Comment

Live and let diet

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Published: 22 December 2003

Genome ***Biology*** 2003, **5:**101

The electronic version of this article is the complete one and can be found online at http://genomebiology.com/2003/5/1/101

I wanted to lose a few pounds in anticipation of the holidays, a time of year that in the U.S. should more properly be referred to as the season of joy and gluttony. By the time you read this, many of you may want to shed your holiday pounds (and kilos). A number of sensible options were available to me: I could reduce the amount of food I ate at each meal, thereby decreasing my total caloric intake without making drastic changes to my eating habits. I could increase the amount of exercise I get each day (like most academicians, this usually consists predominantly of running from students disgruntled about their grades), thereby increasing the number of calories burned without making any changes to my eating habits. Or I could do the most sensible thing of all, namely eating a bit less and exercising more, thereby losing weight even faster while adopting a more healthy lifestyle. Being an American, I of course chose to go on a fad diet instead.

It used to be that one's generation could be defined simply by the war one fought in. Thankfully, we live in a time of relative peace, but since the middle of the last century, equally defining - and perhaps equally hazardous - are the diets that each generation has been swept up in. If you lived in the '40s, '50s and '60s, you were told that too many calories were bad for you, and that the best way to lose weight was to eat less, period. During the '70s, '80s and '90s, you were told that it wasn't the number of calories but the type of calories that made the difference. Fat was the big enemy. Eat less fat, and you would lose weight no matter (the unspoken assumption seemed to go) how many calories of protein and carbohydrate you ate. Today the average U.S. diet is approximately 15% protein, 51-53% carbohydrate and 32-34% fat; the National Academy of Sciences recommends a diet that is 10-35% protein, 45-65% carbohydrate and 20-35% fat - not very different. Yet Americans are getting fatter by the year. And now the latest diet craze is the Atkins diet (or its slightly less draconian variant, the South Beach Diet), in which you are told that the real enemy is not fat but carbohydrates, and if you want to lose weight you can eat as much fat and protein as you want, but you must consume almost no carbohydrates at all.

So I'm now doing Atkins. (One speaks of "doing Atkins"; it sounds so much more hip than "I'm on this godforsaken Atkins diet".) The Atkins diet (named after its creator, Robert C. Atkins, a New York City cardiologist who, in one of life's cruel ironies, supposedly lived a very healthy lifestyle only to die prematurely when he slipped on a patch of ice) is divided into three phases: the induction phase, in which carbohydrates are eliminated from the diet almost completely (this lasts a minimum of two weeks, usually longer); the second phase, during which complex carbohydrates are added gradually back to the diet but refined sugars and starches are still mostly eliminated; and the maintenance phase, which is an Atkins euphemism for "You'll be on this godforsaken diet for the rest of your life, which may be longer because you'll be eating healthier but will be no fun at all."

I'm still in the induction phase, and a carbohydrate hasn't so much as touched my tongue in weeks. I would kill for a piece of chocolate cake right now. According to Atkins, you can eat as much protein and fat as you want during this time, but there's a catch: just about the only foods that have protein and fat but no carbohydrates at all are eggs, meats, fish, butter and cheese. There are only so many ways you can combine these into meals before becoming very repetitious, and they are fairly bland foods as well, so there's a certain sameness of taste to every meal. Doing Atkins, I'm here to tell you, is boring.

It is also effective. Unlike many fad diets, this one makes some biochemical sense, which may be why so many scientists I know seem to be on it. The basic logic of the Atkins diet is that a high-carbohydrate diet provides more grams of carbohydrates than are necessary for immediate energy usage. Some carbohydrates are converted to glycogen and stored in the liver, but this represents only a small percentage. Most of the excess is converted into fat for storage in the body tissues. Thus, eating a high-carbohydrate diet - which is exactly what has happened in the West in the past twenty years, as our fear of fats has led to the consumption of more and more carbohydrate-rich foods that are low-fat - can result in big weight

increases, especially in non-athletes. Further, when carbohydrate in the diet is high, the preferred fuel for most metabolic processes, especially the brain, is glucose and consequently the capacity to mobilize fat is limited. Foods high in carbohydrates also increase blood glucose, stimulating insulin release and all the metabolic sequelae of circulating insulin: fatty acid synthesis is activated and fat breakdown is profoundly inhibited by insulin even at very low concentrations of the hormone. After about 48 hours of low carbohydrates (less than about 25 grams per day), the glycogen stored in muscles is depleted, and the body begins to burn fat for fuel, causing relatively rapid weight loss.

