



Food Rx

A Review and Critical Analysis

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Hippocrates, an ancient Greek physician (460BC-370BC) once said “Let food be thy medicine, and let medicine be thy food.” This ancient but true statement has long been forgotten in Western society. In our culture, we eat whatever we please whenever we please. Food is no longer pictured as nourishment for the body. This mindset has led to the development of many lifestyle diseases such as diabetes and heart disease. Yet, a doctor will readily prescribe drugs to patients with such diseases as a solution to the problem, when the problem itself can be cured and prevented through diet alone.

Americans are not totally to blame for bad diet. Since the 1950’s, the US has seen dramatic changes in its food supply that has caused food to have less micronutrient composition, lead to food allergies and intolerances, and even become questionable as to whether it’s safe to eat. Many of these changes in our food supply have been introduced in order to keep up with growing consumer demands, yet it has been documented that our food supply no longer provides us with the nutrients that we need (Krebs-Smith, Reedy, & Bosire, 2010). Somewhere down the line food production became more of a money-making scheme and less of an important entity to provide proper fuel for the American public.

This review and critical analysis was written in response to the many faces of our current “food crisis”. A literature review was conducted of 20 articles relating to several different aspects of our nation’s food supply and health. Several causes of the food crisis have been outlined as changes in the food supply itself, genetic engineering of food, diet habits in the US as a result of our changing food supply, and the direct link between diet and health. In addition to the literature review, I documented my own personal experiences with food as I went on a raw foods vegan diet for 14 days.

Documented Changes in Food

Since the 1950's, our nation has seen dramatic changes in our food supply. One of the major changes is the decrease in micronutrients in our food. Micronutrients are vitamins and minerals that are needed for various bodily functions that we cannot produce on our own. As the world encounters the issue of a growing population and rapidly disappearing natural resources, changes have been made to our food supply to increase the amount of food being produced.

A study conducted by Davis, Epp, and Riordan (2004) examined the decline in nutrient content in 43 garden crops between 1950 and 1999. This was done by comparing published USDA Food Composition Data reports. The 43 garden crops that were evaluated consisted of 39 common vegetables, 3 types of melon, and strawberries. Researchers examined past reports for changes in water content and 13 key nutrients. As a result, it was concluded that there were statistically reliable declines in 6 of the 13 key nutrients across all data. These nutrients included protein, calcium, phosphorus, iron, riboflavin, and ascorbic acid. Declines in median ranged from 6% (for protein) to 38% (riboflavin). The authors of this article suggest that growing demand resulted in a trade-off between higher yield and nutrient content. Sacrifices in nutrient content for greater yield do little to solve the food crisis, as we now need to consume more food in order to meet dietary requirements for certain micronutrients.

In addition to examining changes in nutrient content in food, other studies have focused on changes in levels of toxins and chemical contaminants. This becomes important as many biotechnological changes are being introduced that pose risks for human consumption. The FDA's Total Diet Study (TDS) has been conducted annually since 1960 as a means of monitoring levels of toxins and chemical contaminants in the food supply. TDS was implemented in response to growing concerns about radionuclide contamination of food due to atmospheric

nuclear testing in 1961. TDS has also become an important method for analyzing nutrient intake by selected age-sex groups. A study by Egan, et al. (2002) used the FDA's TDS data from 1991 to 1996 to examine changes in intake of nutritional and toxic elements. A total of 260 foods were chosen for TDS based on reported consumption frequency. These foods were later divided into 13 major food groups. All TDS foods were analyzed for all elements except mercury, which is only found in seafood. Total intake of nutritional elements was compared with intake references created by the Food and Nutrition Board in 1989. Intake of toxic elements was compared with Provisional Tolerable Weekly Intakes established by the Joint FAO/WHO Expert Committee on Food Additives. Dietary intake for 14 different age-sex groups were estimated by multiplying average concentration of each element by the amount of each food consumed. Normal limit of detection and limit of quantitation were calculated for each element.

After comparison of TDS data between 1991 and 1996, it was determined that for most nutritional elements, teenage boys and adult males had the highest daily intakes. Nutritional intakes by infants were below recommended amounts for 7 out of 10 nutritional elements. In addition, girls and young women had inadequate intakes of at least half of the nutritional elements. Intakes by all 14 age-sex groups were reported as being below reference intakes for all toxic elements. However, it is important to note that this data is based on estimations. Another limitation in the Total Diet Study itself is that only certain foods are chosen for analysis, and some outliers are included in this analysis.

Biofortification of Food

Another proposed solution to the ongoing food crisis is biofortification. This process involves genotypic variation in micronutrients of food in order to promote sustainable agriculture. The biofortification process also is intended to return nutrients to soil. A review

article conducted by Khoshgoftarmanesh, et al. (2010) examined the proposed solutions to promote sustainable agriculture and solve the food crisis. This review compared methods of soil fertilization, seed priming, crop rotation, and biofortification through selection and breeding of micronutrient-efficient genotypes. This article is unique in that it recognizes the importance of maintaining food quality in addition to increasing quantity.

Through comparing and contrasting different proposed methods to increase crop yield, improve soil, and maintain micronutrient composition, the authors concluded that soil fertilization is the simplest way to correct micronutrient deficiency, yet it is not always successful nor is it a sustainable method. Seed priming is a cost-effective method for improving crop yield, yet the safety of the food produced by this method is in question. Crop rotation was determined to be helpful in preventing micronutrient deficiency. Selection and breeding for micronutrient efficiency was concluded as being a beneficial, low-cost alternative that is sustainable. This process could work really well for staple food crops. However, there are many drawbacks in this process in that the crops may not be stable in response to nutrient efficiency in different environmental conditions. In addition, there is no reliable process to screen for toxic elements that could be increased along with micronutrients. Lastly, even though selection and breeding of micronutrient-efficient genotypes can help prevent disease of crop, it leads to a decrease in genetic diversity, which can compromise the survival of the crop over time.

