

Eating for Satiety



Richard Collins, MD, "The Cooking Cardiologist"
Susan Buckley, RD, CDE
South Denver Cardiology Associates

What is Satiety?

- Hunger is one of your body's **strongest and most beneficial stimuli**
- Sending hunger signals helps insure that you consume enough calories to keep your body healthy
- Hunger can also work against you when you're trying to lose weight



What is Satiety?

- We could all easily lose weight just by eating less, but the less that you eat or the longer you postpone eating, the hungrier you become, and the longer it takes your hunger to subside once you do begin to eat.
- Sound familiar??
- So the hungrier you are, the more likely it is that you'll overeate, consuming extra calories that can quickly slow or reverse your weight loss

What is Satiety?

- The only way to end hunger is to eat
- Eating provides satiety - a pleasant feeling of fullness and the corresponding reduction of hunger
- Definition: Satiety: a feeling or condition of being full after eating food
- But are some foods better than others for satisfying your hunger?



- How do you know when you are hungry?
- How do you know when you have had enough?



- Of course, we can override our satiety signals
- **Overriding hunger and satiety signals due to:** boredom, stress, time of day, availability of food sight, and/or taste of food all of which may cause us to continue to eat



- On a physiological level, satiety inhibits ghrelin, a stomach hormone that increases hunger, and stimulates leptin, a hormone produced in adipose/fat tissue believed to decrease appetite and increase energy expenditure.



Obese mouse, unable to produce leptin, and normal mouse

Satiety Index of Common Foods

- One of the most detailed studies that demonstrates how different foods affect satiety was conducted by Suzanna Holt and her fellow researchers at the University of Sydney.
- The results of their study, "The Satiety Index of Common Foods", were published in the European Journal of Clinical Nutrition, September 1995.
- In this study, the researchers fed human test subjects fixed-Calorie portions of thirty-eight different foods, and then recorded the subjects' perceived hunger following each feeding.

Satiety Index of Common Foods

- Holt's tool ranks different foods on their ability to satisfy hunger.
- Holt drew up the Satiety Index by feeding 240-calorie portions of 38 different foods to volunteers.
- Participants then ranked their feelings of hunger every 15 minutes and were allowed to eat freely for the next two hours.
- Of all the foods tested, potatoes were the most satisfying.
- The foods were served from under a hood to minimize the influence of appearance, and, if possible, they were served at the same temperature and in the same size chunks.

Satiety Index of Common Foods

- After eating, the volunteers told the scientists what their appetite ratings were, but they were not allowed anything else for the next two hours.
- Then, after two hours, they were then allowed to eat from a small buffet, where the scientists measured how much they nibbled from a variety of other foods.
- Their consumption was closely monitored, and every 15 minutes they were questioned about their hunger to see if their subjective impression of satisfaction matched their eating behavior.
- Using white bread as the baseline of 100, 38 different foods were ranked.
- In other words, foods scoring higher than 100 are more satisfying than white bread and those under 100 are less satisfying.

Satiety Index of Common Foods

- Holt found that some foods, like croissants, are only half as satisfying as white bread, while boiled potatoes are more than three times as satisfying, easily the most satisfying food tested.
- But potatoes in a different form—French fries—did not score well.
- This type of information can have important implications for those wanting to lose weight.

Satiety Index of Common Foods

- The index sets a slice of white bread at an index score of 100.
- The **higher** the index number the **more full** the subjects felt up to 120 minutes after eating the test food.

