putting on your toast in the morning!

Nowadays there appear to be more and more people taking an interest in what they are consuming, although probably still not enough given that the trends for obesity, Diabetes, heart disease *etc* are still increasing dramatically, particularly in Western countries. That said, though, any step, even a baby step, in the right direction has to be a good thing. Nutrition is one of the *most important* factors that can determine your overall status of health and wellbeing, not to mention define how long you'll live and what your quality of life may be like in older age. It something that we tend to take for granted, though, most of us strangely thinking that we'll live for ever!

Honey has been used for health for literally thousands of years, and nowadays it is once again becoming popular, particularly amongst those who are open to the idea of using more natural remedies and cures. As well, with the increasing pool of scientific evidence accumulating to support its efficacy in human health, it is also starting to become accepted by more conservative medical professionals who in the past have turned a blind eye to even the suggestion that honey could be used as a medicinal remedy.

This book has therefore been designed to help everyday people understand the impact that sugar can have on our health, and discusses how honey can be a much better alternative. It takes the scientific data rather than the folklore and old wives tales, and presents it in a way that is hopefully interesting and informative. Be aware, though, that some of the terms used are scientific in nature, and therefore, may be a little confusing at times. I've done my best to keep these as simple as possible, and to fully explain what these terms mean, but if you have trouble understanding these please refer to the glossary at the end of the book.

Although the book focuses mostly on how honey can benefit us after it has been eaten, a chapter has been added to the end of the book that discusses the research that has been carried out on the use of honey for burns and wounds. This

chapter has been added primarily to give the interested amongst you some background knowledge in this area, but I suggest you follow up with the references in that section for more detailed information.

Lastly, I have included selected readings at the end of each chapter for further resources that might help. Most of these articles are available on the internet, although the information you can obtain without subscribing to the relevant journals is usually limited. The full articles can be obtained from the journal websites themselves (at a cost) or you can contact the authors directly (contact information is generally included with the abstract). However, to make it simpler – you will find all the abstracts from the journal articles listed in this book on our website www.allabouthoney.com. From here you can also link to the relevant journal websites if you wish.

Happy reading!!

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1

The Use of Sugars and Sweeteners

CHAPTER SUMMARY

- Sugar has been used for nearly 1000 years and its use has been documented throughout history.
- Sugars can be detrimental to health. High sugar intake has been linked to the formation and progression of many diseases including Diabetes.
- Some sugars have a high glycemic index, and as a result can cause hunger and weight gain.
- Artificial Sweeteners have become popular in the late 20th century but these can also cause health problems including migraines, headaches and mental confusion.

Introduction

In today's society, life seems to move at a significantly faster pace than it did 100, 50 or even 20 years ago. As a result, there have been several changes to the way we prepare and eat meals, and to which foods are available at our local supermarket. Nowadays, our food markets tend to be dominated by highly processed foods and ready-to-eat meals, and people often place very little thought into what the nutritional value is of the food that they are consuming.

Alongside this, however, there is an increasing awareness of the need for sustainable health, and many people are now becoming aware of the high levels of harmful food ingredients that are becoming common in our daily diet. One of the major food groups that have been receiving a lot of bad publicity is

sugar, or more precisely the simple sugars such as sucrose (normal table sugar), glucose and high fructose corn syrups. In particular, excessive sugar intake (from soda drinks, sweets, processed foods *etc*) has long been thought to contribute to the growing obesity epidemic seen in the Western world. In fact, surveys consistently show that that most adults are now concerned by their weight in one way or another, and that most have been on, or are currently participating in a weight loss program of some sort. In fact, recent data from the US suggests that more than 2/3rds of all Americans are now considered to be overweight or obese. This is a HUGE number of people, but unfortunately the trends suggest that these numbers will increase even further in the next 20 years.

Although increases in weight result from a number of factors, including genetics, lack of exercise and increased stress, the role of high fat and high sugar foods cannot be overlooked. In simple terms, your body requires a certain number of calories (or kilojoules) to keep itself going every day. When you eat more than this, you tend to store those extra calories as fat, and when you eat less you use up those energy stores. Sounds simple, right? The problem, though, is that despite the fact that we understand this principle, it's a lot harder to put it into practice. We are constantly bombarded by television and radio advertising selling this food and that, and more often than not we find ourselves reaching for foods, or for our wallets to pay for foods, that we neither really wanted nor needed. Many of us are also driven by emotional cues, and eat when we are sad or depressed. As well, we tend to eat more when we are happy, such as at BBQs and other social functions. And lets face it, how many of us reach for the carrot sticks instead of the sausage rolls, cakes and sweets?