Another article written by Bouis in 2003 further addressed the issue of micronutrient fortification. Bouis conducted a review on the pros and cons of micronutrient fortification, specifically looking at micronutrient fortification as a means of producing sustainable agriculture in developing countries. He argued that fortified seeds can be developed to produce seeds that fortify themselves, which creates low recurrent costs and promotes sustainability. Conventional

breeding processes allow for short-term increase in mineral content of staple foods. Transgenic techniques can then be used to supplement these processes by further increasing mineral density. Bouis notes that this would ultimately increase crop yield, since increased nutrients in plants allows them to develop more resistance to disease. He concludes this article by stating that biofortification should be considered when analyzing food issues in developing countries, since this solution is cheap, easy, and sustainable. Although he provides a strong argument for the benefits of biofortification, Bouis does not address the risks that fortified seeds may introduce to the environment as well as the consumer, especially when these seeds have been fortified through transgenic processes.

Genetically Modified Food

Biofortification contains two main pathways: selective breeding and genetic engineering. Genetic engineering differs from selective breeding in that genes from other plants are inserted into seeds in order to increase production of certain micronutrients. Genetic engineering is also used a means of increasing disease resistance and product yield. Over the last fifteen years, genetic engineering in our food supply has grown to be a huge money-making business for major biotech companies like Monsanto and Syngenta. According to the USDA, 93% of soy and 86% of corn produced in the US in 2009 was genetically modified. In addition, GM foods are sold in approximately 80% of packaged foods in the average US grocery store (*The Non-GMO Project*, 2009).

However, there is much concern over whether genetic engineering of food produces food that is safe for the consumer. In a study conducted by Dona and Arvanitoyannis in 2009, it was revealed that the process of gene transfer is highly unpredictable as different products are produced by each new attempt. In addition, products of gene transfer are often unstable and don't

break down under normal metabolic processes. It was also noted that transgenic processes lead to the production of anti-nutrients, which interfere with absorption of nutrients and have been known to cause infertility in several animal subjects.

Genetic engineering of food has been a hot issue in other countries as well. For instance, Canada is introducing genetically engineered breeds of pigs and salmon for human consumption (Sharratt, 2011). The genetically engineered pig contains DNA from mice and *E. coli* bacteria. The combination of these different types of DNA creates an enzyme in the pig that causes the pig to produce less phosphorus in its feces. Phosphorus production by pigs is a concern to farmers who use animal manure as fertilizer because too much phosphorus in the fertilizer becomes a pollutant. Therefore, genetic engineering in pigs looks like a viable solution because it would lead to clean fertilizer for soil and would benefit the environment. Yet, much research is needed to confirm the safety of these genetically engineered pigs for human consumption.

In addition to these pigs, Aquabounty, a US company, is lobbying to farm genetically engineered salmon to sell to US consumers. The reasoning behind this is that the salmon would be engineered with a growth hormone gene that will make the fish grow market size at a much faster rate than other farmed salmon. The FDA claims that this fish would be safe to eat, however the tests that the FDA ran on the levels of hormones in these fish were very limited and deficient (Sharratt, 2011). The genetically engineered salmon have a lower ratio of omega-3 to omega-6 fatty acids. This becomes a concern because omega-6 fatty acids are inflammatory, while omega-3 fatty acids reduce inflammation.

The issue of genetically engineered pigs and salmon in Canada are controversial since there are no set regulations on genetically engineered animals. In addition, there is no mandatory labeling of genetically engineered foods in Canada. In the US, the FDA and the USDA have not

set any regulations on labeling of genetically modified foods. Many political activists, such as Alex Jack, have sought to raise awareness of GMO's and urge the FDA to require labels for GM foods (Niedringhaus and Davis, 2011). Jack, a macrobiotic teacher, counselor, environmentalist, and author, has spent many years trying to protect our rice, wheat, and other foods from genetic engineering. In an interview, Alex Jack noted that even organic foods are in danger of being contaminated from the growing number of genetically modified crops. GM alfalfa is also a huge concern, since many dairy cows consume alfalfa. If alfalfa were modified, it would pose problems for all dairy products as traces of the GM alfalfa would be found in the milk produced by the cows consuming the modified alfalfa. Alfalfa is also commonly used to enrich soil. This would provide an opportunity for cross-contamination. Through his work, Jack urges people to educate themselves and others on the dangers of GMOs in our food supply. He also encourages others to be knowledgeable of where our food comes from and to develop a relationship with the grower.

One of the major concerns that have been raised with genetic engineering in food is the possible link between GMOs and food allergies. Many pesticides that are inserted into the genes of crops for the purpose of disease resistance are still present in levels that are toxic to humans. Smith (2007) points out that *Bacillus thuringiensis*, or Bt spray is toxic to humans, but is still used because in small amounts it is reported to not have any effect on the consumer. Therefore, it is assumed to be non-toxic when used in transgenic processes. In sprayed crops, sun, rain and other environmental factors break down the Bt toxin over time. However, the Bt that is genetically inserted into crops is even more toxic, since the consumer is exposed to the full amount that is inserted.

Smith also argues that there are medical reports of people having allergic reactions when exposed to Bt cotton and Bt corn. In a Filipino village of 100 people who were exposed to Bt corn pollen from a neighboring field, 39 showed antibody response to Bt toxin when blood samples were taken. Other related studies have shown immune responses to GM crops (Smith, 2007).

Other articles have examined processed and genetically modified wheat as it relates to intolerances and allergies. One study conducted by Tatham and Shewry (2008) reviewed previous literature on wheat processing and allergens associated with wheat. Many but not all of the proteins in wheat that are responsible for baker's asthma and wheat allergies have been identified through sodium dodecylsulphate polyacrylamide gel electrophoresis (SDS-PAGE) and various skin tests. CM proteins have been identified as the main allergens in wheat. Studies have shown that allergens in wheat can actually be increased by cooking wheat products. Little is known about the effects of processing on wheat allergens. However, one study suggests that hydrolyzed wheat in skin products can cause severe allergic reactions, even when the patient showed no allergic reaction to unmodified wheat proteins in skin tests (Laurière et al., 2006). To conclude their review article, Tatham and Shewry suggest that genetic engineering can be used to can promote gene silencing of genes that express certain wheat proteins. This can be done through preventing gene translation at the mRNA level. However, there is no evidence that this process will provide stable suppression of wheat allergens in the long-term. More controlled studies are needed to support this suggestion.