The Satiety Index

Croissant	47%	Cheese	146%
Peanuts	84%	Grain bread	154%
Yogurt	88%	Popcorn	154%
Ice cream	96%	Grapes	162%
White bread	100%	Beef	176%
Bananas	118%	Apples	197%
Cornflakes	118%	Oranges	202%
French fries	116%	Oatmeal/porridge	209%
Crackers	127%	Potatoes, boiled	323%

Source: *European Journal of Clinical Nutrition*, September 1995

More of the Satiety Index

Bakery Foods	Carb Foods	Protein Foods	Fruits
Croissant 47%	White Bread 100%	Lentils 133%	Banana 118%
Cake 65%	French fries 116%	Cheese 146%	Grapes 162%
Doughnuts 68%	White pasta 119%	Eggs 150%	Apples 197%
Cookies 120%	Brown Rice 138%		Oranges 202%
	Wholegrain bread 157%		
	Whole wheat pasta 188%		
	Potatoes, boiled 323%		

Satiety Index

- The Satiety Index scores reflect the total amount of fullness produced by the set portions of the test foods over two hours—i.e. short-term satiety.
- Although most foods with high Satiety Index scores kept fullness relatively high for the whole two hours, there were a few exceptions, Holt notes.
- "The fruits were served in very large portions, but fullness dropped off quickly towards the end of the second hour, reflecting the rapid rate of gastric emptying (oranges and apples and grapes are mainly sugar and water)," she adds.



Satiety Index

- "Many 'health-conscious' dieters," she continues, "will eat a meal based on several pieces of fruit and some rice cakes and then wonder why they feel ravenous a few hours later.
- These kinds of extremely low-fat, high-carb meals do not keep hunger at bay because they are not based on slowly-digested carbs and probably don't contain enough protein.
- A dieter would be better off eating a wholesome salad or sandwich on wholegrain bread with some lean protein like tuna or beef and an apple. This kind of meal can keep hunger at bay for a very long time."



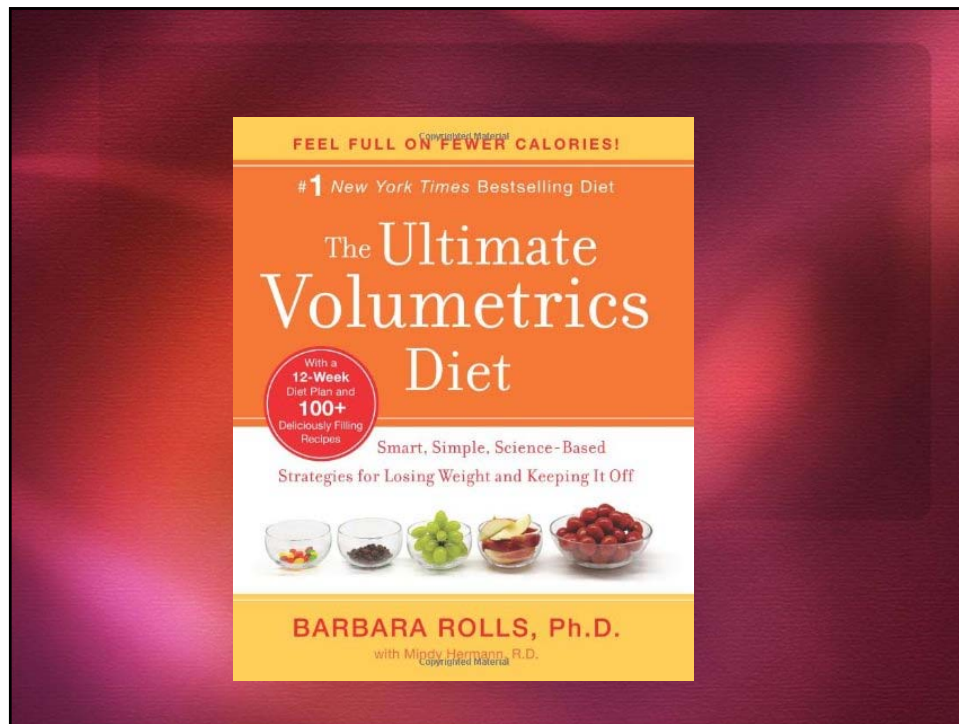
- The chemical components of a food is one of the factors that determines how it ranks on the index.
- "Beans and lentils, for example, contain anti-nutrients and fiber which delay their absorption so they make you feel full for longer," says Holt.
- "Roughly speaking, the more fiber, protein and water a food contains, the longer it will satisfy."



