Volume 1, Issue 1 January-February 2004

Practical Information about Weight Loss and Body-Composition Improvement

Weight-Loss Research

ARE LIQUID CARBOHYDRATES MAKING US FATTER?

Sugar-laden drinks, including sodas have been blamed for the current rise in obesity rates, and there is a strong statistical link between the upswing in fatness and the amazing flood-tide of soda consumption. Surprisingly, though, soda intake has been linked with increased satiation, an effect which should actually curb–not increase—appetites. In this article, we describe how foods with soda-like effects can help you lose weight or stay slim.

About 50 percent of the calories in the average American's diet come from *added sugars and fats (1).* That fact alone would seem to go a long way toward explaining the rise of obesity in the United States.

Although fat outweighs sugar in this startling 50-percent figure, many researchers have contended that the consumption of added sugar *in liquid form* is playing a major role in the current obesity epidemic, both in the United States and around the world (2). Investigators who hold this belief are troubled by the fact that carbonated soft drinks and sugar-laden fruit drinks account for about 43 percent of the sugar added to the diets of individuals over two years of age (mercifully, soft drinks have not yet become a staple of infants' diets).

But sugar is added to solid foods, too, so why should we worry about sweetened beverages *per se,* and why should we put the onus for our nationwide corpulence on sugary drinks, rather than high-fat foods? First, the consumption of sweetened beverages has advanced steadily over the past 20 years, so that sugared-drink intake now exceeds the national guzzling rate for milk and fruit/vegetable juices (3). Since 1978, a beginning point for a remarkable rise

Please continue on page 2.

Coming in the next issues of *Weight-Loss Research:*

(1) Are low-fat diets really good for losing weight?

(2) Do pear-shaped people have different dietary needs than apple-shaped folks?

(3) How much exercise do you really need to be slim?

(4) How does the Atkins Diet shape up?

WHY WE ARE PUBLISHING *WEIGHT-LOSS RESEARCH*

Owen Anderson, Editor

Welcome to the inaugural edition of *Weight-Loss Research,* the e-newsletter which keeps you up-to-date on the most-current scientifically validated information about weight loss and body-composition improvement!

An epidemic of obesity is currently sweeping across the United States and the rest of the industrialized world, forcing the World Health Organization to conclude that obesity is the major unmet public-health problem worldwide. The

Please continue on page 10

Weight-Loss Research
c/o Running Research News
P O Box 27041
Lansing, MI 48909-7041 USA

Phone: 517-371-4897
Fax: 517-371-4447
Email: info@rrnews.com
Web: http://www.rrnews.com
Editor: Owen Anderson
Publisher: Teressa Blanchett

in obesity in the United States, the ingestion of soda has increased by approximately 40 percent (4); in a recent year, Americans swigged about 41 gallons of sugared "pop" per capita, close to a gallon per week (in contrast, beer consumption is pegged at approximately 23 gallons per person per year). There has been a strong statistical link between the advancing consumption of sugared drinks and the upswing in obesity rates, especially among adolescents and young adults, who seem to drink a disproportionate amount of the highly sugared potables (5, 6).

It is estimated that soft drinks now contribute about 7 percent of the calories in the average American's diet (as an interesting aside, ethanol, *aka* alcohol, chips in close to 6 percent of daily energy intake). While this might appear to be a relatively small number, if the 7 percent creates a positive energy balance (a situation in which ingested calories are greater than expended calories) it could lead to a weight gain as great as one pound every 17 days in a person expending approximately 2800 calories daily. Although there is a temptation to blame inactivity for the dramatic expansion of obesity over the last two decades, research reveals that activity levels, low as they are, have been stable during the period; thus, inactivity by itself can not account for the recent trend (7). High-fat diets would be a tempting target, too, but total fat intake has also been relatively stable over the last 20 years or so (8).

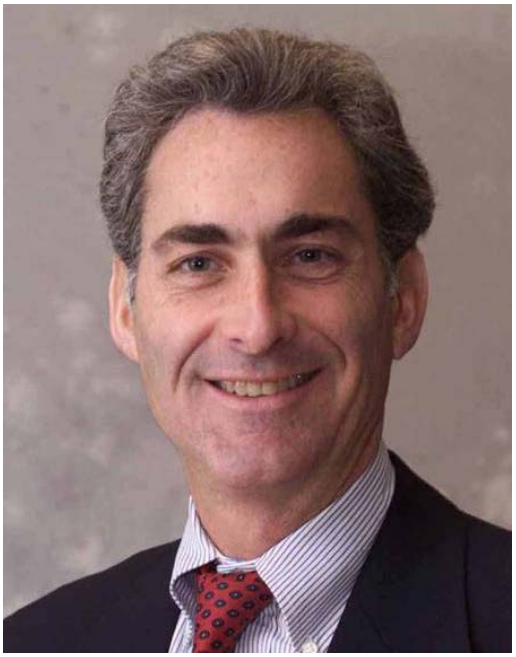
Research also points to a troubling aspect of sugared-drink consumption: Internal physiological mechanisms by which the human body senses ingested calories are thought to be less precise when energy is contained in liquid beverages, rather than in solid foods (7). In other words, the human body thinks it has consumed more calories after the intake of solids, in comparison with a *calorically equivalent* liquid repast, and as a result there is a greater tendency to eat a follow-up meal (or snack) more quickly when liquid food has been enjoyed. As the World Health Organization (WHO) puts it, the energy contained in liquids is not well detected by the body, leading to increased eating later.

