

The Global Obesity Crisis¹

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Today, obesity is one of the biggest social burdens in the world and could have devastating consequences for our health care system, which will not be able to stem the global obesity crisis at hand. Even though obesity and overweight has spread to developed and developing countries prevention measurements are still only catching up. This paper will explain the origins of the crisis and will look deeper into the coming burdens for the global health care system. Furthermore, it will point out a few solutions, focusing on the carbohydrate confusion and the fact that a well-balanced diet of complex carbohydrates could be an important step towards a healthier diet for everyone.

Introduction

There is one social burden generated by human beings that is one of the greatest threats to the global economy. It is more serious than climate change, drug use or outdoor air pollution. It holds the same share of our global GDP as armed violence, war and terrorism only second to smoking. Currently, more than

half of all people in Europe are directly affected by this social burden and more than 30 % are on a global level. This epidemic we are talking about is the global obesity crisis [1].

Between 1980 to 2014 the prevalence of obesity more than doubled, with more than 2 billion adults aged 18 years and older overweight today [2]. Obesity is a chronic disease, growing in severity in both developed and developing countries, and reaching through all age groups. In fact, obesity has replaced the traditional health concerns such as undernutrition and infectious disease [3].

This paper will look deeper into the root causes of today's obesity crisis while giving a clear overview on global trends. It will point out that there is no single solution to this crisis, but rather that a well-balanced diet in regard to complex carbohydrates is a good approach in the fight against Obesity. The paper will look deeper into the carbohydrate confusion and explain why it is not a question of whether or not we should eat carbohydrates, but rather a question of which carbohydrates to eat. Building

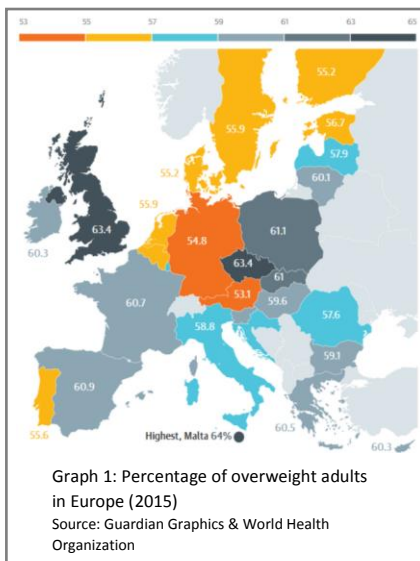
on this the paper we will focus on a simple, yet ingenious way of taking the first step in a long fight to reestablish a healthy weight balance all over the world: Our daily bread.

Global Outlook

Obesity is a complex, systemic issue affecting every country on earth except the sub-Saharan region. In fact, there are 2.5 more overweight people on earth than malnourished ones and most of the world's population live in countries where overweight and obesity kills more people than underweight [4]. Globally seen, the United States is no longer the clear leader in overweight and obesity rates even though today 70.7% of the US population is overweight and one-third of the population is obese [5]. Australia and New Zealand are growing heavier with both having 29% obese people, which is almost double the amount from 1980 [6]. Especially obesity in the Middle East is also becoming a severe problem. Kuwait leads with 43% of people obese and UAE, Jordan, Egypt and Saudi Arabia are all having rates above 30% [7].

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European Outlook



Even though Europe does not yet show numbers in obesity growth that compare with the US or the Middle East, there is still a serious problem in overall weight gain. The World Health Organization (WHO) calculated the average weight of the citizens in most European countries in 2015 and published the number in their health report. In every country in Europe except Switzerland there are at least 50% overweight people with eight countries including the UK, Ireland, Spain, France and Poland having as many as 60% people with too much weight (see Graph 1) [8]. This is worrying, because being overweight carries the same risk as being obese: Even a few kilos over the healthy weight limit can exponentially increase the risk for cardiovascular disease, diabetes and many other health problems that require the attention of a health care specialist. Furthermore, the trends all point upwards with no indication of any major downward change.