The 'glycemic index', which is a measure of how quickly carbohydrates are converted into glucose, is different for different types of carbohydrate. So-called 'high impact carbs' raise blood sugar levels rapidly, causing insulin to spike. Using 100 as the reference, table sugar has a glycemic index of 65. White bread is 72 and baked potatoes have a glycemic index of 85. Corn flakes have a glycemic index of 84, while ice cream has a glycemic index of 50. The Atkins diet allows consumption of complex carbohydrates with very low glycemic indices after the induction phase, but suggests that one should limit one's consumption of high impact carbs forever. Foods with low glycemic index values include dairy products, green vegetables, beans, and pure fructose, which has a glycemic index of 20.

Remember also that the Atkins diet allows you to eat lots of fats and proteins. Fats, unlike carbohydrates, have a high satiety factor. Whereas carbohydrates make you hungry a couple of hours after eating, fats make you full, and the satiety lasts for hours, proponents claim. Thus, you tend to consume fewer calories on a high-fat diet than on a high-carbohydrate diet. Since insulin levels are low on this diet, the fat you eat cannot be stored. Yet your blood glucose does not drop too low, because your liver continues to convert some of the dietary protein into glucose. Any excess dietary fat is not stored but broken down by a process known as lipolysis (the opposite of dehydration synthesis) and excreted. This excretion requires a lot of water and so one needs to drink plenty of water on this diet. Metabolized fatty acids are broken down further into ketone bodies, which become the primary fuel of the brain in the absence of glucose. Any excess ketones are not stored but are excreted in the urine - again the need for lots of water. The production of ketones during fat metabolism is called ketosis and can be recognized by the characteristic, somewhat fetid breath of Atkins dieters, one of the diet's many charming features. Although ketoacidosis is dangerous, the effects of long-term, low-level ketosis such as that produced by low-carbohydrate diets are not established.

Genomics may turn out to be a boon for dieters, especially those on low-carbohydrate diets. Different people respond differently to such a diet: most lose weight fairly rapidly, but some are 'metabolically resistant' and do not. What this means exactly is still controversial but the claim is that, in general, high carbohydrate consumption can result in overproduction of insulin and eventually in people becoming less sensitive to it, which is thought to lead in some cases to diabetes. Presumably some percentage of dieters may have genetic profiles that make them naturally more resistant to insulin, and for such individuals a different dieting strategy may be needed. It should be relatively easy for the burgeoning science of pharmacogenomics to identify such individuals by simple comparative genome expression profiling, which leads me to speculate that services for doing just that are likely to be a growth industry - and probably one rife with charlatans - in the near future.

Low carbohydrate diets induce a milder version of many of the same biochemical changes as diabetes, or prolonged fasting. Lawrence McKeown, of West Belfast, Northern Ireland, holds the record for the longest period that any human has gone without food and lived to tell the tale: 70 days. He and his fellow Republican inmates in the H Blocks at Long Kesh (also known as Maze Prison) went on a hunger strike in 1981. Bobby Sands, their leader, died after 66 days. Nine other prisoners died as well. McKeown, a former footballer, was in superb condition at the start of his fast, which perhaps explains how he was able to escape the long-term disabilities, including kidney failure, optic-nerve damage, strokes and early heart attacks, that have plagued most of the other survivors. But there remains the tantalizing possibility that he, and his compatriot Raymond McCartney, who endured a 53-day fast without lasting damage, possess some unique genetic characteristics that protected them - a question that would not be difficult for genomics to address, given a suitable database of allelic variations in metabolic genes among 'normal' individuals as a basis for comparison. McKeown's description of the physical changes that took place during the early stages of his time without food are a magnified version of what occurs during the induction phase of Atkins. "What I remember most is the chill in my bones," he recalled during an interview with jouralist Bob Drury. His sense of smell was heightened, and his appetite diminished as he became ketotic. Muscle fatigue and exercise intolerance also occurred rapidly. I had a much milder version of all of these symptoms by the end of the first week of the induction phase of the Atkins diet, consistent with my glycogen stores becoming depleted after about four days, and a switch to ketone bodies as the primary source of fuel for the brain. My ability to tolerate exercise (I mean physically - psychologically I never have cared for it much) also dropped, although it recovered after a couple of weeks. Fasting for weight loss is apparently a rising fad in the developed world. No doctor I know would endorse it. Neither would McKeown, who says simply that fasting without a cause worth dying for is beyond his ken.