Current Diet of the US Population

Since our food supply has changed dramatically over the recent decades, has this changed how the US population eats? One study by Pennington and Hernandez (2002) examined the core

foods of the US food supply between 1994 and 1996. The core foods are the foods that are most frequently consumed. This model is a useful mechanism to determine the most important foods in a population's food supply so that these foods can be further examined. This information is also used to help develop the Recommended Dietary Intakes (RDIs). In the study conducted by Pennington and Hernandez, 16,065 adults between ages of 19 and 30 were surveyed on their food consumption habits using the USDA's Continuing Survey of the Food Intake of Individuals (CSFII). This survey examines food consumption habits in terms of meals, food preparation, and shopping lists. A total of 5,722 foods were identified as consumed by survey participants, and these foods were broken down into 300 groups based on food type, food use, and similar nutrient composition. Foods in each group were ranked by frequency of consumption, and the most frequently consumed food from each group was chosen to represent the groups. From this method, 304 core foods were identified and coded. The core foods with the largest number of USDA codes were roasted chicken breast, white bread, white cake with white icing, and chicken noodle soup. The highest consumption frequencies were found for white bread, low fat milk, whole milk, regular coffee, and cola carbonated soda. Although the core foods model does provide insightful information on diet habits of a population, this study does not indicate demographics, social statuses, or how survey participants were chosen.

In response to the dramatic changes in our food supply, many are concerned that the current food supply does not provide us with the recommended daily amounts of vitamins and minerals. In a study conducted by Krebs-Smith, Reedy, and Bosire (2010), the authors examined data from the Healthy Eating Index-2005, the USDA's Food Availability Data, Loss-Adjusted Food Availability Data, Nutrient Availability Data, and US Salt Institute's data on salt sold for human consumption to assess whether the US food supply between 1970 and 2007 conforms to

Federal dietary guidance. From this study, it was determined that while meats and grains were supplied in recommended proportions, total vegetables, total fruit, whole fruit, and milk were not supplied enough and changed very little over time. Dark-green and orange vegetables and legumes were entirely insufficient with no change over time. In addition, saturated fat, sodium, and calories from solid fats, alcoholic beverages, and added sugars were found to be in unhealthy abundance between 1970 and 2007 (Krebs-Smith, Reedy, and Bosire, 2010). Since fruits and vegetables are not supplied in recommended proportions, yet saturated fats, sodium, and sugars are readily available for consumption, this is a clear indication of how the food supply and ultimately the diet of the US population has taken a turn for the worst.

Not surprisingly, it is evident that changes in our food supply have dramatically affected our diet habits, which in turn have greatly impacted our health. “Lifestyle” diseases such as diabetes have skyrocketed due to changing diet habits in our country. In the documentary titled *Food Matters: You are what you eat*, producers Colquhoun and ten Bosch highlight these changes in our food supply and diet as being the direct cause of type II diabetes, high blood pressure, heart disease, and many other diseases. This documentary takes on a political approach as it critically examines Western medicine’s refusal to address nutrition as a mode of healing. Because Western medicine is very compartmentalized and fails to look at health through a holistic approach, pharmaceutical companies continue to make money at the expense of people’s lives. There is no money in being healthy. The recent development of these lifestyle diseases have brought in a lot of revenue for drug companies. Through interviews with leading experts in nutrition and natural healing, this documentary proves that you really are what you eat. So much of our food is highly processed and nutrient depleted, which leads to a significantly weakened immune system. In addition, our natural resources are depleted of nutrients and we need to figure

out a way to promote sustainable agriculture while putting back the nutrients we need into the soil (Colquhoun and ten Bosch, 2011).

A similar documentary produced by Wendel, Corry, and Boon (2011) also critically examines the current diet of the US population and what it's doing to our health. This documentary suggests that the cause, cure, and prevention of many different degenerative diseases all lead to one thing: diet. In *Forks Over Knives*, the documentary follows the research of Dr. T. Colin Campbell and Dr. Caldwell Esselstyn leading to the discovery of the benefits of a plant-based diet. Plant-based diets are often criticized for not providing enough nutrients, as many are led to believe that animal products are necessary to our health. In reality, we can get much of the protein, calcium, and other nutrients we need just from plants (Wendel, Correy, and Boon, 2011). This film involves the clinical trials of real patients who have switched to plant-based diets and have benefitted greatly from doing so.

The Direct Link Between Diet and Health

The most difficult part of maintaining a healthy diet is finding balance. It's challenging, especially with our food supply, to balance the right vitamins and minerals our bodies need while cutting back on saturated fats, sodium, and sugar. One of the major changes in our diet has been the increase in consumption of niacin (vitamin B₃) because of B-vitamin fortification in grains. This could lead to a chronic overload of B-vitamins. A study by Zhou et al. (2010) examined the possible link between B-vitamin consumption and development of diabetes and obesity. This study was based on a time-lag regression analysis of the past 50 years using per capita consumption data from the US Economic Research Service and data from US Centers for Disease Control and Prevention. This data also included the National Health Interview Survey, the Nation Health Examination Survey, and the National Health and Nutrition Examination

Surveys. It was concluded that long-term exposure to B vitamins may have led to an increase in diabetes and obesity in the US within the last 50 years. This is likely due to B-vitamin fortification and excess consumption of niacin. Significant correlations were found between prevalence of diabetes and increased niacin consumption. Grains, which became fortified with niacin, showed a huge peak in consumption in the 1930s and 1940s. That peak was immediately followed by a spike in diabetes within the US population. There were significant correlations found between grain contribution to energy consumption and prevalence of obesity. However, there were no significant correlations between increased obesity prevalence and other main energy contributors such as meat, animal fats, and sugars. This study indicates the necessity for further research on the long-term implications of vitamin fortification of food.

In Western medicine, the idea of changing diet to promote better health is commonly overlooked. Diabetics are often told that there is nothing they can do to completely cure their condition, and they are led to believe that they will be taking insulin and other medications for the rest of their lives. In *Simply Raw: Reversing Diabetes in 30 Days*, producers Elliot and Maliga follow the experiences of a small group of six diabetics as they are challenged to adopt a strict, raw foods, vegan diet for 30 days in attempts to significantly decrease the amount of medications they take. Four out of the six participants have type II diabetes, one is type I, and one participant is both type I and type II diabetic. Throughout the 30 days, the participants resided in a retreat center in Arizona where they were fed healthy, raw foods. Their blood sugar levels were measured before and after every meal, and the producers interviewed the participants about their physical, mental, and emotional well-being during the process. Four out of the six participants saw a dramatic improvement in their blood sugar levels within the first week of eating raw. At the end of the 30 days, all participants had significantly decreased the amount of

insulin and medications, and all showed significant improvement in their blood sugar levels. These dramatic changes all came from 4 weeks of abstaining from meat, dairy, caffeine, alcohol, and processed and cooked foods. This documentary clearly demonstrates the importance of diet in health. It also supports the need for more plant-based foods in our diet, as plants provide all of the nutrients that our bodies need.