I guess it's a fact of life to say that sugars are here to stay. But, we can make educated choices about the sugars we eat, and about the foods we consume in general. Some of these changes can be simple, like recognising that many low-fat foods often have large amounts of sugar added to maintain taste and mouth feel (often such that the amount of calories

you are consuming is nearly the same as that as the full-fat version), whilst other changes require a little education. Understanding how sugars can affect blood sugar levels, for example, can be key, especially if you suffer from, or are predisposed to Diabetes or other insulin-related disorders. Recognising the difference between foods with a low and high glycemic index (GI) can also make a large difference in your overall wellbeing, especially as GI is now recognised and one of the main factors that can influence how full you feel after eating a meal. These ideas, and more, are all discussed further in the chapter.

History of Sugar

The use of sugar is nearly as old as human civilisation itself, dating back over 9000 years. The original use of sugar was first recorded to have occurred on the island of New Guinea with the discovery of the bamboo-like plant sugar cane that has an inner pith with a juicy substance that could be chewed or sucked to release the sweet sap inside. The world's scriptures also have limited references to “sweet cane” and Gautama Buddha specifically refers to the use of sugar in 568 BC. Armies of Alexander the Great reported the presence of sugar cane in India around 325 BC and it is thought that sugar was taken to Egypt and the African continent around this time. During the Middle Ages the knowledge and use of sugar began to spread throughout Asia and Europe, and with the development of the African slave trade in the mid 1400s the processing and ready accessibility of sugar became quickly established.

By the start of the 20th century, the level of sugar consumption had increased dramatically, with sucrose production having increased from 250 000 tonnes in 1880 to more than 16 million tonnes in the early 1900s. Sugar (mostly sucrose) had by then become an essential ingredient in British diets, and a major food component in other cultures. From 1970 onwards, the use of sugar increased even further with the belief that high-fat diets were responsible for the increasing

weight gains seen in Western populations. Low-fat products quickly became available on the food market, but many of these were bolstered with additional sugar in order to maintain taste.

In more recent times, though, the popularity of simple sugars has begun to wane, particularly as we have started to realise that as a population we are generally getting more overweight and less healthy overall. Dietary intake of high-sugar foods such as cakes, biscuits, jams and ice-creams is now peaking, and even decreasing in some groups, and many of the sweetened foods and beverages produced nowadays are available in a low-sugar or sugar-free form. As well, both the medical community and the general public are becoming aware of the negative consequences that excessive sugar consumption can have. This includes effects on every day health as well as the longer-term impacts upon aging and cognition.

Problems Associated with Sugar Intake

As the use of sugar dates back approximately 9000 years, it is not too difficult to accept that problems with sugar have also been documented throughout history. Limited reports from the 1600 – 1800s, for example, mention that sugar may have had some negative implications on health including effects on the teeth and internal health. Only recently, though, have researchers specifically focussed on the effects that sugar consumption can have on human health.

Today, it is well accepted that excess sugar intake can contribute significantly to weight gain because it has a high energy content (17 kilojoules of energy per gram) and a high GI value. GI refers to the way your blood glucose levels respond after you eat a certain quantity of a particular food. To make it simpler to understand, GI generally uses a scale from 1-100, the higher the number, the higher the GI value. Foods that have a high GI, for example, are those that contain carbohydrates that are quickly broken down into their basic molecules. These foods, which include the simple sugars such

as glucose, have fast-acting but short-lasting effects on blood sugar level (see Figure 1). Consumption of foods containing large amounts of these ingredients lead to a rapid increase in blood glucose levels, followed by a rapid plunge back to low blood glucose levels as large quantities of insulin are released (the release of insulin into your blood stream from the pancreas is what allows the glucose in your body to be absorbed). This rapid decline in blood sugar levels then ultimately makes you feel hungry again, which can, in turn, lead to overeating, excessive energy intake and weight gain. In contrast, foods that have a low GI (this includes most honeys) tend to maintain a more stable blood sugar level over a longer period of time (see Figure 1). As a result, hunger is minimised after a meal, and you generally feel fuller for longer.