In general, most foods which you eat can produce a phenomenon called energy compensation, which simply means that your body adjusts its eating and total energy intake to take into account the fact that a significant amount of energy has already been consumed. Eat a T-bone steak in the mid-afternoon, and your appetite at dinner is likely to be slack, for example. Sodas, however, are blamed for being poor inducers of energy compensation; imbibe a soda (or even a couple of sodas) in mid-afternoon, and you are still ravenous as a wolf at dinner time, say the soda skeptics (9).

There is decent experimental research to back up such assertions: In general, drinks which are rich in sugars have been linked with reduced appetite control, increased total energy intakes, and a higher risk of being overweight (2). In an extremely interesting recent investigation carried out by Drs. Richard Mattes and D. P. DiMeglio in the Department of Foods and Nutrition at Purdue University, 15 normal-weight subjects (seven males and eight females) with a mean age of 23 were asked to modify their daily diets in two different ways: (A) By guzzling 450 calories per day of caffeine-free soda (A&W Root Beer™, Coca-Cola™, Pepsi-Cola™, Sprite™, and/or Faygo™ orange, creme, grape, or red pop), or (B) by eating 450 daily calories of solid jelly beans (bean flavors included blueberry, bubble gum, champagne punch, cherry, grape, green apple, island punch, lemon, orange sherbet, raspberry, strawberry daiquiri, and tangerine jelly belly). The subjects were assigned to the jelly-bean or soda groups at random and consumed the jellies or pop each day for four weeks; after a four-week "wash-out period" (with neither beans nor soda), the subjects shifted to the other consumption pattern (from beans to pop or vice-versa) for four weeks (7). The young research

participants were told that they could consume the added sugar as they wished, either as between-meal snacks or as part of their meal-time consumption.

In a perfect world, the young Boilermakers would have reduced their usual intakes by about 450 calories per day to compensate for the added solid or liquid-form sugar, and it would not have mattered whether the energy plopped into the gullet as part of a liquid drink or as a chewable solid. The world of energy compensation is far from perfect, however, and what actually happened is that jelly-bean eaters pared down their "free-feeding energy intakes" (what they ate each day in addition to the jelly beans) by about 500 calories, which constitutes better-than-perfect compensation from a weight-loss standpoint ("perfect" compensation would have involved a reduction of those same 450 calories contained in the jellies). Meanwhile, the soda drinkers flunked their energy-compensation tests, failing to reduce their free-feeding energy intakes at all; in fact, they tended to eat slightly more of their customary diets when they were imbibing soda! Notably, total intake of fat increased significantly during the liquid-sugar period. Overall, the soda calories were simply piled onto the calories normally eaten during the day, without damping general appetite. As you might expect, body weight at the end of the liquid-load period was significantly higher, compared with the beginning (there was no such gain with the solid sugar); there was also a trend for percent body fat and total kilograms of body fat to increase among liquid drinkers.



Research carried out by Dr. Richard Mattes at Purdue University showed that carbohydrate in liquid form could be far less satiety-inducing than carbs in solid foods—and thus could promote weight gain.

In other words, the sugary drinks produced less *satiety* than the sugary solids. Satiety is simply a factor which helps to control the amount of energy consumed at a later meal and – in general – later during the day after something has been eaten. High-quality foods which promote satiety are thought to be good for losing weight, since they lead to reduced caloric intakes for significant periods after they have been ingested; naturally, edibles with simpering satiety are linked with overeating and the possibility of weight gain. Of course we're not suggesting that a jelly-bean diet might help you lose weight (beware, though: such a plan might soon become the national rage); there are many foods - eatables which actually contain real-live vitamins, minerals, and antioxidants - which have superior satiety to jelly beans.

Of course, you might well ask: What was the actual mechanism underlying the increased eating in folks who had consumed sugar in liquid form, rather than as part of solid "food"? After all, both groups had ingested equal amounts of calories, so why were jelly beans satiety-promoting and sugar drinks satiety-preventing? Hunger levels were not to blame, as the two groups reported similar patterns of daily food-yearning over the four-week periods.

