Diet and Non-Communicable Diseases.

Part 1: Does diet affect the risks contracting of non-communicable diseases.

Chronic non-communicable diseases were defined as diseases or conditions that occur in, or are known to affect, individuals over an extensive period of time and for which there are no known causative agents that are transmitted from one affected individual to another. Chronic non-communicable diseases such as heart disease, cancer, asthma, Type II diabetes, allergies, and stroke account for 60% of all deaths worldwide which is double the number of deaths from all infectious diseases (including HIV/AIDS, tuberculosis and malaria), maternal and perinatal conditions and nutritional deficiencies combined. Type 2 diabetes, also known as 'non-insulin-dependent diabetes mellitus' (NIDDM) or 'adult-onset diabetes', occurs when people produce insulin, but either do not make enough insulin, or their bodies do not use the insulin they produce. Although Type 2 diabetes commonly occurs in adults, an increasing number of children and adolescents who are overweight are also developing Type 2 diabetes and the cause for this is unknown. According to the World Health Organization (WHO), 80% of all deaths worldwide related to non-communicable diseases now occur in developing low and middle-income countries (WHO, Geneva, 2005).

What are the causes of these diseases? It is suspected that urbanisation is a major risk factor in the non-communicable diseases epidemic. As economies grow and become 'modernised' and populations migrate from rural to urban areas. Studies have shown that urbanisation leads to dietary changes towards adoption of the so-called 'western diet', which is high in animal proteins, fat and sugar. The media especially television is the most influential source of dietary changes and information, for example the food advertisements enticing young children with colourful sweets and chocolate products. This influences food choices based on children's taste, leading to family preferences for "junk food". A westernised lifestyle consisting of cheap and readily available processed foods coupled with reduced physical activity have created an epidemic of over-nutrition resulting in overweight/obesity. It is now emerging that this diet is the cause of many of the diseases we encounter today.

Nearly all the genes and epigenetic regulatory mechanisms we carry today were originally selected for behaviourally modern humans who appeared in Africa between 100,000 and 50,000 y ago. However, core biochemical and physiologic processes have been preserved. It has been suggested that some populations are susceptible to chronic disease because of inherited genes (also referred to as "genotype"). This may be only partly true as our genotype is affected by our diet. The 'Barker hypothesis' formed in 1997 found a relationship between birth weight, subsequent growth and development, and the emergence of risk factors for chronic diseases. Since then numerous studies have shown that the associations are thought to be consequences of developmental plasticity, the phenomenon by which one genotype can give rise to a range of different physiological or morphological states in response to different environmental conditions during development. A recent study has shown that impaired growth in infancy and rapid childhood weight gain after age 2 years is related to an increased

risk to develop cardiovascular events later in life confirms this hypothesis. These disorders related to it arise through a series of interactions between environmental influences and the pathways of growth and development that precede them. Modern day feeding of our children with modern diets encourages their rapid weight gain during the early years of development causing them to be increased to the risk of non-communicable diseases. Foods identified as having potential addictive properties include sweets, carbohydrates, fats, sweet/fat combinations, and possibly processed and/or high salt foods.

It is widely accepted that chronic non-communicable diseases are largely due to preventable and modifiable risk factors such as obesity, lack of exercise, unhealthy diet, tobacco use and inappropriate use of alcohol. The increase in body weight during infancy and childhood along with excess body weight throughout life and obesity is associated with an increased risk of diseases. This increase in body weight is common as we age therefore excess body weight should not be measured using the Body Mass Index (BMI) which is the recommended universal criterion of overweight and obesity. BMI changes with age and level of activity as muscle and fat have different mass and contribute differently to BMI. The recent headlines has been: "Obesity Reduces Risk Of Cardiac Death" but this is misleading as the study measured BMI and risk of sudden cardiac death in a group of people already predisposed to heart problems. Waist-to-height ratio has been found to be a better predictive value for risk of cardiovascular events. Processed foods have been shown to be responsible for increase in waistline of our modern populations. Even though most of these studies were done to correlate BMI as an indicator of risk, they are still valid for the connection between consumption of processed foods and risk of obesity. For instance, a new study showed that relatively small lifestyle modifications related to weight reduction, physical activity and diet can decrease the risk of Type 2 diabetes in male smokers. Interestingly, no association was found between consumption of red meat, poultry and the risk of Type 2 diabetes but the reduction of the consumption of processed meat did indicate a risk of this disease.