Strain on Health Care System

These numbers are not only very worrisome, they will also cause a lot of pressure on our global health care system. The United States Centers for Disease Prevention (CDC) estimated in 2008 that the annual cost of obesity in the U.S. was USD 147 billion and that the medical bills for obese people were 1.43 times higher than those of people with normal weight [9]. Currently, the global economic impact of obesity exceeds USD 2.0 trillion and in developing countries obesity already makes up 5%-10% of health care spending [10]. At the current weight gain trends, we will be faced with half of the world's population overweight by 2040 and it simply just will not be possible for the global economy to bare the health care costs (see Graph 2) [11].

Health Effects of Obesity

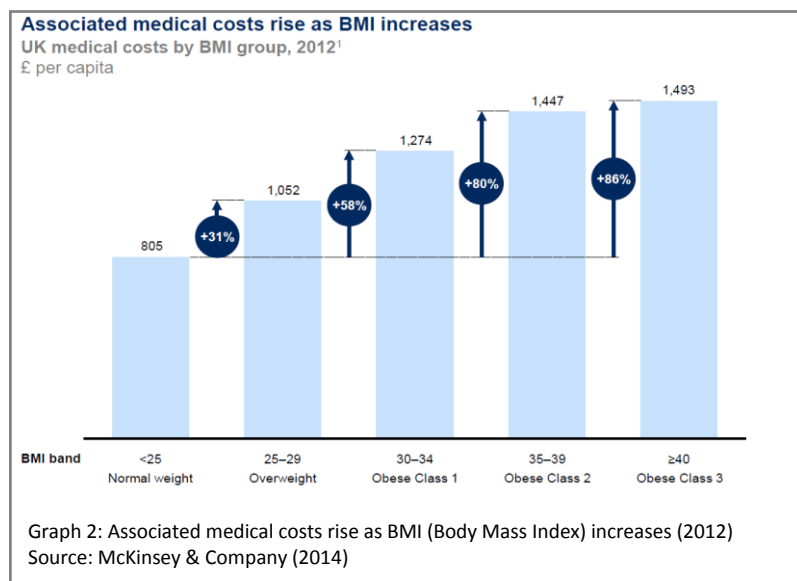
When measuring body fat this is most commonly done through the Body Mass Index (BMI). The BMI is a person's weight in Kilograms divided by his or her

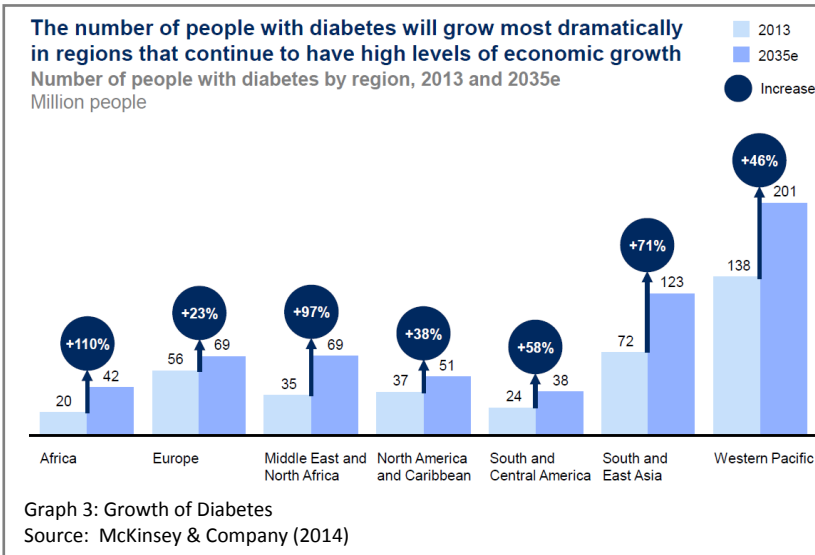
height in meters squared ($\frac{weight(kg)}{height(m)^2}$) [12]. Even though there is some room for error with the BMI, it is used by most people as well as health care specialists to make a quick evaluation of a person's potential health level. See the chart below for how results of the calculation are defined (see Table 1):