- Another thing that makes a food satisfying is its sheer bulk.
- "You can eat an awful lot of popcorn without taking in a lot of calories," says Holt.
- "It may not weigh much, but it makes your stomach feel full just because it takes up so much space.
- Oranges come out very high on the index for the same reason—but orange juice probably wouldn't, even though it has the same number of calories."

- The results of Holt's study, like many similar studies, indicate that satiety is most strongly related to the weight of the food consumed.
- In other words, the foods that weigh the most, satisfy our hunger best, regardless of the number of calories they contain.
- However, higher amounts of certain nutrients, such as protein and dietary fiber, also appear to improve satiety.
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- Because of the strong correlation between satiety and a food's weight, some researchers have recommended the consumption of foods with low Caloric densities - i.e. foods that have the fewest total Calories per gram.
- One of the most notable of these researchers is nutritionist Barbara Rolls, Ph.D., whose prior best-selling diet book, *Volumetrics*, explained her use of low Caloric density foods for weight loss.



- Volumetrics is based on more than two decades of research by nutritionist Barbara Rolls, Ph.D., in Nutrition at Pennsylvania State University.
- Rolls has been president of the Society for the Study of Ingestive Behavior and the North American Association for the Study of Obesity.
- She has also been published in a variety of peer-reviewed journals, including the *Journal of the American Dietetic Association*, *New England Journal of Medicine*, and the *American Journal of Clinical Nutrition*.

- **Divide the number of calories per serving by the number of grams in one serving.**
- For instance, if your food has 160 calories per serving, and one serving equals 98 grams, then 160 divided by 98 equals about 1.6, which is your calorie density.
- **Very low CD category (foods with a CD of 0.6 or lower):** These foods include fruits, non-starchy vegetables and broth-based soups.
- **Low CD category contains foods (CD of 0.6 to 1.5).** Whole grains, legumes, lean protein and low-fat dairy generally fall into this category.
- **Medium CD category foods.** This category contains bread, dessert, fat-free baked snacks, cheese and higher-fat meats.
- **High CD foods.** Fried snacks, cookies, nuts, oils and candy

- In her laboratory at Penn State, Rolls has studied dietary patterns and eating behavior.
- Based on her research and that of others, she has determined that the **volume of food** that people eat affects both how satisfied they feel and how much they eat.
- Scientists like Rolls who study eating behavior have observed that over the course of a day or two, **a person eats about the same weight of food.**
- To lose weight, then, a person can lower the calories in each portion of food while maintaining the same amount of food.
- If a dieter eats the Volumetrics way and increases the water and fiber content in their daily food intake, he or she will still feel full. However, because the person is taking in fewer calories than before, weight loss will occur

- Research shows that the amount of food we eat has a greater effect on how full we feel than the number of calories in the food.
- If you feel full after eating, you're likelier to stick with a diet.



Volumetrics

- An example of Volumetrics: Eliminating dried fruits and substituting fresh fruits can be a simple way to increase volume, decrease calories, and balance blood sugar levels.
- 1/4 cup raisins is 100 calories which can easily be mixed with 1/4 cup nuts as trial mix to total well over 300 calories; while for 100 calories of grapes you get 2 full cups of volume and can curb the carbohydrates with a couple tablespoons of nuts (healthy fats and protein) to save around 150 calories!
- This would provide 4xs the volume with half the calories!
- Better yet would be 1 cup of grapes and 2 Tbsp of nuts!