In context with weight gain, another factor that contributes to increased risk of non-communicable diseases is physical inactivity. This is associated with increased levels of obesity, breast cancer, colon cancer, osteoporosis, stress, anxiety and depression. Physical inactivity is one of the major underlying causes of mortality in the world. It has been shown that moderate amounts of physical activity (frequency, duration and intensity) are associated with health benefits, and can help reduce various chronic diseases related to lifestyle. The urbanised lifestyle such as use of tobacco is one of the most modifiable risk factors and preventable causes of death for non-communicable diseases. The World Health Organization (WHO) attributes some 10 million deaths each year by 2020 to tobacco. It is estimated that by 2030 smoking will kill one in six people globally, if current trends continue. This will include seven million people in developing countries. Tobacco use has been associated with premature mortality amongst users, with cardiovascular disease (i.e. stroke and heart attack) causing most deaths. This is closely followed by chronic lung diseases, such as chronic bronchitis, emphysema and lung cancer.

In conclusion, diet and nutrition is a major modifiable determinant of chronic non communicable diseases, with scientific evidence supporting the view that alterations in diet

and activity have effects on health throughout life. Non-communicable diseases are linked to high consumption of energy dense foods, made of animal origin and of foods processed or prepared with added fat, sugar and salt. So why do we continue to consume these foods? Do we lack the knowledge that these foods are disease causing? This cannot be possible as we are constantly being bombarded by health organisations that processed foods are bad for us and we should eat as naturally as possible. Does the fault lie in our governments? Are they doing enough to reduce the consumption of processed foods in our society? In 2005, the US Food and Drug Administration indicated that around 10000 new processed foods are introduced every year and since then the processed food industry has boomed. The problem is these newly introduced processed foods are labelled with "low in fat, low in salt, low in sugar, no trans-fats, completely natural" which the consumer readily accepts. Just because the label indicates this, it is not the whole truth. Read more about this at www.foodmythsbusted.com.

Part 2: Diet To Prevent Non-Communicable Diseases

In 2004, the WHO developed a global strategy for diet, physical activity and health, to be implemented within the integrated prevention and control of non-communicable diseases. The strategy aimed at promoting healthy lifestyles (i.e. better food choices and increased physical activity) in a healthier environment, where nutritious foods, especially fruit and vegetables are available locally at reasonable prices. The strategy also seeks to promote simpler labelling of benefits and potential harmful effects of foods to enable people to make informed food choices.

A large body of literature shows that processed foods are energy dense foods. A review in 2006 on energy density of various foods found that sweet snacks, i.e., cookies, cakes, pies, ice cream, and chocolate bars, possessed an average energy content of 1,500–2,000 kJ each100 g, whereas savoury foods, i.e., potato chips, had an energy density of about 2,200 kJ and even in a ''low fat'' form were found to have an energy density of about 2,000 kJ each 100 g. In contrast, fruits and vegetables contain average energy densities of less than 100 kJ each 100 g. Processed foods are loaded with highly refined starches, concentrated sugars, and other chemicals such as fructose, can change the hormonal balance of the body to create 'a toxic environment and an addiction to food', leading to obesity and chronic diseases and this is extensively discussed in our book "Is Your Food Killing You?" MacInnis and Rausser (2005) for instance, show that energy density can be one of the major risk factors to the incidence of childhood obesity in the US. Increasing consumption of processed foods, therefore, could be taken as one of the most important risk factors for the growing overweight/obesity problem worldwide.