BMI Score	Definition
< 18.5	Underweight
18.5 – 25	Normal Weight
25 – 30	Overweight
30 – 35	Obesity Class 1
35 – 40	Obesity Class 2
40 – 45	Obesity Class 3

Table 1: Body Mass Index Overview
Source: Centers for disease Control and Prevention (2015)

Researchers from both Norway and the UK found in a joint project that even people in the overweight category have increased risk of developing heart failure. One researcher commented: "Overweight individuals had a 35% increased risk of heart failure as compared with normal weight individuals, and our findings indicate that overweight should be considered a clear risk factor for heart failure" [13]. Furthermore,





the researchers have found that with every 10cm increase of the waist circumference was linked to a 29% higher risk of heart failure [13]. Already in 2012 the World Health Organization (WHO) found that Ischaemic heart disease and strokes were the leading cause of death in the world in the past decade with nearly 15 million people killed in 2012 alone [14]. It is important to address obesity and overweight, because eradicating obesity will also eradicate a wide range of health problems that are already leading causes of death today.

For example, cardiovascular disease is not the only noncommunicable disease connected to being overweight or obese. Diabetes 1 and 2 are quickly on the rise with an estimated increase of 38% in North America and the Caribbean, a shocking 71% in South and East Asia and a 23% rise in Europe (see Graph 3) [15]. The risk for Musculoskeletal disorders, especially osteoarthritis, cancers, infertility and premature death and disabilities, especially in children, also

rapidly increase with excessively high body fat. This is just a shortened list of some of the health risk obesity and overweight causes and it should be evident that our global health care system will not be able to bare the rising health care costs of people who require medical attention, caused by the global obesity crisis.

Especially at risk for the above mentioned health problems are low- and middle-income countries that are facing a “double burden” of disease [16]. The World Health Organization found that “while these countries continue to deal with the problem of infectious disease and under nutrition, they are also experiencing a rapid upsurge in noncommunicable disease risk factors such as obesity and overweight, particularly in urban settings” [16]. The British Medical Journal found that from 1975 to 2014 especially middle- and poorer-income countries like India, Brazil and China all jumped in rankings when it came to obesity [17]. This even though India and China also

have the most underweight citizens in the world.

The Root Causes of Obesity

Since obesity and overweight is not a localized problem anymore and it is affecting all income groups as well as all age groups it is clear that there is no singular cause to the current epidemic we are facing [18]. The causes of obesity can be roughly divided into five groups: Food production & intake, politics, society, wealth & activity.

Food production & intake: The fundamental cause of obesity and overweight is an energy imbalance between calories consumed and calories expended. On a global scale, there has been a clear increased intake of high convenience, energy-dense foods that are high in fat. While our intake of vegetables and fruit has remained almost stagnant in the last forty years the consumption of added sugars and sweeteners, such as high fructose corn syrup, and added fats, oils and dairy fats has drastically increased [19]. There have been also global changes in terms of food intake. In Asian and middle Eastern countries diets are westernizing, meaning that people consume more western staples and this often through imported western fast and junk food chain restaurants. Conveniences food has gained a strong food hold all over the globe and traditional diets are more and more replaced by highly processed foods.

Politics: The lack of control over nutrition labels, ingredients and effects of food on a person’s

health has given the large industrial producers little incentives to change anything about their production of high fat and high sugar foods. Only recently has been the talk started about added sugar tax and excise tax on specific high sugar foods. An example here would be a sugar tax already implemented in parts of the United States and in Mexico, France, Denmark, Norway, South Africa, Hungary and the UK will implement their sugar tax in 2018 [20]. In-depth studies in Mexico and in Berkeley, CA have shown that even a small tax can decrease the soda consumption by 10% annually [21]. Government taxation of unhealthy processed foods is a heated topic, especially on the profit driven industry level. However, with regards to current trends it is more than evident that the industry has no interest in preventing the epidemic at hand. The government's authority over our food choices may be a last resort solution to solving today's epidemic.