- The human stomach holds about 3-4 cups of volume
- There are stretch-receptors that tell the brain we are satisfied or full when the stomach is stretched, so for long-term weight loss or satiety we want to aim for 3-4 cups of volume per intake
- Ideal balance would be
 - 2-3 cups of non-starchy vegetables (10-25 calories each),
 - 2/3-1 cup protein (40-120 calories),
 - 1/3-1/2 cup carbohydrates from fruit/starch/liquid dairy (60-120 calories) to yield balance with sustainable results!

- In a study co-authored by Rolls and published in a 2011 issue of the American Journal of Clinical Nutrition, people who ate an entree meal made with up of 25% pureed vegetables -- in this case, squash and cauliflower were blended into macaroni and cheese -- consumed 360 fewer calories per meal
- The vegetables helped to "volumize" the dish, tricking the brain into thinking you're eating more when in fact you're eating less.
- Sneaky chef



- Pumping up foods with air also works to increase volume and promote satiety.
- For example, instead of munching on a handful of potato chips, you can fill up on three handfuls of air-popped popcorn for the same number of calories.



Add Protein

- Research shows that increasing protein in the diet increases satiety
- Both the amount and type of protein in a meal influence satiety.
- High protein meals delay stomach emptying and thus create a longer-lasting feeling of fullness.



Protein

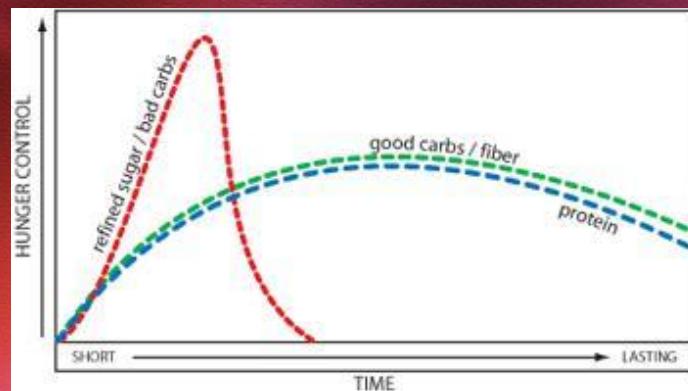
- The satiating property of dietary protein is influenced by the time of protein consumption.
- Studies have shown that protein intake at breakfast has a greater satiety effect than later meal times
- There are several explanations as to why this is the case.
- Protein has a greater thermogenic effect than carbohydrates and fat, which enables the body to burn more calories.
- Secondly, a high protein breakfast appears to slow gastric emptying, which attributes to the fact that protein appears to be one of the most satiating macronutrient.

Protein

- One study showed that fat loss was approximately twice as much in the high-protein diet group than the moderate-protein diet group in overweight and obese individuals



- Choosing a fat-free breakfast option may backfire because satiety may be reduced.
- Normal weight young adults fed muffins containing comparable amounts of either peanut oil, canola oil, or butter, or a fat-free muffin reported greater hunger as little as 30 min after eating the fat-free muffin breakfast
- More calories were consumed at subsequent meals on the days that the volunteers ate the fat-free muffins as well.



Eat Protein

- Convincing evidence exists that protein exerts an increased thermic effect (energy expended by our bodies in order to consume and process food) when compared to fat and carbohydrate.
- Evidence is also convincing that higher protein diets increase satiety when compared to lower protein diets.
- Higher protein diets may facilitate weight loss when compared to a lower protein diet
- Exchanging protein for carbohydrates has been shown to improve blood lipids, and in epidemiologic studies, higher protein diets have been associated with lower blood pressure and reduced risk of coronary heart disease.
- Aim for 25-30 grams of protein per meal

Watch the Beverages!