It is relatively easy to limit consumption of processed foods but what is the diet we should choose to prevent disease? The pursuit of the optimal human diet has come full circle, with an increased interest emerging in the positive aspects of ancestral diets. Groups whose way of life tends to continue the Stone Age pattern with hunter-gatherer diets have low rates of complex degenerative diseases; however, predictions arising from the ancestral health

concept have only just begun to be rigorously evaluated. A recent article in Nature, states "it is difficult to refute the assertion that if modern populations returned to a hunter-gatherer state then obesity and diabetes would not be the major public health threats that they now are. Nevertheless, the genetic loading that some unfortunate people receive is so adverse that they are likely to suffer metabolic disease despite their best efforts to avoid it". The problem with this statement is we do not know which of us falls into the category of "some unfortunate people". Does this mean we should not try to avoid processed food in the first instance? It would seem that there are yet many unanswered question and these are still under investigation by the scientific world.

The ancient Paleolithic diet consisted of wild animal-source foods (lean meats mainly high in protein and unsaturated fat, internal organs, bone marrow, but no dairy) and uncultivated plant-source foods (mostly fruits, non-grain, vegetables, nuts, but no legumes) with much higher levels of potassium being consumed. Calcium intake did not meet recommendations for any of the diets, and it was particularly low in the Paleolithic diet due to no dairy product. Current research on the Paleolithic diet has shown beneficial effects in blood pressure and glucose tolerance, a decrease in insulin secretion and an increase in insulin sensitivity without weight loss in less than 2 weeks on this diet—all important factors that would be necessary in any potential cure for most metabolic syndrome. This experimental Paleolithic diet looks like this:

Breakfast:	Honey, Carrot Juice, Scrambled eggs, Fresh pineapple and Pork tenderloin.
AM snack:	Almonds and or Carrot juice
Lunch:	Carrot juice, Tuna Salad (mayo, radishes, shallots) on lettuce and Low-salt tomato soup with chopped tomatoes
Day Snack:	Turkey, guacamole and tomato lettuce roll-ups
Dinner:	Chicken breast stir-fry with fresh spinach, garlic and broccoli, Roasted parsnips and mushrooms with thyme and Low-salt tomato soup
PM Snack	Cantaloupe and Carrot juice

An interesting observation is that a majority of these foods in the Paleolithic diet are in the raw form and supports the leukocytosis theory. In 1930s, Dr. Paul Kouchakoff studied the influence of cooked food on our blood. He found that unaltered food (i.e. not been overheated or refined in any way) did not cause leukocytosis but food that had been heated beyond a certain temperature (unique to each food), or food that was processed, always caused a rise in the number of white cells. Another remarkable finding was that if a cooked foodstuff is eaten along with the same food in the raw state, there is no pathological reaction. The raw food will neutralize the detrimental effects of the altered food. It is recommended to eat raw vegetables (as little as 10% of the meal) with every meal, along with some lightly cooked ones and the Paleolithic diet above seems to fulfil this criteria.

The question remains: Should we return to the "Stone age" or an ancestral- based "Paleolithic" diet? Would this be suitable and easily incorporated in our hectic daily lifestyle? Care should be exercised in recognizing that a typical Paleolithic diet as the one described above would fail to meet current daily requirements and may not be feasible on a long-term basis. The diet above consists none of the foods that our bodies automatically crave for: wholegrains in the form of breads or rice, pasta or noodles, fish and shellfish as well as chocolates. Each of these food groups have also been shown to be beneficial to our health. A more practical approach would be to consume foods with added health benefits that were found prevalent in ancestral diets as functional foods, in addition to a healthy lifestyle to help prevent chronic diseases. In view of this, there are some lessons can we learn from the Paleolithic diet that we can incorporate into our modern day diets that will help us prevent diseases. Here are some tips (adapted from Vorster et al., 2001):