Society: With every country in the EU having more than 50% overweight people it has become the new "normal" to have more overweight people around one's community. This has caused a "normalization" of the actual issue. Public perception of this epidemic has not caught up with the actual severity of the issue. Much of the public underestimates the proportion of overweight or obese people in their country. In a global survey an Irish research agency asked citizens of 33 countries to estimate the percentage of overweight or obese people in their own

respective countries. Only three countries overestimated the numbers (India, Japan & China) and one estimated correctly (South Korea). The remaining 29 countries all underestimated the severity of the problem in their country: in Germany respondents guessed the percentage of overweight people in their own country at 40% instead of 57%, in Great Britain 44% instead of 62%, and in Russia 31% instead of 57%. However, the biggest difference was by far in Saudi Arabia where people guessed 28% instead of 71% [22].

Activity: An increase of physical inactivity due to the increasingly sedentary nature of many forms of work, changing modes of transportation, and increasing urbanizations caused some humans over time to burn less calories than they consume. Daily activity is maybe the easiest and simplest way a person can make a good contribution to health. Obesity would be largely preventable through simple lifestyle changes such as frequent physical activity and consuming more balanced meals.

Wealth: Wealth or the lack thereof dictates how and what we eat. In the U.S. low-income communities have less access to fresh produce, because they live in "Food Deserts" [23]. A term the CDC defines as "areas that lack access to affordable fruits, vegetables, whole grains, low-fat milk, and other foods that make up the full range of a healthy diet" [24]. In low-income countries, however, personal wealth is often shown through the

excessive consumption of high fat western junk food. In the Middle East, India as well as China, America's most famous fast food chains hold a high social value that have caused a sky rocketing in obesity numbers all over these countries.

How to Prevent Further Growth

Obesity is a multilayered global issue, which cannot and will not be combated with one single solution [25]. Industries as well as society need to come together. Below are three ways a dent can be made in the obesity crisis.

Individual: Supportive environments and communities are fundamental in shaping people's choices, by making healthier food choices and integrating physical activity into daily life. Furthermore, people can limit energy intake from total fats and sugars, increase consumption of fruit and vegetables, as well as legumes, whole grains, and nuts and finally support others in the community to do the same.

Social & Political: Individual responsibility can only be successful if people have actually access to a healthier lifestyle. Therefore, it is important to support individuals and communities in living healthier lifestyles. Parental education and raising awareness about the health implications of being overweight are also important prevention methods to limit the numbers of obese/overweight people. There has also been a continuous rise of countries implementing soda

tax on sugary drinks. Denmark, Norway, France, Mexico, UK and the US are all countries currently with targeted measures introduced [26].

Food Industry: However, the most efficient and cost-effective way to promote healthy eating is for the food industry to promote healthy diets by reducing fat, sugar and salt content in processed foods [27]; ensuring that healthy and nutritious choices are available and affordable to all customers; restricting marketing of foods high in sugars, salt and fats, especially those foods aimed at children and teenagers; ensuring the availability of healthy food choices.