The Atkins diet, of course, is not a fast; in fact, one is allowed to eat as much fat and protein as one needs to maintain a

feeling of satiety. However, there have been a number of reports lately that question the safety of a diet that is so high in fat and protein but low in fiber and vitamins (although the Atkins book explicitly advises that one should not undertake this diet without seeing a doctor first, and that one should take a vitamin and mineral supplement while on it, and drink copious amounts of water). Many doctors, and the American Heart Association (the same folks who endorsed the low-fat diet, remember) have warned that the increased urination in the first few days of the diet can cause a potentially dangerous reduction in calcium and potassium levels in the blood. This drop in electrolytes has been cited as a possible contributing factor in the deaths from cardiac arrhythmia of some people who were on the diet, and for heart damage to others. Paul Robinson, director of adolescent medicine at the University of Missouri hospital, has published a paper in the *Southern Medical Journal* advising against this diet for adolescents until more research is done. It's hard to know whether such concerns are valid, because when millions of people go on the same diet, there will always be a small number who have a previously existing, undiagnosed abnormality that makes such a diet contraindicated. Statistically, one also expects that a small number of people will develop some serious health problems whether they are on the diet or not, but in the litigious society we live in, nothing happens to anyone by chance. If anything bad occurs, it must be someone's fault, and therefore someone owes you money. In such a climate, even when the research needed to decide whether a diet is really safe has been done, it can be difficult to persuade people to believe the results.

Some cardiologists have claimed that the premise that carbohydrates make people fatter than other foods is questionable, and that the high-fat content of the Atkins diet could worsen heart disease by raising cholesterol (to be fair, the Atkins diet book warns against consuming much saturated fat). I've been careful to eat more protein than fat, have avoided saturated fats like the plague, drunk enough water to irrigate a small farm, and taken vitamin supplements religiously. So far everything seems fine, but I doubt that I'll stay on Atkins much longer anyway. Once the holidays are over, my plan is to go back to a more balanced diet, probably with a good bit less starch and sugar than before and certainly with smaller portions of everything. Besides, I have found that, for me anyway, the real problems with the Atkins diet are psychological, not physiological.

Psychologists are fond of saying that it's important to get in touch with your anger. No problem; I've found mine: it was hidden under all those carbohydrates. Atkins dieters, the book notes, may experience "some increase in irritability" during the induction phase. That's like saying that Scuba divers may experience some water. One consequence of a carbohydrate-free diet is a dramatic reduction in the level of serotonin. Serotonin is the neurotransmitter that helps us feel happy and prevents us from attacking one another at random. I don't have much serotonin now, so my interactions with people lately have been, shall we say, somewhat prickly. I have a cactus in my garden that's less prickly than I am at the moment.

Then there's the matter of concentration. Low-carbohydrate diets are claimed to improve your ability to concentrate. I can attest that this is true, but what that they don't tell you is that your concentration will be on chocolate cake. Many people have the problem of being obsessed with certain foods, or foods in general, some of the time. Doing Atkins, claims the diet book, will change all that. It does. I'm obsessed with food all the time now. Much of that obsession is with foods I can't have, like chocolate cake - and this does not improve my irritability (q.v.).

Once you've done Atkins, the book says, you'll be ready for a whole new life. I can confirm that: being on this diet has made me regret the day I was born. But soon it will be over. You'll know when that happens, because you'll probably be able to hear my cry of joy from whatever country you're in.