Theories abound as to why liquids fared so poorly, but one thought, backed up by experimental work, is that the liquid drinks produced less satiety in the jelly-bean study because their consumption involved no actual chewing (10)! This may seem a bit far-fetched, but research reveals that something as simple as a lack of mastication produces subtle changes in pancreatic function and hormonal release in humans which may predispose a person to an earlier desire to eat after the intake of energy. Slowly and thoroughly chewing (i. e., savoring) your food during your meals might annoy your family members or dining partners, but it will probably also help you feel less hungry between collations. Perhaps this factor helps to explain why dogs, which as a group seem to inhale rather than masticate their nourishment, seem to be perpetually hungry.

It should be noted, too, that liquids tend to empty from the stomach and move through the small intestine at

much loftier rates, compared with solids; beverages may thus be less apt to create continued "fullness" signals which help to inhibit further eating. Research has shown that the perception of satiety can depend strongly on the rate of gastric emptying and is not necessarily tightly tied to the quantities of calories in various foods (11). For this reason, a high-calorie liquid may often be less satiating than a low-calorie, bulky food which plops along slowly through the stomach and small intestine.

Surprisingly, rheological factors can have a strong impact on satiety.

Amazingly enough, another factor which influences satiety is the *viscosity* of ingested food. Basically, the viscosity of beverages (i. e., their thickness and/or resistance to flow) is inversely related to subsequent hunger ratings in humans (12); the thicker and sludgier a potable, the great the potential satiety produced. A bowl of murky, made-with-milk potato soup or clam chowder, for example, would be more satiety-producing than a same-sized bowl of chicken soup concocted with clear broth, even if the latter contained as many (or more) calories – and much more satiety-inducing than a glass of soda. The way in which this works is not clear, although it is thought that the mouth, esophagus, and stomach may all provide the brain with more intense signals of fullness when thick fluids are ingested, compared with light beverages; if thin fluids (such as sodas) are taken in, satiety promotion is extremely limited. In addition, viscous drinks *tend* to be higher in dietary fiber, compared with easy-flowing drinks, and fiber may reduce the rate of absorption and increase a sense of intestinal fullness, decreasing the desire to eat.

Cognitive factors may have been at work, too. The subjects in the Purdue study were not told how many calories were in the assigned sodas or beans, and there is a natural tendency for individuals to believe that solid foods are higher in energy than potables. Thus, the subjects may have consciously attempted to take in less food during their jelly-bean days, in the belief that the jelly beans were adding vast amounts of calories to their daily regimens. Some research has indicated that the *perceived* energy content of a food is a better predictor of subsequent intake than actual energy content (13). In effect, people may drink sweetened beverages freely and not limit their subsequent eating in part because of a belief or feeling that sodas are low-calorie.

Taken together, the viscosity, absorption-rate, mastication, and cognitive factors suggest reasons why sugary drinks might add calories to an individual's daily diet – without producing much satiety and thus without leading to significant energy compensation (i. e., without leading to a situation in which fewer calories are consumed later on). On a number of levels, however, placing the blame for obesity on sugary drinks is a bit perplexing. For one thing, sugar-containing drinks *are usually not very energy dense*, meaning that they have relatively few calories per unit weight (the consumption of significant quantities of energy-dense foods is thought to be a risk factor for obesity, while a reliance on energy-dilute estables may reduce the risk). As you think about the concept of energy density, bear in mind that the energy-density spectrum of the foods which humans eat is rather broad, with oil (pure fat) at the very top with 9 calories per gram of weight and pure water at the absolute bottom with 0 calories per gram. In general, if you want to know the energy density of a food you are contemplating eating, you need to focus primarily on its fat and water content; water and fat together account for about 99 percent of the variation in energy density in the foods commonly eaten by humans, with only minor contributions by sugar and protein (14).

As it turns out, water, because it accounts for the bulk of food weight, contributes more to the energy density of food than any other macronutrient, with fat coming in second; the least energy-dense foods are the ones which contain lots of water, and the most energy-dense comestibles are those which have little water. For example, the energy density of potato chips, which contain relatively little water, is 5.3 calories per gram, whereas the energy density of plain potatoes and most other vegetables and fruits, composed mainly of water, is usually below about .96 calories per gram. Carbonated soft drinks, the ones villainized as being a key source of obesity, actually have the same, low, energy density as orange juice and low-fat (one-percent) milk – a miserly .43 calories per gram. Dry chocolate, on the other hand, has

an energy density above 5.3 calories per gram. Would not chocolate consumption thus be a greater risk factor for weight gain, compared with the consumption of carbonated "pop," which is no more energy-rich than low-fat milk? Since soda is low in energy density, it is very possible that it has been getting a "bad rap."