The Carbohydrate Confusion

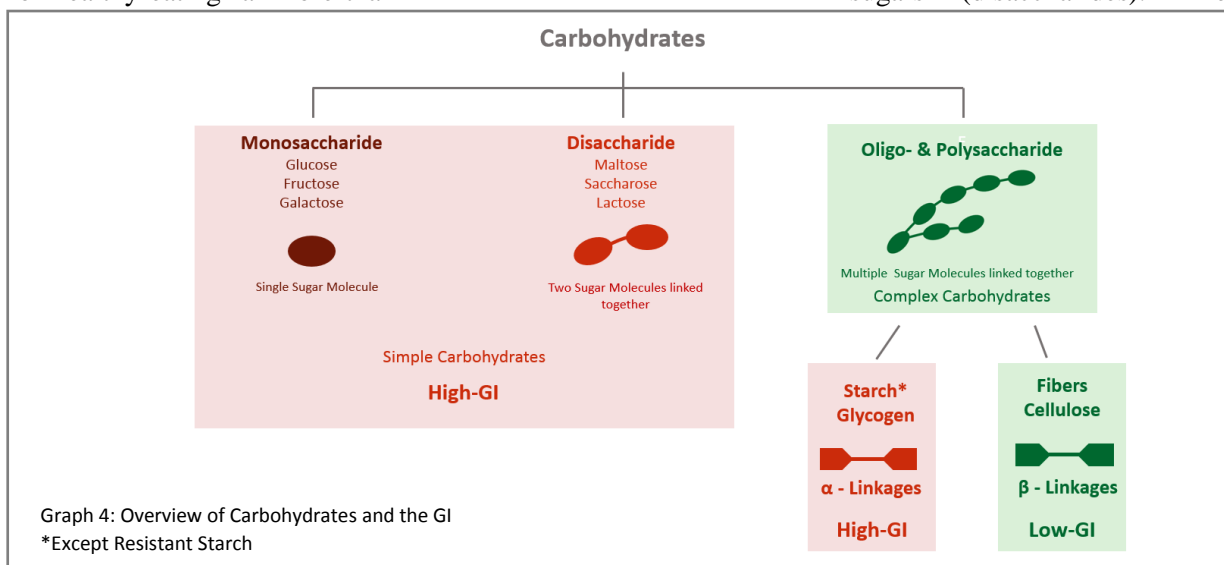
Together with healthy eating another important way to battle obesity is to educate consumers. However, when it comes to healthy eating, there is a serious “carbohydrate confusion” [28]. Food trends such as low-carb, high-carb, no-carb, gluten-free, grain-free, vegan and trendy diet books with false claims have the tendency to polarize the subject of healthy eating far more than

contribute to it. The key is combination and consuming foods in moderate amounts. For example, many of the recent food trends go against carbohydrates, even though they are the main energy source for our body. They are the energy that gets used first before protein and fat. According to the European Food Safety Authority (EFSA) approximately 45-60% of our daily energy intake should therefore come from carbohydrates [29]. Carbohydrates have an important role in our bodies including:

- An energy source that gives us the energy the body needs;
- A part of many proteins and fats that our body needs for many processes;
- Providing nutrients for the good bacteria in our intestines that helps us digest our food; and
- Protecting our muscles since carbohydrates are the first source of energy for our body, preventing that protein from our muscle will be used.

Therefore, they should always be included in our diet for maximum functioning of our bodily processes like metabolism, hormone release and immune function. So, it is not about whether or not we should eat carbs, but rather what types we should eat.

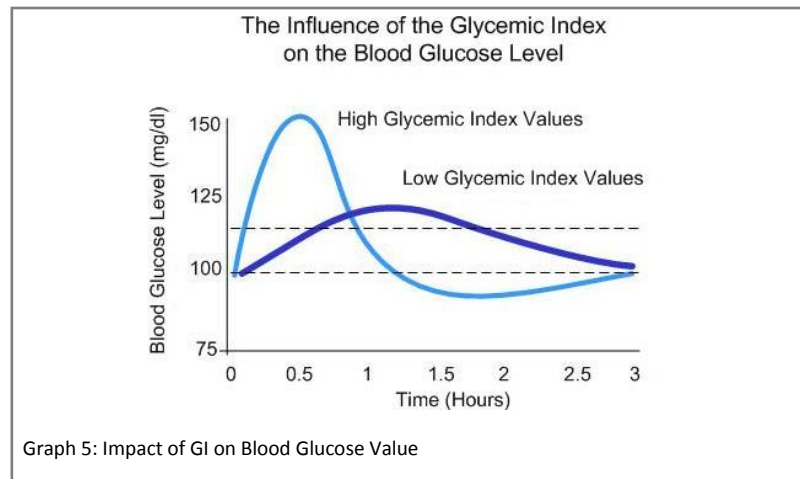
If a consumer is asked whether a bowl of white rice, a loaf of bread or a can of soda has more Carbohydrates it will most likely lead to confusion. Most consumers could tell about the evils of pure sugar and saturated fats, but when it comes to how carbohydrates fit into this spectrum there is very little knowledge. In fact, omitting all other nutritional content such as vitamins and fats all three mentioned products have more or less the same amount of carbohydrates. The key here is to differentiate between so called “simple” and “complex” carbohydrates. Simple Carbohydrates, as found in a can of soda, are composed of sugars such as glucose, fructose and galactose, which have a simple chemical structure composed of only one sugar (monosaccharides) or two sugars (disaccharides). The