- Americans live in a beverage society.
- Consumers tote sports drinks and sweetened beverages, consume large quantities of soda, and have become addicted to flavored coffee drinks.
- Many people don't realize that they're often chugging hundreds of calories.
- But how do calories consumed in beverages affect satiety?
- When you control macronutrients, usually food makes you feel fuller than the same amount in a drink
- Drinks deliver calories faster than solids.
- **The White Chocolate Crème Frappuccino at Starbucks has 510 calories! A McDonalds Big Mac Burger has 550 calories!**

- A 2008 *Appetite* study coauthored by Rolls investigated the effects of eating different forms of apples on satiety.
- The results showed that eating a whole apple reduced lunch calorie intake by 15% compared with the control group and decreased calorie intake compared with applesauce and apple juice with and without added fiber.
- Overall, the whole apple increased satiety more than applesauce or apple juice.
- In a world that finds Starbucks' coffee drinks exceeding the calorie content of a Big Mac, it's an important strategy to look at beverage intake among those watching their weight.

Start your meal with Soup!

- Start your meal with soup or salad
- A study coauthored by Rolls and published in *Appetite* tested the effects of consuming different forms of soup (broth and vegetables served separately, chunky vegetable soup, chunky-puréed vegetable soup, or puréed vegetable soup) as a preload on meal intake.
- Results showed that consuming soup significantly reduced test meal intake and total meal calorie intake by 20% compared with having no soup.
- An earlier study coauthored by Rolls and published in the *Journal of the American Dietetic Association* discovered that eating a low-energy-dense salad reduced meal energy intake by 7% for a small portion and 12% for a large portion.

- Of course, it's important to note that not all soups and salads are created equally; consider that a bowl of a restaurant's baked potato soup can set someone back more than 500 calories. High-energy-dense soups and salads can potentially increase the total caloric intake of the meal.
- Try Imagine Vegetable soups or Health Valley Tomato Vegetable
- Aim for 80-100 calories worth of soup



Filling Up On Fiber

- When it come to satiety research: Fiber is a winner.
- There is a lot of data on fiber and satiety.
- It's not just viscous fiber that helps; insoluble fiber appears to stay in the gut for days, and a full gut tends to make you feel fuller for longer.
- Fiber appears to work on hunger in many ways: by displacing available calories and nutrients from the diet; increasing chewing, which limits intake by promoting the secretion of saliva and gastric juices, resulting in stomach expansion and increased satiety; and reducing the absorption efficiency of the small intestine.

Fiber

- In a 2001 research summary published in ***Nutrition Reviews***, researchers found that when volunteers were allowed to eat all they wanted, the average effect of increasing dietary fiber across all of the studies indicated that an *additional 14 grams of fiber per day resulted in a 10% decrease in energy intake and a weight loss of more than 4 pounds through about 3.8 months of intervention.*
- While eating whole grains can be an excellent way to increase fiber intake, researchers caution against lumping all whole grains into one category.
- It's the form of whole grains that are important.
- If you apply the energy density rules to many whole grain foods on supermarket shelves, a whole grain cookie just doesn't match up to a bowl of oatmeal or a serving of quinoa.
-

Portion Size Matters

- In a 2004 study coauthored by Rolls and published in the ***American Journal of Clinical Nutrition***, study participants were served a lunch entrée at one of two levels of energy density in one of three portion sizes.
- Subjects consumed 56% more energy when served the largest portion of the high-energy-dense entrées compared with when they were served the smallest portion of the low-energy-dense entrée.
- Despite the 56% difference in energy intake between the two entrées, **participant ratings of hunger and fullness did not differ after the meals!**

Don't Skip Meals

- We know that those who skip breakfast tend to weigh more and make up for lost calories—and then some—during the day.
- It's common sense that skipping meals increases hunger, which can lead to binge-eating behavior.
- A gorging pattern of food intake has been shown to **enhance fat storage and increase body weight**, which may be due to large fluctuations in storage and mobilization of nutrients.
- It is thought that in a state of energy balance, increasing meal frequency may prevent large metabolic fluctuations.
- So what frequency of meals is the perfect combination?