In addition, laboratory studies reveal that although low-energy-density foods such as sodas produce poor satiety, they are generally linked with increased *satiation.* Satiation is a force which reduces *the amount of energy consumed at a given meal,* and it should not be surprising that low-energy foods should enhance it. Simply remember that low-energy-dense foods usually have a high water content, and water tends to fill up the stomach and create a sense of fullness which dulls the appetite. In general, liquid, non-energy-dense foods such as soups, vegetable juices, and milk have been found to have very high satiating power (15), even though their satiety-inducing prowess is in question. In fact, fresh vegetables and fruit, which are routinely high in water content, have a greater capacity to produce satiation than either chocolate or potato chips, even though both of the latter are much higher in calories (16). Overall, liquid foods, including our dreaded carbonated soft drinks, make people "feel full on fewer calories" and thus would not seem to be ideal candidates as obesity promoters.

Critics of this line of reasoning suggest that sweetened drinks can not simply be lumped together with other liquid foods, however. They tend to call vegetable/fruit juices and milk "foods that you drink," substances which are capable of triggering physiological satiety and satiation messages which restrict food intake; in contrast, it is argued that sugared drinks might reduce thirst but do little to allay hunger and the desire to eat. The overall texture of a drink (and possibly its nutrient content) play a key role in inducing satiety, and since sugared drinks tend to be thin, texture-free, and fairly devoid of nutrients (although sweetened juices may be packaged with supplemental vitamin C and even calcium), they are not hunger-reducing (the reasoning goes). However, recent scientific evidence indicates that in fact orange juice, low-fat milk, and *regular cola* all have the same impact on hunger, fullness, and thirst for up to two hours after ingestion, with no difference in satiating power (17).

So what should we conclude about the effects of sweetened-drink consumption on weight gain? If you remove sugared potables from your diet, will you lose weight? Can a true understanding of the physiological effects induced by sweetened drinks help you devise ways to improve your body composition?

To answer these questions, let us focus our attention once again on the concepts of satiation and satiety. There is little doubt that soft-drink consumption can induce significant satiation; the water content of sodas indeed makes one feel full. The problem, though, is that this effect is very short-term. Studies which show that liquids induce significant "satiety" have used ample intakes of liquid (more than 20 ounces) and very short time periods between the liquid intake and a test meal (30 minutes of less) (18). This is actually short-term satiation, not satiety: If the time period is longer than 30 minutes, eating at subsequent meals (or snack times) is not significantly affected by the prior soda consumption. Sodas are often consumed between meals, and since they do not promote satiety (i. e., they don't reduce subsequent meal-time eating), they represent nothing more than added between-meal calories, offering little positive nutritional impact and a potential boost to the weight-gain process. Individuals who sip on sweetened beverages between meals tend to be like the students in the Purdue study, with increased daily caloric intakes and gradually expanding girths.

Soda, which is basically devoid of nutrients, is a poor choice as a satiation-inducing food.

Since sugary drinks are satiation-inducing, however, they could be consumed at the beginning of a meal, in which case they would depress within-meal eating and potentially pare down daily caloric intake. This is a decent idea, except for one thing: Added-sugar drinks tend to be fairly low in nutritional value, and thus it makes no sense to treat them as meal-time favorites. Fortunately, you can achieve the same satiation effect by using highly nutritional, no-added-sugar fruit or vegetable juices –

tipples which you can concoct in your own blender. For example, if you simply fill your friendly home blender to the three-cup mark with a variety of seedless grapes (black, red, and green, as you desire), add a bit of chopped, fresh ginger root to enhance the pizzazz factor, and then blend everything into a nice froth, you will have a wonderful drink, relatively high in fiber, calcium, potassium, vitamin C, folate, and vitamin A, which contains less than 300 calories. Consume this grape-ginger combination at the beginning of a meal, and your consumption of energy-rich foods during the meal will drop precipitously. Alternatively, you can use such a beverage as a meal replacement (make sure the rest of your day's eating provides you with your required nutrients, however).

Soups, especially rheologically favorable ones (with high resistance to flow) are especially good satiation-inducers.

As you might expect, soups are tremendously satiating, and thus it can be advantageous to include soups in your meals or to begin meals with a soup course. Instead of simply injecting extra calories into your daily diet, soups produce great energy compensation and smaller total-calorie intakes per meal. The scientific evidence reveals that soups successfully limit total food consumption at lunch, for example, either when they are simply eaten along with regular food (19) or employed as a first course (20). In part, you are playing the volume game here, with soups filling the tummy and making the thought of energy-rich-comestible consumption unpalatable (a nice feature of soups, too, is that they can be relatively low in energy density themselves).