A similar documentary followed the experiences of Joe Cross, a man suffering from obesity and urticaria. Urticaria is a rare autoimmune disease in which the immune system is overly-sensitive and results in multiple allergic reactions and intolerances. In *Fat, Sick, & Nearly Dead* (2010), Cross challenged himself to reverse the effects of his disorder by adopting a healthier lifestyle. To do so, he began a unique type of fasting that involved consuming only vegetable juice for 60 days. At the end of the 60 days, Cross was successfully taken off of all of his medications. During his journey, he inspired other people to try the juice fast. This fast had produced amazing results for all that attempted it. The remarkable thing about Cross' story is that it highlights that diet not only effects digestion and metabolism, but immune system function. He no longer suffers from urticaria, and his immune system functions normally after significantly improving his diet habits.

The idea that diabetes can be better managed through changing diet habits has been well documented. A review article by Barnard, et al. (2009) indicated that clinical trials of vegetarian and vegan diets were commonly associated with lower body weight, increased insulin sensitivity, and reduced risk of diabetes. This study was a review of both observational and clinical studies on the effects of vegetarian and vegan diets and management of type II diabetes. In observational studies, it was found that prevalence of diabetes is lower among vegetarians in comparison with omnivores. In a long term-study involving 8,401 Seventh-day Adventists (who avoid tobacco,

alcohol, and caffeine for religious reasons, and of whom roughly half are vegetarian), people who ate meat once per week were estimated to have a 29% higher chance of developing diabetes than those who ate no meat. Those who consumed processed meats were 38% more likely to develop diabetes (Barnard et al., 2009). Other observational studies have reported meat consumption as being associated with development of type II diabetes. In reviewing clinical trials, early studies have shown significant decreases in medication use when diabetic patients switched to a vegetarian or vegan diet. In addition, some studies reported that this diet change resulted in increased insulin sensitivity and glycemic control. In a related study involving 212 participants going on a near-vegetarian diet, 83 participants discontinued the use of insulin at the end of the 26-day trial (Barnard et al., 2009). In conclusion, Barnard et al. noted that individuals with type II diabetes that undertake vegetarian or vegan lifestyle changes experience favorable changes in both macronutrient and micronutrient uptake. Larger clinical studies are needed to confirm these findings.

Vegetarianism and veganism have often been criticized for leading to nutritional deficiencies. According to a study by Wiwanitkit, Soogarun, and Suwamsaksri (2004), the abstinence of meat in vegetarians can lead to anemia and decreased hemoglobin levels. In this study, the authors examined the health of 50 male Thai subjects. Of these subjects, 25 were vegan Mahayana Buddhist monks, and 25 were non-vegetarian Hinayana Buddhist monks. One blood sample was taken from each participant on a daily basis and analyzed to measure hematocrit, hemoglobin levels, mean corpuscular volume and red blood cell distribution. The authors found that hematocrit and hemoglobin levels were significantly different between the vegan Buddhist monks and the non-vegetarian Buddhist monks. Both parameters showed significantly lower levels in the vegan group. The authors concluded that this reflects the

existence of anemia in this population. However, the authors note that other factors besides diet could have contributed to the anemia.

Raw Foods Experience

Prior to this project, I attempted a raw foods detox diet for five days to see how I would feel after eliminating meat, grains, dairy, caffeine, cooked, and processed foods from my diet. After partaking in this experience for only five days, my skin looked much clearer, and I felt I had more energy. I began to realize that fruits and vegetables, although they provide much of the nutrients that our bodies need, are not a key component of our nation's diet. This experience opened my eyes to what is going on with our food supply. The issues with food today are both a concern of the consumer and supplier. In addition, I was shocked to discover that these issues are not questioned or challenged, as most people don't even realize the implications of diet. I feel that these issues are something that should be contemplated, discussed, and acted upon as they affect not just a small group of people but everyone. Everyone eats, and everyone should have a right to know what they are putting into their bodies.

I decided to challenge myself further and attempt a second raw foods detox diet, this time for 14 days. This would be ample time to allow my body to adapt to the drastic changes I was making in my diet, as well as help me to develop important habits in making good food choices. I expected that I would experience more energy, better sleep, clear skin, and just better mood overall after eating completely raw.

The first few days were the most challenging. I became so focused on the foods that I couldn't have that I developed a negative mindset and began to feel like I was missing out. I also experienced a terrible headache from sugar withdrawal. However, within the first four days, I began to see changes in my skin. I dealt with the negative mindset by finding ways to keep

myself occupied so I couldn't think about food. By the end of the first week, I noticed a huge improvement in my sleep. I slept more deeply, and always felt refreshed and recharged the next day. I also experienced more sustained energy throughout the day (appendix A).

Even though my raw foods diet is over, I am still challenging myself to eat raw fruits and vegetables with every meal. I have noticed that I no longer have sugar cravings, and I don't have the same taste for meat and dairy. Instead, I crave salads and fresh fruits. This detox diet, although challenging, has been a positive experience that I hope will change the way I eat for the rest of my life.

This research and my own experiences have changed my views on food, diet, and our food supply. The food crisis that we are experiencing is made up of several factors that all lead to health risks for the consumer. These factors include micronutrient depletion in both crops and soil, biofortification of food, development of food allergies and intolerances, the diet choices that the US population makes, and the development of lifestyle diseases. It has been documented that our food has gone down in nutritional value, and one of the major contributors is the depleted soil. Micronutrient depleted soil is a growing concern that has been assessed from angles of biofortification in terms of both selective breeding and genetic engineering. Genetic engineering changes the genetic makeup of food, which ultimately changes the way it is metabolized in the consumer's body. These patterns persist, and when combined with poor diet choices lead to food allergies, obesity, diabetes, and heart disease.

Hippocrates was correct when he implied that food is medicine for the body. It has been well proven that a well-balanced diet will strengthen the body's immune system and help ward off disease. This is something we must never forget. Food is important. We should take good care of our food supply, so that ultimately we can care for ourselves.