Harvard School of Public Health explains that these simple carbohydrates “are easily and quickly utilized for energy by the body because of their simple chemical structure, often leading to a faster rise in blood sugar and insulin secretion from the pancreas – which can have negative health effects” [30]

Complex carbohydrates or “dietary starch” on the other hand, have a more complex chemical structure, with three or more monosaccharides strung together like a necklace or branched like a coil. These are known as either oligosaccharides or polysaccharides. These complex carbohydrates are broken down into their monosaccharide building blocks during digestion, which then are used for energy by cells. Furthermore, “many complex carbohydrate foods contain fiber, vitamins and minerals, and they take longer to digest – which means they have less of an immediate impact on blood sugar, causing it to rise more slowly” [30]

As seen in Graph 4 Starch is also a complex carbohydrate, but as most know, is quickly broken down into their monosaccharide building blocks, causing a similar blood sugar spike as with the simple carbohydrates. White toast bread or a bowl of white rice are a good example of this. The reason for this is that the digestion track breaks down complex carbohydrates differently based on the bonds between the simple sugars or monosaccharides. With starch, for example, the glucose is linked together by alpha-



linkages, which are easily broken down by enzymes in our digestion tract. Fiber, on the other hand, is a complex carbohydrate, where the monosaccharides are mainly linked together by beta-linkages. An exception to this rule is Resistant Starch (RS), which contrary to simple starch is linked together by linkages, which like with fiber cannot be broken down by enzymes. Beta-linkages cannot be broken down by our digestions tract, slowing down the release of glucose into our blood significantly.

This is why a slice of white toast and a portion of broccoli have very different effects on our blood sugar level despite both being made up of complex carbohydrates. A good rule of thumb is that the closer a product is to its natural state the more fiber it contains. However, for a more comprehensive explanation on “how different kinds of carbohydrate-rich foods directly affect blood sugar, the glycemic index was developed and is considered a better way of categorizing carbohydrates” [30]

The Glycemic Index, or short the GI, helps us understand carbohydrates and how quickly

they are turned into sugars during digestion. This helps the consumer, to avoid a sudden “sugar rush”, also called a postprandial Hyperglycemia (PPHG). Even though there are certain discrepancies with the GI as explained further below, it is still a very useful tool to easily gauge a foods impact on our body’s health.

The Glycemic Index

Essentially, the Glycemic Index is a simple way to measure the quality of the carbohydrates we consume on a daily basis [31]. This physiologic assessment of the quality of carbohydrate content in food and its effect on postprandial glycemia, was developed approximately three decades ago in Canada by Prof. David Jenkins and Prof. Tom Wolever mainly as a tool for the management of diabetes. Today, the Glycemic Index is still an important tool for people with diabetes, or people prone to the disease, because it keeps the blood sugar low with controlled insulin release [31]. However, thanks to the continued research of Professor Jenny Brand-Miller, PhD at University of Sydney this method is also