Could the consumption of a couple of pieces of fruit as an appetizer produce the same satiation effect as a calorically equivalent amount of soup? Although the fruit would certainly be bulky enough and adequately rich in texture, the perhaps-surprising answer is that the soup would usually work better. In a very interesting study carried out at the Johns Hopkins University School of Medicine in Baltimore, 12 students (ages 19-34) consumed – on different occasions - calorically equivalent lunch appetizers consisting of either tomato soup, cantaloupe, or cheese and crackers and then were monitored as they ate *ad libitum* from a second course of offerings which included a macaroni and beef casserole and – on yet another occasion - grilled-cheese sandwiches (21). The tomato-soup, cantaloupe, and cheese-on-crackers appetizers each contained 200 calories.

As it turned out, the luncheon intake of casserole and sandwiches was significantly lower following the soup appetizer, compared with the melon and also the cheese and crackers. Basically, the subjects ate about 450 calories of casserole after the soup, versus 500 calories following the melon and 575 calories after the cheese on crackers. In addition, the participants ingested just 625 calories of grilled-cheese sandwich following soup, against 775 calories after melon and 825 calories on top of cheese on crackers. Overall, soup intake decreased subsequent caloric intake at mealtime, either in the form of casserole or sandwiches, by more than 20 percent! Despite the differences in calories ingested, all meals produced similar levels of hunger abatement and overall satisfaction, and there were no differences in nausea ratings between the soup, melon, and cheese (an important factor, after all).

When selecting soups for your appetizers, it makes sense to use ones which are rich in texture and viscosity (remember that texture and viscosity seem to spike satiety). One such soup, quick and easy to make, would be gazpacho. If you simply blend together (using your handy kitchen blender again) about six tomatoes, an Anaheim pepper or two (don't forget to take out the seeds), a small onion, some cloves of garlic to taste, a bit of cucumber (with skin in place), a dash of red vinegar, a few drops of olive oil, a couple of pimentos, salt and pepper to taste, and a small collection of cilantro leaves, you will have a delightful raw soup with less than 300 total calories and rich lodes of fiber, calcium, potassium, vitamin C, vitamin A, and folate. This can be a meal by itself, or it can precede other meal-time edibles, the intake of which will be greatly reduced by the gazpacho first course. Plain-old-tomato soup is also great as a satiation-inducer, as the Johns-Hopkins research demonstrated, and one would also expect vegetable soups of all kinds to have sizzling satia-

tion effects.

What if you can't stand the thought of another bowl of soup – or of another ginger-grape drink or raw root-vegetable imbibable? Another possibility, of course, is to turn to salads, which may not be quite as satiation-inducing as soups and vegetable/fruit drinks but nonetheless are high in water content (helpful for satiation) and very low in energy density. Pasta salad in particular has a kind of stick-to-your-ribs quality which is good for both satiation and satiety, and adding a variety of vegetables to a pasta salad appears to be a particularly effective technique for lowering subsequent caloric intake. In a high-quality investigation, adding vegetables to a pasta salad spiked satiation and effectively decreased overall energy consumption at meals (22).

Strangely enough, when you start your meal with a satiating soup, fruit drink, vegetable juice, or salad, the *size of the serving container* may also matter! While this may seem quite strange (we hesitated to mention it, actually), bear in mind that human eating patterns are not always logical, and also note that there are good scientific underpinnings for this concept. For example, in a great study carried out at Penn State University, 24 lean women (aged 20-37) consumed three different "preloads," 17 minutes before lunch, on three separate days, and were then monitored for lunch-time food consumption on each day (23). The preloads were 1) a chicken-rice casserole, 2) a chicken-rice casserole served with a glass of water, and 3) a serving of chicken-rice soup containing exactly the same ingredients (both type and amount) as the chicken-rice casserole with the glass of water. Each of the preloads contained 270 calories.

If you have been following along with our story so far, you would of course expect that #s 2 & 3 would be more satiation-inducing than the poor chicken-rice casserole by itself: As we have suggested, water contributes volume and weight to food and increases an eater's sense of fullness during meals. You would also expect that a chicken-rice casserole along with a glass of water would have the same satiation inducements as chicken-rice soup with exactly the same ingredients (similar chicken, rice, vegetables, and total water content). After all, what could be different?

Surprisingly, the chicken-rice soup was far more satiating than the chicken-rice casserole plus glass of water, even though intakes of energy, protein, carbohydrate, fat, water, spices, butter, peas, mushrooms, etc. were exactly the same, and each preload weighed exactly 619 grams. Surprisingly also, the casserole plus glass of water were no more satiating than the plain casserole, with no water at all! After consuming the soup, the subjects consumed about 290 additional calories for lunch, but they took in approximately 400 lunch-time calories after both the casserole and the casserole plus glass of water! In addition, the participants did not adjust their energy intake at dinner to compensate for the reduced caloric intake associated with the soupy lunch (i. e., they didn't eat more at dinner because they had eaten less at lunch). Thus, the soup would be the preload (appetizer) which would be most likely to be associated with weight loss (or prevention of weight gain).