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Appendix A: Blog Posts

Tuesday, Jan 3rd

Disclaimer

The opinions and ideas shared in this blog are of my personal thoughts and experiences. If I make any bold claims I will do my best to back up my arguments by citing sources.

Over the next few weeks, I plan to research and create a review paper on the condition of our nation's food supply. This research will be conducted of 15-20 scholarly articles may include information on GMOs, food allergies, nutritional value, history, and FDA and USDA. Ideally, I would like to be able to research all sides of these issues, but I have limited time to conduct research and write my final paper. I plan to share interesting research findings on this blog.

For two weeks, I will be going on the raw foods diet. I recognize that the purpose of the raw foods diet is a detox and is most effective when experienced over 30 days or longer.

However, I have attempted the raw foods diet for 5 days and at the end of those 5 days have already seen a tremendous difference in my overall health and well-being. I hope that by abstaining from processed and cooked foods over 14 days, I will experience more energy, better sleep, improved mood, and decreased stress. I will document these experiences by updating this blog daily.

Lastly, I've never created a blog before. I'm still trying to figure out all these "gadgets" and settings, so please bear with me. I welcome all comments and suggestions!

Thank you for following me on my journey.

Thursday, Jan 5th

Things to Ponder...

Hippocrates once said "Let food be thy medicine, and let thy medicine be food". In our society, we think of food and medicine as entirely different entities. It is absolutely remarkable how much what we eat can affect us not only physically, but mentally/emotionally as well. There's a book that highlights this, *The Food Mood Connection* by Gary Null. I have not read this book yet, but I have heard wonderful things. This book is definitely on my to do list.

Recently, I have been watching a documentary titled "Simply Raw: Reversing Diabetes in 30 Days", created by Mark Perlmutter and produced by Aiyanna Elliot and Leda Maliga. In this documentary, six people suffering from diabetes were chosen to take part in a 30 day program in which they retreat to a remote location, try to go off of their medications and insulin, and are fed nothing but vegan, raw, organic foods. Five of these participants are type 2 diabetic, and one is type 1. The documentary follows the struggles and accomplishments of these six participants as the program significantly improves their blood sugar levels and teaches them a new lifestyle. [click here to learn more about the raw for thirty challenge](#) This documentary really makes you think about the poor diet habits that many people in our nation have developed, and how much external sources have created these poor habits. It is interesting to me to think about how these habits develop, and how/why people make some of the diet choices they do. Often, it has to do with time and money. Good, nutritious food is not always accessible and when it is, it's often expensive. In my personal opinion, I think we should start to think about how spending a few extra dollars now on nutritious food can save us the financial burden of hospital bills later on.

Saturday, Jan 7th

Stuck

One of the angles that my research has taken is the idea of improving micronutrient quality in food by selecting and breeding micronutrient-efficient genotypes (Khoshgoftarmanesh et al., 2010). On the surface, this seems like a logical approach to solving the world food crisis, as we are expected to have another 4 billion people on this earth by 2050 (granted the world doesn't end in 2012). So we would be able to select the crop we want, and then produce the exact same crop in mass quantities. This crop would be rich in the micronutrients that our bodies need. We would then hopefully be able to feed everyone and ensure that everyone is getting the nutrients they need. Cool.

I am no expert in sustainable agriculture by any means, but I do know that if you select and breed a species to have genetically identical offspring, you will eventually have no genetic diversity whatsoever. This will ultimately compromise the survival of that species as a whole, because all it takes is one disease that the species is unable to develop any sort of resistance to, and then it's goodbye to that species. Then we will have no micronutrients. So right now we're stuck.

What are your thoughts on this issue?

I'll let you know when I come up with a solution for world hunger. And peace. I'm working on that one too.

References:

Khoshgoftarmanesh, A.H., Schulin, R., Chaney, R.L., Daneshbakhsh, B., and Afyuni, M. (2010). Micronutrient-efficient genotypes for crop yield and nutritional quality in sustainable agriculture. A review. *Agronomy for Sustainable Development*. 30, 83-107.

Sunday, Jan 8th

The Last Supper

Today was my last day eating "real" food.

But in all honesty, I'm really excited to start my raw foods diet. I know my body really needs it. I am ashamed to admit it, but I think I've eaten out just about every single day this week. Other than the broccoli and salad I had with dinner tonight, I can't remember the last green food I ate....

It is amazing to me how much your skin is a clear sign of your health. The last time I tried the raw foods diet (even though it was only for 5 days), the biggest change I noticed was in the clarity of my skin. When I looked in the mirror, I felt like my face was just glowing, kind of like how you feel if you've spent spring break in a warm, sunny location, and your skin is just so happy and healthy. Even though I wasn't tan, I just looked and felt so much healthier. This last week, because I have eaten so much crap and drank so much pop, (not to mention the Christmas cookie binge because I don't want to have to look at them next week when I can't have them..) my skin looks like I time-travelled back to middle school. My cells are craving fruits and veggies. I work at a grocery store, and the other day the food ladies were demo-ing a kale salad. It was just kale with carrots, sunflower seeds, and a light vinaigrette. It was delicious, and I'm almost positive my cells started dancing.

I'm hoping that through just 2 weeks of eating nothing but raw fruits and veggies, nuts, and seeds, I will experience the following:

- more energy
- better sleep
- clear skin
- decrease in sugar craving
- increase in cravings for healthy food

In addition, I'm hoping that extra energy will help me get going on training for a 10k I hope to do this summer. By the end of January, I will be a lean, mean, green-eating machine! (well maybe not mean)
I'm ready to eat the REAL real food.

Monday, Jan 9th

Day One

1 day down...13 to go...

Today was really not that bad. I was able to have my favorite breakfast in the world: organic banana with real, organic peanut butter. I snacked on peanuts and pistachios when I got hungry, drank lots of water, and had a delicious quinoa salad for dinner. I really noticed the times I'm tempted to munch...whenever I walked through the kitchen I was tempted to grab one of those darn Christmas cookies sitting on the counter, or grab some sort of snacky thing out of the cupboard. However, I did not cheat today. I made mental note of my cravings, and told myself that if I stick to this, my cravings will start to change.

I anticipate that the next couple of days will get harder as my body starts to detox..but I have found a couple recipes for raw desserts that include making my own chocolate. I have those recipes saved for the days I will really need them.

Tuesday, Jan 10th

Coincidence?