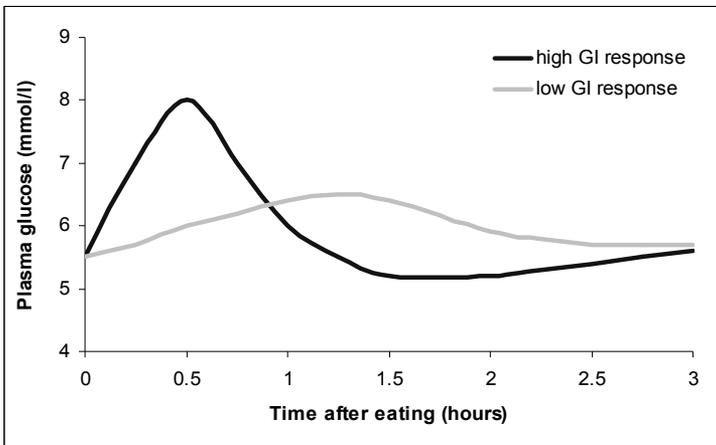


Figure 1: Plasma glucose response (mmol/l) after eating a high and a low GI food. The change in blood glucose concentration over time is expressed and calculated as the area under the curve.

Different sugars actually have different GI values depending on the makeup on the molecules. Glucose is what we call a monosaccharide, in that it consists of individual sugar units. It has a GI of 100 (the highest possible value) as it is immediately absorbed after eating (it doesn't need to be broken down any further before it can be absorbed) where it is then available for use as blood sugar (blood glucose). Fructose is also a monosaccharide, but it has a GI value of only 20. This is because, whereas it can be absorbed intact, it cannot be used as blood sugar without first being converted to glucose. Sucrose, on the other hand, is a disaccharide. It consists of a glucose molecule attached to a fructose molecule. These two molecules must be broken apart before they can be absorbed, and because the two different individual molecules have differing GI values, the overall GI value of sucrose is around 61. Honey has quite specific sugar compositions depending on their floral source (see Table 1 on page 34), but they do contain mostly glucose and fructose as well as small amount of more complex sugars. As such, the GI values of honey can also vary, but studies undertaken in Australia and the US have shown them to mostly be in the range of 35-65. They are therefore considered to be low-moderate GI depending on the sample in hand.

Importantly, it has been shown that diets that contain substantial amounts of moderate-to-high GI foods (including sugars, white bread, potatoes and some rices) can also be detrimental to health because of the reoccurring high blood glucose levels that result. In particular, high GI diets have been linked with the formation of atherosclerosis, cancer and insulin resistance, as well as with increased rates of morbidity and death. Elevated blood glucose levels (termed hyperglycemia) have also been associated with the formation of *advanced glycation endproducts* (AGEs). While these might sound like something technical and/or complicated, really it is simply where sugar molecules such as sucrose or fructose bind onto proteins, fat molecules and nucleic acids (the building blocks of DNA). Research has shown that these AGE products form spontaneously in environments that promote a lot of free

radicals damage (see Chapter 4 for details), the level of damage depending on the severity and length of time that the high blood sugar levels occur for. More importantly, AGE formation has been shown to contribute to the development and progression of a number of chronic disorders including high blood pressure (hypertension), vascular disease and atherosclerosis and there is strong evidence to suggest that AGEs may also be involved in the development of diabetic complications.

AGEs have also been shown to bind to particular receptor molecules that occur on the outside of most cells. This binding acts to disrupt the normal cellular processes inside the cell, leading to dysfunctional processes that ultimately stop the cell from working properly. These alterations in normal cellular functions are obviously harmful to our health as they can lead to tissue destruction, diabetic complications such as nerve and kidney damage as well as damage to the body's main blood vessels. Binding to these cellular molecules also results in the turning on of signalling systems inside the cell which can result in the development of chronic inflammation. This, in turn can result in even further cellular and tissue damage because of a self-amplification cycle (Inflammation is discussed further in Chapter 5).

So, with the knowledge that excessive sugar intake can lead to pronounced elevated blood glucose levels (hyperglycemia), and that this can promote or exacerbate several chronic disorders including Diabetes and inflammatory conditions, there has been a move away from the use of simple sugars in recent years. Today, a suite of substitutes is available to replace these sugars, ranging from artificial sweeteners to the more complex sugars and plant sugars. These tend to either be sweeter or not absorbed, or they offer nutritional advantages in other ways. Foods that can offset some of the sugar-related damage are also being investigated. These include foods that have a lower GI than sucrose and glucose (thereby leading to less hyperglycemia) and those that contain antioxidants (as antioxidants can help minimise the damage that results from inflammation).

Honey fits into both of these categories, and therefore offers the potential to provide both sweetness in foods and a protective effect after consumption.