Low GI 0 – 55	Medium GI 56 - 70	High GI 70 +
<p>Hummus 6 Green lentils 22 Spaghetti (5 min cooked) 32 Wheat bran 42 Oat flakes 42 Sweet potato 44 Brown rice 48 – 56 Popcorn 55</p>	<p>Honey 56 Baked potato 60 Hamburger bun 61 Raisins 64 Canned beans 64 Granola 66 Pineapple 67 Couscous 69 Whole wheat bread 69</p>	<p>White bread 71 – 77 French fries 75 Sport Drink 78 – 95 Gluten-free bread 79 Cornflakes 84 Pretzel 89 Baguette 95 Jasmine rice 99 Glucose 100</p>

Table 2: GI Score of selected Foods
Quelle: Glycemic Index Food Search & American Journal of Clinical Nutrition

accessible to a wider audience interested in eating healthier foods and adapting a healthier lifestyle [32][33][34].

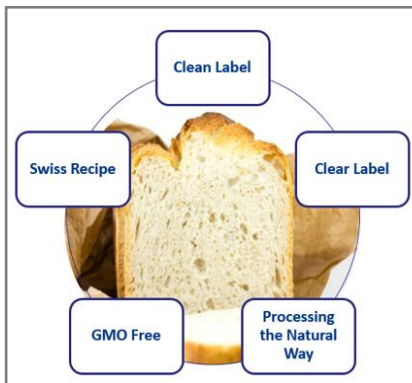
Here is how it works: The GI gives a particular number to every type of food, which indicates the food’s effect on a person’s blood glucose (also called “blood sugar”) level. 100 represents the equivalent amount of pure glucose (see Table 2). Foods with a low GI raise the blood sugar slower and sustain longer, making the person feel full longer while eating less. A high GI number however, lets the blood sugar spike, giving the person a “sugar rush”, which plummets 2 hours later causing a quicker feeling of hunger. Furthermore, other side effects of the sugar low are decrease in mood, extreme tiredness and less productivity (see Graph 5). Foods should not solely be picked based on a low GI score, but the combination is key. Through that the GI score becomes an optimization tool that helps people to prepare and eat meals that make us feel good, energized and healthy for longer.

The GI can help consumers to avoid sugar spikes and provides

an easy tool to estimate how quickly food is broken down into sugar, or glucose, in our digestive tract. The GI represents the umbrella tool, which gives the consumer a good oversight of the general impact of foods on their blood sugars. All calculations are based on 50 grams of carbohydrates, which does not always represent the amount of food a person will typically consume. If a consumer wants to calculate specifically the digestible carbohydrates – the total amount of carbohydrates excluding fiber – then the Glycemic Load or GL represents a better tool, because it takes portion size into account and not the generic measurement of 50 grams of carbohydrates for all foods. However, because the GL simply is derived from the GI and poses an extra step of calculation most scientific studies as well as the Glycemic Index Foundation have accepted the GI as the go-to tool for international standards. If you would like to know more about this topic please visit the official Glycemic Index website at www.glycemicindex.com

The Journal of *the American Heart Association*, as well as *the American Journal for Clinical Nutrition* showed in three separate studies, that people who consumed low glycemic diets were at a lower risk of developing diabetes Typ 2 than those who ate a diet of high glycemic foods. The same results were also found in relation to coronary heart disease events. Seperate studies of the same magazines have shown a similar trend with the GI. This, however, does not mean that consumers should soley base all their food choices on the basis of the GI or GL. The most important part is to have a well-balanced diet and the GI and GL are a simple and accessible tool to support healthy meal choices. The wide range of independent studies on this topic show, that the GI does indeed have a positive impact on consumers and that this tool is indeed effective.

PANATURA® GI



It is clear that the reformulation of food products should be one of the main focus groups when it comes to battling the obesity crisis. This is why we at VERIPAN AG want to attack the crisis head first and go after one of the biggest staple foods in the world: Our daily bread. The regular white sandwich loaf or white bread a consumer can find in a grocery store has a very high GI score, because it is made from highly processed simple carbohydrates that quickly turn into sugars, which in turn spikes our blood glucose level.