When you search information on genetically modified foods, you will almost always find the work of Jeffrey M. Smith. Smith is the author of *Seeds of Deception* and is the one who started the Say No to GMO's campaign. In my research, I came across an article he wrote on a possible link between GMOs and food allergies. Genetic engineering in our food supply started in 1996. Isn't it interesting that there has been a significant rise in food allergies within the last decade? Correlation does not prove causation, but Smith makes some compelling points in his article:

- a common pesticide genetically inserted into corn and cotton, *Bacillus thuringiensis*, or Bt, has actually been found to be dangerous to humans. Farmers who have been exposed to Bt spray have reported allergy or flu-like symptoms. In cases of exposure to liquid Bt, farmers developed skin irritation, burning, swelling, and even some cases of ulcers developing on the cornea. One woman who was accidentally sprayed with Bt experienced fever, altered consciousness, and seizures.

- Bt that is in GM foods is even more toxic than its spray or liquid form. Once genetically altered, the plants can produce up to 5,000 times the amount of toxin than is in spray form. In addition, toxins on sprayed plants can be broken down naturally by sunlight or high temperatures, and can be rinsed off in rain.

- Studies on animals have shown an immune response to GM crops, including increased lymphocytes and total white blood cells.

These are just some of the arguments that Smith makes in his article. Many people will

argue that the studies on animals are irrelevant because it delves into the issue of how similar are certain animal models to humans, etc. But there haven't been any studies done on humans.

References:

Smith, J.M. (2007). GENETICALLY ENGINEERED FOODS May Cause Rising Food Allergies. *Total Health*, 29(4), 40-42.

Wednesday, Jan 11th

Updates

Today was mostly spent doing "reverse" shopping- exchanging Christmas presents for new sizes, better styles, etc. I noticed that by keeping busy, I was not experiencing as many cravings. The fact that I was determined to buy new running shoes may have had something to do with it...

In my running around, I saw this new popcorn stand in the Mall of America that specifically pops non-GMO corn. I am so thrilled that the non-GMO campaign is starting to catch on! The popcorn stand is called doc pop. They have several different flavors of popcorn including cinnamon and jalepeno cheese. It's fantastic.

For dinner, I ate a homemade Greek salad. My brother and sister had tater tot hotdish....those tater tots looked really good....but I stuck to my green stuff. I was amazed at the fact that a salad, something we are so used to eating as a side item with a big dinner, can actually be filling. I think I'm slowly starting to train myself that I really don't need to fill up on starchy, high carb foods to make a meal.

I promised I would put recipes up on this blog, so here we go! Recipe number one: Greek Salad

Dressing:

6 tablespoons olive oil
 1 1/2 tablespoons fresh lemon juice
 1 tablespoon red wine vinegar
 2 garlic cloves, minced
 1 teaspoon dried oregano

Salad:

1 head lettuce, torn into bite-size pieces (Romaine or red-leaf works best)
 3 large plum tomatoes, seeded and coarsely chopped
 1 cucumber, cut into thin slices
 1 medium red onion, cut into thin rings (you can soak the rings in a bowl of ice water for 10 min to make it less sharp)
 1 small green pepper, chopped
 3/4 cup kalamata olive
 3/4 cup feta cheese

I put the leftover dressing in a glass jar to keep in the fridge. It's nice to have on hand when I want to make a quick salad for my lunch break at work. For the dressing, I added a little bit

of dill, sea salt, and fresh cracked pepper to change it up a little. For my dinner, I did not use feta on my salad because I'm abstaining from cheese this week. I also did not add olives simply because I am not a fan.

Enjoy!

Thursday, Jan 12th

Organic and fresh from.....China?

This was just recently brought to my attention.

Those of us that want to eat healthy will go out of our way to shop at stores like Whole Foods to buy what we think is fresh, local, USDA certified organic produce.

But this produce is coming from China.

USDA certification for US grown produce is a separate process than for produce that is imported. Whole Foods said that the produce that comes from China is investigated by a "third party agent".

[Find the ABC News coverage on this issue here](#)

For example, the "California Blend" frozen veggies have on the back, in fine print, "made in China"

This is just more proof that our government doesn't give two blanks about what we're eating.

I'm not saying that produce from China is all *bad*, I'm outraged because of two things: 1. the way this produce was marketed was completely misleading, Whole Foods prides itself in selling fresh, organic, *locally grown* foods. and 2. the fact that imported food doesn't go through the same inspection as US food before being marketed.

I did some internet sleuthing, and apparently this issue has been going on for a couple of years now.

I'm not shopping there anymore.

Friday, Jan 13th

Still going strong

"I feel great, I feel strong, and I'm glad to be doing this"- Babbers

In cross country in high school our coach had us recite this as a team at the end of every workout, no matter how tough the workout or how crappy we felt afterwards. I thought this quote was fitting to sum up my raw foods experience so far. Today, I feel wonderful. My skin is starting to clear up, I have steady energy throughout the day. All day yesterday I had a terrible headache, I'm thinking maybe it had to do with sugar withdrawal? But the headache is gone, I'm really starting to see the benefits of changing my diet. I've even lost a little weight. The biggest thing I noticed today, was that right around 2pm when I usually get tired and want a nap, I did not experience that at all today. I've been trying to work out on a regular basis, drinking lots of water, and I look and feel great.

Going completely raw isn't easy though. I'm usually not a picky eater, and I do like vegetables. But I am so used to eating raw vegetables in the form of carrots and dip as a snack, or a salad as a light lunch. It's been an interesting experience focusing on vegetables as the main course. Trying to completely change that mindset of what a typical

meal looks like is kind of difficult...

Today I wanted to try something other than a salad for dinner. I found a recipe for gazpacho soup, which is just tomato, basil, red pepper, cucumber, onion, garlic, and olive oil blended together to make a thick, chunky soup. It looked good, and even smelled good, and I was excited to taste it when I put it in the fridge to chill for two hours. But it sure didn't taste too good. Nothing's more depressing than trying a new recipe, getting all excited about how it's going to turn out, and then finding out that you don't even like it. I gave it three solid tries. Even once with sugar snap peas. No dice. At least I tried.

So for now I will stick to my spinach, kale, and Greek salads until I find another interesting recipe to try. I have a few marked, I will keep you all posted!

ps- If you want the recipe to the gazpacho soup, shoot me a comment! The recipe wasn't a total dud- my mom and sister really liked it.

pps- I have been taking pictures of foods I've been eating this week to spice up my blog. I will have those up soon!