The apparent size of your serving sometimes matters far more than its actual energy content.

Exactly why did the soup induce the most satiation? As the Penn-State researchers expressed it, the portion of soup, which was served in an oversized cup, *appeared to be quite large*, compared with the casserole, which was served in a rather small bowl. The serving of a bland glass of water next to the casserole would be unlikely to change this perception. In other words, *visual cues* associated with the volumes of the servings probably enhanced satiation with the soup and limited satiation with the casserole, with the glass of water acting as a satiation-outsider when it came to visual impressions. Thus, if possible, you should always try to make your non-energy-dense, water-rich soups, fruit drinks, and vegetable concoctions as pleasing and desirable to the eye as possible. Overall taste certainly matters, too; you should work on developing soups and beverages which are extremely palatable to you. This may have played some role in the Penn-State investigation, with the soup being more pleas-

ant from an orosensory standpoint than the charisma-free water and somewhat lifeless and institutional-style casserole.

If you are tempted to use plain water as an appetite curb before meals, keep the Penn-State research in mind, and also take note of the fact that some researchers believe that water consumed *with* a food, rather than as part of a food, is processed by the body's thirst-regulating mechanisms, rather than by internal hunger-regulating factors (24). Overall, water has a greater effect on satiation when it is consumed as part of a food, compared with when it is taken in with a food. When water is an integral part of a food, it increases the weight and volume of the comestible, disperses the nutrients within the food, and probably strongly activates physiological mechanisms associated with feelings of hunger abeyance.

Conscious mental processes will always play an important role in the success of your weight-loss plan.

Cognitive factors will have to be an important part of your overall weight-loss strategy, of course. The first few times you rely on a soupy or fruit-drink lunch instead of your usual ingestibles, your digestive system may feel slightly out of sorts during the ensuing afternoon, and pangs of hunger may make the box of oatmeal cookies atop the refrigerator begin to look pretty good. If this takes place, simply relax and tell yourself that you are going to make it just fine until dinner time. Take some generous swigs of a brothy, unsweetened tea, if necessary, and enjoy the unexpected burst of energy you are feeling as a result of your new, healthier eating plan. You will be less dozy and more productive in the afternoons, and soon your brain and digestive system will adapt to the new food-consumption pattern, making you much more comfortable overall. Of course, the real pleasure will come as you see your body mass steadily retreating.

Make sure that you let your doctor know that you are planning to utilize satiating, low-energy-density foods as part of your plan to lose weight (it is a safe practice, but you should always work closely on matters of health with your primary-care physician). If you are an athlete engaged in regular training, be certain that your reliance on low-energy-density, satiating foods does not leave you short on the energy you need to train and perform at your highest levels. Athletes who train from 60 to 90 minutes per day require approximately four grams of carbohydrate per pound of body weight per day to keep muscles well-supplied with fuel. To determine your total carbohydrate intake, use the diet-analyzing tool at http://www.usda.gov (non-athletes may also want to employ this site to determine the overall quality of their diets).

An unfortunate aspect of human eating behavior is that downward energy compensations are usually more difficult to achieve than upward adjustments (25). That is, people have a fairly hard time downgrading subsequent eating after experiencing an energy surplus, but they generally find it easy to increase their caloric intakes to compensate for a missing meal or for a small number of calories taken at a particular meal. Consequently, as you use the strategies we have recommended in this article to decrease your meal-time intakes, you may find yourself hungrier than usual at subsequent meals (it is easy for your body to shift into an "I need more" state). If this is the case, you can simply use the same strategies, carried out to a more moderate degree, to stop yourself from overcompensating and eating too much. Start your subsequent meals with soups or at least with high-volume, low-energy-density substances which are pleasing to both the eye and the palate, and your appetite will be calmed much more quickly, compared with the consumption of energy-rich, low-water substances.

So what's the bottom line? Rely on foods which are voluminous, non-energy dense, water-containing, viscous, highly palatable, pleasing to the eye, and chewy to satisfy your hunger and keep your meal-time caloric intakes within reasonable bounds. This is a great strategy – one that you can rely on to decrease your total daily intake of calories and one that you *can carry out on a consistent basis*, since the foods you are using are pleasant to eat, satisfying, health-promoting, and easy to prepare. Overall, the strategy will help put you into the negative-energy balance state on a routine basis, allowing unwanted pounds of

fat to drop steadily and progressively from your body. ©

References

(1) America's Eating Habits: Changes and Consequences. USDA/ERS, Agriculture Information Bulletin No. 750, U. S. Government Printing Office: Washington, DC, 1999

(2) Diet, Nutrition and the Prevention of Chronic Disease: Report of a Joint WHO/FAO Expert Consultation. WHO Technical Report Series 916, WHO: Geneva, 2003