PANATURA® GI was developed by VERIPAN AG in corporation with Holista Colltech and is the world's first sourdough, which allows for the production of clean-label and low GI white bread. It is suitable for all types of baked goods based on wheat flour such as ciabatta, baguette, pizza & buns. The new white bread was clinically tested by multiple laboratories including GI Labs in Toronto and the British Oxford Brookes University. Most recently also Sydney University tested the white bread made from PANATURA® GI in various trail runs and scored it at 49, 51 and twice 54 on the GI scale.

This is significantly below the average score of typical industrially produced white bread, which will score between 71 and 77. All ingredients are 100% natural and the dough is produced without the use of E-numbers and GMOs.

There are four important ingredients for PANATURA® GI that contribute to the low GI score of white toast bread: Okra, Fenugreek, Lentil and Barley. Okra (*Abelmoschus esculentus*) is a flowering plant in the mallow family. The seed pods can reach a length of up to 20cm and include small white seeds used in the production of. Fenugreek (*Trigonella feonum-graecum*) is also used in our low glycemic sourdough and belongs to the family of Fabaceae. The small seeds are often used in Asian cuisine and especially in the Indian cuisine as spice mix. The two other key ingredients known for their high nutritional value are white lentils (*Vigna mungo*) and barley (*Hordeum vulgare*), both already well-established ingredients in western cuisine, as well as eastern cuisine. The okra and lentils in our GI lowering sourdough work synergistically to make it more difficult for the wheat to be digested. The protein structure of the lentils positively influences the insulin and glucagon hormones and this reduces the rate of blood sugar. Lastly, the fenugreek and barley in our GI lowering sourdough provide the "steric hindrance" which delays gastric emptying and hence, the rise blood sugars are slowed down. This is the first white bread that will keep

you full for longer and will not spike your blood sugar levels [35][36][37].

An increased consumption of standard white bread has been linked in multiple studies to an increased insulin release especially in comparison to whole wheat bread [38]. Especially in Asian countries sweet white bread is becoming more and more popular, because of its convenience and its accessibility. This is causing a very unbalanced diet, because in many parts of Asia white rice, a high GI product, is already consumed with almost every meal three times a day. For example, in Singapore the quick rise in diabetes is partially attributed to the excess consumption of white bread and white rice [39]. This is an important market for PANATURA® GI. What we offer is to substitute the intake of nutritionally poor quality white bread with a high quality, all natural PANATURA® GI, which will not spike your sugar levels, keep you full for longer and more energized for prolonged time.

Conclusion

Today, there are more than 2 billion overweight people all over the world and 600 million of them are obese. Just as much as there is not a single cause for today's obesity crisis there is also not a single solution. Currently there is a lack of supportive policies in sectors such as, health, agriculture, transport, urban planning, environment, food processing, distribution, and education. However, in the midst of this crisis it is vital not to forget that

obesity is preventable and that every problem also holds an opportunity. Already small changes to our diet could have a big impact on our health. Especially when it comes to consuming highly processed carbohydrates, which are easily broken down into simple sugars there is still a lot of room for improvement. Dr. David Ludwig from the Harvard School of Public Health notes here that “Americans consume more calories from refined grains and potatoes than from sugar. Starchy foods like white bread, white rice, potato products, crackers and cookies

digest quickly into glucose, raise insulin levels, program the body for excessive weight gain and increase risk for chronic disease” [40]. This is why the reformulation of food, such as developing a healthier white bread by using PANATURA® GI, is an opportunity for industries to produce healthier foods for their customers. A product, which before had very little nutritional benefits, suddenly could become a part of a healthy and nutritional meal, while making no sacrifices in production, taste or cost. These are very exciting developments, which are possible in an

industrial setting thanks to modern technology. Every person can contribute to this change by taking matters into their own hands and taking the first steps into the right direction. In the end the consumer has the most powerful voice in creating the demand. If the demand for healthier products is there, than the industry will respond. We at VERIPAN AG feel that we will soon witness significant changes within the global food markets and we strongly believe that ever one has the right to access healthy and affordable food

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Note

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