Saturday, Jan 14th

Photo Journal

I don't really have much to update other than the same stuff: skin's continuing to clear up, energy is steady, quality of sleep is getting much better. So, to switch things up, I thought my blog needed some pictures. I decided to take pictures of some of the raw foods I've eaten over the week.

Enjoy!





Quinoa salad



Spinach and sunflower seed salad



That's all I have for now. I would have more pictures but most of the food got eaten before I thought to take a picture...

Monday, Jan 16th

Halfway mark

Today is day 8 of my raw foods detox challenge. I feel really good. It's hard to put into words...but my entire body just feels really...clean. Healthy, like this is the way my cells are supposed to be. I've been sleeping really well, and my energy continues to be at a healthy level. I guess when I thought about wanting more energy out of the deal, I was kind of thinking that it'd be like the energy boost you get from drinking too much caffeine, only you'd never crash. It's not that kind of energy at all. It's a steady, relaxed, but fulfilling type of energy.

As far as sugar cravings go- they are still present, but manageable. Yesterday, I made a chocolate dip for strawberries using pure maple syrup and organic cocoa powder. You have to treat yourself every once in a while, the key is to set limits. I also try eating fruit when I'm craving something sweet. I'm snacking on blueberries as I write this.

One thing I've noticed that's really surprising is I no longer have any knee pain when I run. Now, this doesn't exactly mean that eating raw will get rid of all of the aches and pains in your body, there are several other factors that could have contributed to the absence of my knee pain. But I'd be willing to bet my diet is a key factor. When I first started experiencing this knee pain as a runner, I went to the doctor and was told I have the starting signs of Osgood-Schlatter's disease and that I should just take advil for the pain. Ha. I started seeing an acupuncturist last summer, and he told me that outside my acupuncture treatments, I should focus on rebuilding connective tissue through my diet.

Throughout this project so far, the main thing I have learned is the importance of diet in almost any ailment. It's amazing how much changing your diet can change other aspects of your life, as I have pointed out through viewing *Fat, Sick, & Nearly Dead*, and *Simply Raw: Reversing Diabetes in 30 Days*, and through my own experiences. But when you think of food as fuel and nourishment for your body, it really makes sense.

Tuesday, Jan 17th

Random Thoughts

I started watching "Forks Over Knives" tonight to supplement my research. Again, this documentary stresses the idea that many diseases can be cured and prevented with the right food. The narrator consults an MD that specializes in diet and nutrition- he even goes grocery shopping with the narrator and teaches him how to read labels. I think we need more doctors like that.

One major idea that is repeated is looking at prevalence of certain diseases across the globe. For instance, prostate cancer. In one year, Japan experienced a total of 18 deaths due to prostate cancer. In that same year in the US, the prostate cancer death toll was 14,000. The major difference between the two countries: diet. This same comparison approach has also been used when looking at prevalence of disease in the past. We compare differences in diet between now and the 1950s to see how diet changes have led to increase in disease. One thing that is commonly overlooked however, is how our food supply has changed.

To update on my raw foods challenge, things are easier this week. At this point, I've discovered raw foods that I really like, and ways to treat myself without cheating. When the end of the two weeks is over though, I hope to continue to eat raw foods and challenge myself to make fruits and veggies the focal point of each meal. I think we could really change the face of health if we switched from the traditional plate of the main course being

meat, a side dish of potatoes of some sort, and a small side salad to a plate where the main course is vegetables, and then a side of some healthy, lean meat or fish.

Thursday, Jan 19th

Just Label It!

So I know I've briefly mentioned genetic engineering of food as part of my research. The FDA approves this practice, but clearly more *quality* research needs to be done on the risks of GM foods to the consumer. What's even more irritating is that GM foods aren't labeled. So it's up to the consumer to research what foods are typically modified, and then make an educated guess on the foods they buy. Last year I petitioned to create labels in the Gustavus marketplace for foods that came from genetically modified sources, I even researched each food back to the farm where it was produced, and called farmers to ask who their seed suppliers were. When trying to get students to sign my petition, many expressed their concern in that GM seeds produce better yield, so how are we going to change the minds of farmers trying to make a living? I understand it's a difficult issue, and we can't stop genetic engineering in our food supply overnight. But can't we just put a label on them at the very least?

The Environmental Working Group, a non-profit founded by Ken Cook and Richard Wiles in 1993 started an online petition for the FDA to require labeling of GM foods. You can find more information and sign this petition [here](#).

Friday, Jan 20th

Why didn't I see this before?

The term "diet" has a lot of negative connotations. Diet is defined in the dictionary as the type of food a person, animal, or community typically eats. But because of all the weight loss fads, and in the midst of New Year's resolutions, "diet" to most people means "to purposefully inflict suffering on oneself through strict limiting of food intake in order to lose weight". I try to tell people what my independent study is about, and I've learned that I cannot start out by saying "yeah, I'm on the raw foods diet for.." because then I get those looks of "ick diets" or "what do you need to diet for?" or "ugh, don't remind me". It's not about weight. Yes, I may lose some weight in the process, but that is not the focus. Detoxifying the body. So I reword my statement by saying "I am currently on a raw foods *detox* diet" I really don't think people should diet anyway, as in diet meaning the short term radical change in food intake that lasts for a couple weeks, and then binge eating takes place. Instead of *dieting*, we should *change our diet*. It sounds like they are the same thing, but they can be very different. So yes, there are some faults with my 2 week program- it's short, and it involves trying to incorporate a dramatic change in my lifestyle. Ideally the way to do this would be to work up to eating only raw, so that I wouldn't have experienced the sugar withdrawal, the feelings that I'm not being able to have what I want. Maybe my end goal would be to have a complete, whole foods, plant-based diet. But there are many things that I am unwilling to part with for good, and cheese is one of them. Recently, I've been hearing more about how we really don't need dairy or meat in our diet. This is very hard to comprehend, because growing up we were told to drink our milk for strong bones, and eat meat because we need protein to build muscle. These teachings

have been drilled into our brains so that when someone tells us a plant-based diet is all we need we kind of freak out and go "what?! but what about my yogurt?! calcium! I don't want osteoporosis! and where's my protein going to come from?! are you nuts?" but there is something that most of us don't realize, and as a biology major I am surprised that I didn't figure this out sooner- amino acids are what your body needs. Protein is just the vehicle for amino acids. Your body breaks down that protein so that it can use the amino acids that the protein is composed of. Raw plants have these amino acids that our muscles need. An athlete explains this in [this video](#). By getting the amino acids from raw foods instead of protein in meat, we are saving our bodies an energetically costly step. Mind blown.