(3) "Food Sources of Added Sweeteners in the Diets of Americans," *Journal of the American Dietetic Association,* Vol. 100, p. 51, 2000

(4) Fact Book 1998. Bedford Hill: New York, 1998

(5) "Sugar and Sugars: Myths and Realities," *Journal of the American Dietetic Association,* Vol. 102, pp. 351-353, 2002

(6) "Soft Drink Consumption among U. S. Children and Adolescents: Nutritional Consequences," *Journal of the American Dietetic Association,* Vol. 99, pp. 436-441, 1999

(7) "Liquid versus Solid Carbohydrate: Effects on Food Intake and Body Weight," *International Journal of Obesity,* Vol. 24, pp. 794-800, 2000

(8) "Energy and Macronutrient Intakes of Persons Aged 2 Months and Over in the United States: Third National Health and Nutrition Examination Survey, Phase 1, 1999-1991," Advance Data from Vital and Health Statistics, No. 255, National Center for Health Statistics: Hyattsville, MD

(9) "The Effects of the Spontaneous Ingestion of Particular Foods or Beverages on the Meal Pattern and Overall Nutrient Intake of Humans," *Physiol Behav,* Vol. 53, pp. 1133-1144, 1993

(10) "Food Properties Affecting the Digestion and Absorption of Carbohydrates," *American Journal of Clinical Nutrition,* Volume 59 (Supplement), pp. 699S-705S, 1994

(11) "Effect of Energy Density of a Solid-Liquid Meal on Gastric Emptying and Satiety," *American Journal of Clinical Nutrition,* Vol. 60, pp. 307-311, 1994

(12) "Beverage Viscosity Is Inversely Related to Postprandial Hunger in Humans," *Physiol Behav,* Vol. 74, pp. 551-557, 2001

(13) "Can Calories Be Perceived and Do They Affect Hunger in Obese and Non-Obese Humans?" *Journal of Comparative Physiology and Psychology,* Vol. 80, pp. 250-258, 1972

(14) "Energy Density, Palatability and Satiety: Implications for Weight Control," *Nutr Rev,* Vol. 56, pp. 347-353, 1998

(15) "Effect of Liquid versus Solid Preloads on Eating Behavior of Obese and Normal Persons," *Physiol Behav,* Vol. 11, pp. 285-290, 1973

(16) "Volume of Food Consumed Affects Satiety in Men," *American Journal of Clinical Nutrition,* Vol. 67, pp. 1170-1177, 1998

(17) "Hunger, Thirst and Energy Intakes Following Consumption of Caloric Beverages," *Physiol Behav,* Vol. 79, pp. 767-773, 2003

(18) "Liquid Calories and the Failure of Satiety: How Good Is the Evidence?" *Obesity Reviews,* Vol. 4, pp. 201-212, 2003

(19) "Role of Food Characteristics in Behavioral Change and Weight Loss," *Journal of the American Dietetic Association,* Vol. 79, pp. 24-29, 1981

(20) "The Satiating Efficiency of Foods," *Physiol Behav,* Vol. 32, pp. 319-332, 1984

(21) "Foods with Different Satiating Effects in Humans," *Appetite,* Vol. 15, pp. 115-126, 1990

(22) "Energy Density of Foods Affects Energy Intake in Normal-Weight Women," *American Journal of Clinical Nutrition,* Vol. 67, pp. 412-420, 1998

(23) "Water Incorporated into a Food but not Served with a Food Decreases Energy Intake in Lean Women," *American Journal of Clinical Nutrition,* Vol. 70, pp. 448-455, 1999

(24) The Physiology of Thirst and Sodium Appetite. Cambridge, United Kingdom: Cambridge University Press, 1979

(25) "Daily Caloric Intake of Normal-Weight Adults: Responses to Changes in Dietary Energy Density of a Luncheon Meal," *American Journal of Clinical Nutrition,* Vol. 48, pp. 214-219, 1988

Why We Are Publishing *W-LR* continued:

negative health consequences of this rising tide of obesity are enormous, and it is believed that the financial costs of treating the various ramifications of obesity may overwhelm the health-care systems of many countries. The psychosocial costs of obesity are also very large.

In the United States, less than 39 percent of the population has a healthy body weight, and this number is steadily dwindling. What is causing such a major upswing in obesity? As body-weight researchers have pointed out, part of the problem is that in modern society there is a huge mismatch between human physiology and the environment (1). Throughout most of human history, a high level of physical exertion was required for daily subsistence, but the food supply was inconsistent. Under such circumstances, control of body weight was primarily accomplished through natural physiological processes and required very little cognitive effort. Physical work was the key driving force which determined body weight, and the frequency of obesity was low. Humans struggled to eat enough to keep pace with their necessary energy expenditures and to maintain healthy body weight.