Artificial Sweeteners

With the increased awareness of the risks associated with elevated levels of sugar intake, food manufacturers have begun to look for alternative methods by which they could sweeten their products. The use of artificial sweeteners was established in the early 1970s, although their usage did not increase dramatically until the 1980s when it was found that sugars can substantially contribute to obesity and weight-related disorders. Currently there are four artificial sweeteners commonly available to consumers: saccharin, aspartame, sucralose and acesulfame potassium, with products containing these ingredients being worth at least 1.5 billion dollars per annum in the United States alone. At present, aspartame has the largest market share, as it is the major sweetener used in soft drinks. In fact, it has recently been approved as a “general-purpose sweetener” allowing it to be used in all types of food and beverages.

Despite the fact that the average intake of these sweeteners is below the recommended daily intake levels there is now considerable debate over the safety of these sweeteners. Scientific research suggests that whereas both aspartame and saccharin are generally safe and non-toxic when consumed in foodstuffs there is some evidence to suggest that they may have harmful side effects. Studies in animals have shown, for example, that intake of saccharin can lead to a higher incidence of cancer. The intake of aspartame has been linked with migraines/headaches, muscle tremors, vision problems and mental confusion.

Acesulfame potassium and sucralose are two relatively new artificial sweeteners, and they have only been approved for use in foodstuffs in the United States since 1988 and 1998, respectively. Because of the newness to the market, very little

research has been undertaken to evaluate their toxicity and safety. There have been a few scientific studies done, though, which suggest that sucralose may also trigger migraines in at-risk individuals. However, the same has not been reported with acesulfame potassium. Whilst neither of these new-generation sweeteners have been linked at this stage with the development or formation of cancer, it is generally accepted that it is too early to really know what effects these sweeteners could have on this aspect of health.

Natural Sweeteners

With the possible negative connotations associated with the use of artificial sweeteners, there has been a drive towards the discovery of other, more natural, products that could potentially offer sweetness without harmful side effects. In recent years much research has been undertaken to assess the various sources of sweet-tasting compounds that occur naturally in the plant kingdom, and, to date, more than 75 highly sweet compounds have been identified.

A small number of plant-based sweeteners are now being used commercially as sucrose substitutes, the most common of which are the sugar compounds derived from the South American plant *Stevia* (part of the sunflower family). Other plant-derived sweeteners approved for use include a substance called glycyrrhizin extracted from licorice roots (this being 20-50 times more sweet than table sugar) and a protein called thaumatin from fruits of the Sweet Prayers plant. In addition, many kinds of sweet compounds have been isolated from *Cucurbitaceous* plants (these include pumpkins, squashes, melons etc) and from the fruits of the Chinese *Grosvenor Momordica* plant. To date, there has not been a lot of work done to evaluate the safety of these compounds as food additives, although most of these compounds have been given GRAS (Generally Regarded as Safe) status by the FDA in the United States.

These plant-based sweeteners are often also known as “intense” sweeteners as they offer a sweetness intensity that is greater than that of sucrose. But, there are also other sweeteners, termed “bulk sweeteners”, that are less sweet than sucrose. These compounds include isomalt as well as the sugar alcohols sorbitol, xylitol, lactitol and mannitol. Bulk sweeteners have been shown to offer a number of nutritional advantages over the use of sucrose and simple sugars such as glucose and fructose. Sugar alcohols, for example, are not easily broken down by bacteria in the mouth, so they may aid in reducing the development of sugar-related dental cavities. As well, research with animals has shown that xylitol and sorbitol (common ingredients in chewing gums) may help improve the absorption of calcium from the gut, this occurring through the formation of soluble complexes of calcium in the intestine (most calcium is usually insoluble after ingestion).

Whereas these natural sweeteners offer a good alternative to the use of more mainstream sugars such as sucrose and high fructose corn syrup, as well as the artificial sweeteners used in diet products, the methods of extraction and the often small quantities produced can make such natural sweeteners prohibitively expensive. This tends to restrict their use in large scale food production, and instead they are often viewed as luxury food additives that must be incorporated into food by the consumer rather than by the food producer. For this reason, the search continues for food ingredients that are cost-effective to produce, whilst offering health advantages to the consumer, particularly when incorporated into mainstream food production. Several large food production companies are currently looking at ways to improve the “healthiness” of their products, and, as a result, products such as cholesterol-lowering spreads are now reaching the supermarket shelves, albeit at premium prices.

Honey is a natural sweetener that has been used since ancient times (see Chapter 2) and its use as a food ingredient in products such as spreads and marinades is well established. Only in recent times, though, have the potential health benefits

of honey begun to be explored. It is now recognised that honey contains a mix of both simple and complex sugars, thereby providing good levels of sweetness, as well as vitamins, minerals, acids and enzymes. Furthermore, it has been demonstrated in animal and clinical studies to have several health-promoting and medicinal properties. These will be discussed, in detail, in the following chapters.

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