Sunday, Jan 22nd

Day 14

Today was the last day of my raw foods diet. I can honestly say that I have gained everything I wanted out of this experience and more. To recap:

- I have more energy, even though its not incredible bursts of energy it's a steady energy that lasts the entire day

- I have been sleeping a lot better. I fall asleep more quickly, and experience deep sleep that leaves me feeling refreshed and recharged the next day.

- Clear skin. My skin, although the standard Minnesota-winter pale, looks really clear and healthy. Last week at work, a customer even asked me if I was still in high school! (that actually has nothing to do with the raw foods diet, I get that all time....)

- Reduced sugar cravings. This is the only one that didn't improve as much as I wanted it to, but I did notice a difference-many sweets and baked goods no longer look as appealing.

- Increase in cravings for healthy food. This one is the biggest eye opener. I was expecting that my taste buds would become accustomed to the different raw foods that I have eaten the past 14 days, and that I would really start to enjoy raw vegetables more. Tonight, being my last day of the raw foods diet I went out to dinner with my family and ordered chicken marsala with a salad and cooked vegetables. The chicken sounded really good, but when I got my plate all I wanted was the vegetables. The chicken came breaded, and it didn't even taste good to me. It's like my taste buds have been awakened to what real food is supposed to taste like. My body no longer tolerates crap anymore, the "food" that many of us have become so accustomed to that our bodies and taste buds are completely desensitized. I'm really hoping that I can keep this sensitivity to certain foods up by sticking to a plant-based diet.

This independent study, although challenging at times, was an absolutely incredible experience. It not only opened my eyes to food related issues, but taught me that the values of focus and self-discipline can go a long way. The most challenging thing right now is dealing with internal struggles- I feel that my sensitivity to a lot of different foods has turned me into the world's biggest food snob. It's kind of sad that I can no longer enjoy the foods I used to love, but at the same time it's exciting to see that my metabolism, my digestive system, my immune system, my entire body is working in the way that it was meant to. It's like the last week of the cross-country season in high school: I'm excited to be done with the season and have a break but I want my body to stay in the shape it's in.

I want to stay where I'm at right now, but I don't want to eat 100% raw. I'm toying with experimenting with vegetarianism, or try to aim for a diet that's roughly 2/3 raw.

Monday, Jan 23rd

Damn Cookie

Today was my first official day of not being on the raw foods diet but still trying to eat raw...I started out the day really well with a healthy breakfast, good cardio workout, and even prepared a spinach salad lunch before I left for work. But, the sugar cravings were quick to come back and I caved and bought a cookie while I was on break, which I immediately regretted. Honestly, it didn't even taste good. I think it was again my super-sensitive taste buds detecting all of the unnecessary sugar (either that or it was the sour taste of regret that ruined the cookie for me...) There is a quote I heard recently that goes something like "just because you lost the battle doesn't mean you've lost the war". So I caved a little bit today, but quickly learned my lesson and got back on the right track. And tomorrow's another day.

Tuesday, Jan 24th

This makes my head hurt...

According to Beth Harrison, PhD and author of *Shedding Light on Genetically Engineered Food*, nobody's really keeping track of the health and safety of GM food. FDA approves it since the biotech companies say it's safe. In a 1992 statement of Food Policy, the FDA was quoted in saying "It is the food producer who is responsible for assuring safety" Yet, the biotech companies claim it's not their job to assess food safety. Monsanto's former director of corporate communications stated "Monsanto should not have to vouch the safety of biotech food. Our interest is in selling as much of it possible. Assuring its safety is the FDA's job."

Why hasn't anybody put their foot down on this issue?

Source: <http://www.thetruthaboutgmos.com/>

Wednesday, Jan 25th

Reflections

Now that my raw foods diet and research is done, I thought it appropriate to reflect on this whole food experience. I have learned a lot about food itself, the current state of our nation's food supply, and most importantly, the many links between diet and well-being. I'm a list-type person so I'm going to outline this in bullet points:

- First and foremost, the mind is more powerful than we know. There is so much about the brain, how our thoughts can affect our health, and what meditation and positive thought can do that we have scratched the surface on how to harness this energy. The raw foods diet was a mental challenge, it required me to change the way I look at food. I realized that when I changed my thoughts on the experience, I changed my attitude, which changed my behaviors, and those behaviors changed my thoughts, etc. The cycle repeats.

- Our society is way more into immediate gratification than I thought. This not only relates to diet choices, but choices made on how to manage composition of micronutrients in our food, increase crop yield, etc. On the surface, biofortification through genetic engineering of food looks like an attractive solution, but there is so much about the transgenic processes that we still don't understand.
- So many people are kept in the dark. It's really depressing. I try to explain my project to people, and a lot of people don't know what genetic engineering is or that it's been going on in our food for the last 15 years. This is why I fully support labeling of GM foods. It doesn't stop genetic engineering of food from happening, but it makes people aware of the term "genetically modified". This is the first step in creating awareness of the issue.
- We live in a world where there is no money in being healthy. We have to remember that. We have to remember that next time we go to the doctor, we are a paying customer and have a right to ask questions and get second opinions. I'm not discrediting Western medicine, I think Western medicine and pharmaceutical companies have made some valuable advances in medicine that are necessary. But we also need to remember that the body is totally connected. One diseased organ removed doesn't necessarily mean that you have removed the disease itself.
- I still don't like spinach. I've tried eating it in salads, using different dressings, even on sandwiches. I still don't like it, but I know it's good for me.
- Fresh fruit is not chocolate, but it does make awesome dessert.
- When you view food as fuel for your body, it will change the way you eat.
- The "food crisis" has many faces: obesity, diabetes, overeating, malnourishment, depletion of nutrients in soil, the food supply itself, etc. The list goes on. This project has been overwhelming in trying to narrow my research to one edge of focus, but I have found that in many ways all of these issues are interrelated. I was hoping that through my research I would come closer to finding solutions to the "food crisis", but all I've found is more questions. However, I believe that this project did accomplish one important goal in creating awareness around these issues.