A key cause of obesity: In the modern, industrialized world, food is nearly always available, and exercise is seldom required.

To help with this struggle, physiological mechanisms evolved which increased the chances that an individual could stay in energy balance. Food shortages were a common occurrence in human history, so humans developed the ability to reduce metabolic rate whenever energy balance was "in the red," with more calories expended than taken in. Humans probably also developed a kind of innate drive to rest during periods when high levels of activity were not required for survival; an urge to exercise for the sake of exercise (or to prevent the accumulation of fat) did not promote survival and thus did not evolve. Obesity was ordinarily observed only in royal families and among the very privileged and/or rich members of society, as well as in a few people with genetic predispositions for fatness. Throughout most of our history, humans have been lean.

The situation has changed dramatically today! Activity levels are no longer the driving force for body weight, and the inherent physiological mechanisms which protected us throughout history are now increasing our risk of becoming overweight. People still love to take it easy when food is not required, and they love to eat when food is available, but the problem is that food is almost always available and physical activity, at least the kind of physical activity which keeps body weight in check, is seldom required or utilized routinely (1). Metabolic rate still takes a dip when food intake decreases, but this simply makes it very difficult to lose pounds piled on during periods of great eating and little activity. Dieting becomes a tough process! In fact, research reveals that just 15 percent of individuals who lose weight as a result of dieting are able to keep the weight off for significant periods of time.

In today's environment, physical activity is no longer the factor which pulls eating and body weight along; instead, physical activity has been minimized, and food is the factor which drives human physiology and determines body composition (1). Our foods are abundant, high in fat, energy-dense, incredibly available, very easy to prepare, fairly inexpensive, and served in large portions. Evolution has left us with no natural drive to increase exertion levels in response to this huge increase in caloric intakes, and when we do exercise the subsequent rise in resting metabolic rate is far more temperate than the dip in metabolic rate we experience when we diet.

The bottom line is that most people in our modern society become obese unless they make a conscious effort to reduce ingested calories and/or increase activity levels. There are a few "physiological super-stars" who manage

to stay lean no matter what, but most of us are left with the struggle of eating in an optimal way and/or exercising regularly in order to ensure a healthy body composition.

But how does one eat in an optimal way – in a manner which will prevent obesity or transform overweight individuals into normal-weight folks? Currently, information about how to eat in order to lose weight is everywhere. Cultural icons advocate specific modes of eating for weight loss, with little scientific back-up for their claims; books on dieting climb to the very top of the best-sellers' lists, despite the fact that scientific support for the weight-loss strategies within the books is meager. An amazing array of diets are claimed to foster weight loss: There are high-carb diets, low-carb diets, high-fat diets, low-fat diets, high-protein diets, blood-type diets, cabbage-soup diets, food-combining diets, grapefruit diets, herbal diets, juice-fast diets, kashi diets, on-line diets, quick-10 diets, salad diets, "shakes" diets, soy diets, special-K diets, sugar-buster diets, thin-for-life diets, zone diets, diets named for geographical locations (South Beach, Beverly Hills, Scarsdale), diets named after people (Atkins, Perricone, Pritikin, Richard Simmons, and "Somersizing"), a diet named for a medical clinic (The Mayo Clinic Diet), a diet associated with a magazine (The Good Housekeeping Diet), and even a diet named for a sandwich shop (The Subway Diet). Which of these eating regimens – if any – actually promote sustainable weight loss?

There is also an amazing array of dietary supplements and products which purport to promote weight loss (many of which are sold by the same folks who market the diet plans), and there are even "diet patches" which – when worn on the skin – are said to stimulate the loss of fatty tissue. Certain foods are advocated as "fat-busters," while other apparently wholesome comestibles have suddenly been assigned to the fat-gaining nutritional garbage pile.

How does one make sense of all of this? At *Weight-Loss Research*, our goal is to help you sift through the enormous amount of information available about weight loss and find the "gems" which will help you achieve your goal body weight. Although the world's population is growing significantly more obese, significant numbers of people do manage to lose weight and/or maintain a healthy body composition. In *Weight-Loss Research*, we will tell you what those people are actually doing to keep body weight in line, and we will also summarize the latest scientific research on weight loss and body-composition improvement, keeping you current on scientifically validated strategies for keeping your weight in check. We will focus both on healthy eating patterns and on healthy lifestyles, including information about how to exercise properly to lose unwanted pounds. Of course, all of the material will be presented in a user-friendly, lively manner. We think you will greatly enjoy your subscription to *Weight-Loss Research*, and that it will help you succeed in reaching your body-weight goals.

Reference

(1) "From Instinct to Intellect: The Challenge of Maintaining Healthy Weight in the Modern World," *Obesity Reviews*, Vol. 3, pp. 69-74, 2002