- **Enjoy a variety of foods** – it is important in ensuring that the body gets a variety of nutrients. Where possible, eat fresh locally grown foods preferably freshly harvested as well and wild or free range meat produce.
- **Drink lots of clean, safe water** – this is important for dissolving certain nutrients and assists in reducing constipation. Ensure where possible you remove contaminants such as fluoride from your water source.
- **Make carbohydrate from unrefined wholegrains the basis of most meals** - unrefined wholegrain wheat and other unrefined wholegrains such as buckwheat contains antioxidants such as zinc, selenium and magnesium that are important in the prevention of cancer. Where possible fermented grains as occurs in bread making are of benefit and this is discussed in our article "Wholegrains and their health benefits".
- **Eat plenty of fruit and vegetables** - for their fibre, micronutrients and antioxidants, which are essential in the prevention of certain types of cancers and in the reduction of the risk for overweight and coronary heart diseases. Ensure you wash your vegetables with Organic Produce Wash to reduce the consumption of pesticides and herbicides.
- **Eat dry beans, peas, lentils and soya often** - for increased soluble fibre, protein and flavonoids intake. Soluble fibre is important for lowering blood cholesterol therefore, preventing the risk of cardiovascular diseases. Do not consume processed soya products such as tofu or store bought soya milk as an alternative to dry soya beans as any benefit acquired from the soya beans is counteracted by preservatives and additives in the processed products.
- **Meat, fish, chicken, milk and eggs can be eaten everyday** - although foods in this category can be consumed daily, over-consumption of animal-based food may increase the risk of cancer due to the method of cooking and production of carcinogenic products. Eat white fleshed fish and red fresh water fish at least once a week. Avoid processed versions of these meats.
- **Eat fats sparingly** - to prevent a high intake of fat and saturated fats. High consumption of fats has been linked with overweight, cardiovascular diseases, high cholesterol, diabetes and certain cancers. Moderate amount of fat is necessary for normal function of our cells. It has also been shown to act in synergy with vegetables

and fruits to provide a benefit from vegetables and fruits. Fats in the form of butter or other dairy products have been shown to be especially beneficial in this respect. Also having a balanced omega-3: omega-6 polyunsaturated fatty acid ratio and to keep this in the correct proportion to saturated fats in the diet helps maintain a healthy lifestyle.

- **Use salt sparingly** - High refined salt intake increases the risk of coronary heart diseases and stroke, and increases blood pressure. Use unrefined salt where possible. Avoid processed foods as these contain lots of hidden salts. Use traditionally made dark soy sauce in cooking as this has been shown to have cancer prevention benefits.
- **Use foods and drinks that contain unrefined sugar –** this unrefined sugar is found naturally in fruits and vegetables. Avoid refined sugar where possible, especially high fructose corn syrup found in a variety of processed foods.
- **Do not take vitamin supplements if you are healthy-** There are no evidences that supplements prevent diseases in a healthy individual.
- **If you drink alcohol, drink sensibly** - excessive alcohol consumption may contribute to overweight as alcohol is high in energy. This will therefore increase the risk for coronary heart disease, hypertension and diabetes. Excessive alcohol consumption can increase the risk of developing certain types of cancers and high blood pressure. A little red wine is beneficial due to the antioxidants found in these products.
- **Be physically and mentally active** – this is an important preventative measure for diabetes, obesity and hypertension. This is also an important factor in aging as discussed in our article "Aging and Nutrition".
- **Eat probiotic products** - recent studies have focused on intestinal microbial flora as environmental factors that increase energy yield from diet, regulate peripheral metabolism and thereby increase body weight. Intestinal microbial flora may play a pivotal role in converting nutrients into energy. Increased energy yield from diet in obese mice and humans could be a contributing factor to obesity and changing this microenvironment with probiotic bacteria is beneficial. Consuming probiotics at least once a week may be useful. Consuming products fermented by probiotic bacteria such as occurs in traditionally made cheeses has also been shown to be of benefit.

More on the food topics mentioned above as well as the synergy of food and how to cook foods to prevent carcinogenic products are discussed in "Is Your Food Killing You?"

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