Don't Skip Meals

- A 2008 study in the *British Journal of Nutrition* found that eating three meals compared with two meals with the same amount of energy increased satiety over 24 hours.
- For some people snacks help them from becoming too hungry as well
- But it is important to let yourself become slightly hungry before eating again
- Between meals, after all the digestible food has left the stomach, there are occasional bursts of very strong, synchronized contractions that are accompanied by opening of the pyloric sphincter muscle at the end of the stomach.
- These are sometimes called "housekeeper waves" because their function is to sweep any indigestible particles out of the stomach. Another name for them is the migrating motor complex.

Water

- Water consumption is a key component of the Volumetrics eating plan.
- It recommends women drink at least 9 cups daily, whereas men should consume 12 cups daily.
- Water can come from foods or beverages and should replace sugary drinks in the diet.
- Rolls suggests lowering intake of sodas and other sugary drinks because these foods add calories without satiety.

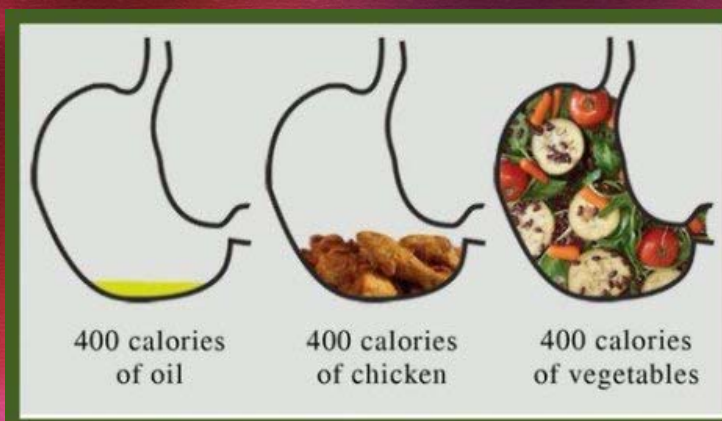
Water



- The symptoms of dehydration (sleepiness, low energy) closely mimic those of being overly hungry, which may lead you to think you need food to increase your energy level
- So many people misinterpret dehydration as hunger and it's an easy mistake to make considering that even though your body is thirsty the signal it gives off is hunger.

Volumetrics

- It all comes down to calories per bite.
- By choosing foods that have fewer calories per bite, your portion size grows, but your overall calorie count decreases
- Mac & cheese vs veggie stuffed mac & cheese – same calories!

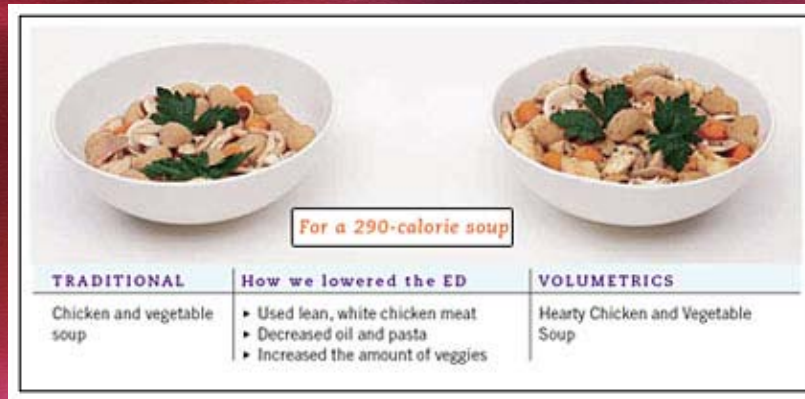


- Both of these meals contain 500 calories ~ the same number of calories!! The top photo gives you only small portions of fried chicken, mashed potatoes, and cheesy broccoli.



- English Trifle with Custard Sauce vs. Strawberry Trifle with Lemon Cream**





Energy Density

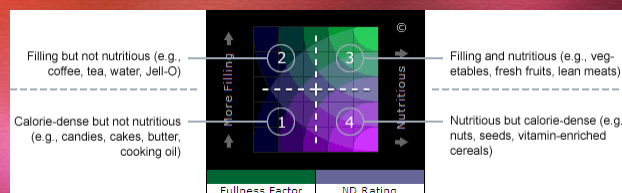
- Energy density is the amount of energy in a given weight of food or drink (calories or kcal/g).
- This is fairly straight forward to calculate - just divide energy in calories (kcal) by weight in grams and then use this value to determine if the food is of very low, low, medium, and high energy density.
- 'Very low' energy density is defined as foods up to 0.6 cal/g**
- Plain green salad – $19 \text{ cal}/100\text{g} = 0.19\text{cal/g}$
- Apple – $47 \text{ cal}/100\text{g} = 0.47\text{cal/g}$
- Vegetable soup (broth-based) – $52 \text{ cal}/100\text{g} = 0.52 \text{ cal/g}$

Energy Density

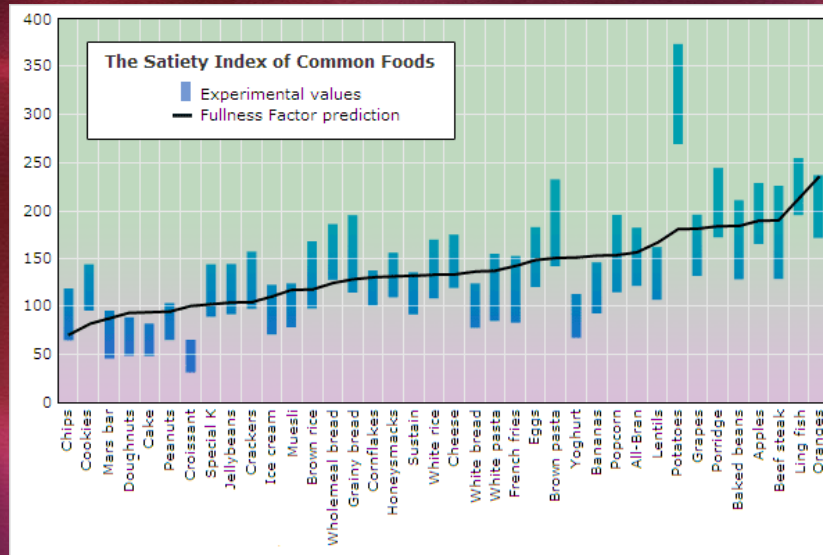
- **Low energy density is defined as 0.6 cal/g-1.5 cal/g**
 - Low fat yoghurt – $78 \text{ cal}/100\text{g} = 0.78 \text{ cal/g}$
 - Plain baked potato – $136 \text{ cal}/100\text{g} = 1.36 \text{ cal/g}$
 - Grilled chicken breast – $148 \text{ cal/g} = 1.48 \text{ cal/g}$
- **Medium energy density 1.5-4 cal/g**
 - Spaghetti Bolognese $190 \text{ cal}/100\text{g} = 1.9 \text{ cal/g}$
 - Grilled salmon $220 \text{ cal}/100\text{g} = 2.2 \text{ cal/g}$
 - Croissant $370 \text{ cal/g} = 3.7 \text{ cal/g}$
- **High energy density 4-9 cal/g**
 - Crackers $410 \text{ cal}/100\text{g} = 4.1 \text{ cal/g}$
 - Standard crisps $530 \text{ cal}/100\text{g} = 5.3 \text{ cal/g}$
 - Roasted peanuts $600 \text{ cal}/100\text{g} = 6 \text{ cal/g}$

NutritionData.com

- After studying the results of numerous satiety studies, NutritionData used a mathematical analysis of the existing data to create a new mathematical formula that predicts satiety from the nutrient content of a given food or recipe.
- This formula yields a value that called the **Fullness Factor**
- FF values fall within the range of 0 to 5. Foods with high FF's are more likely to satisfy your hunger with fewer Calories. Foods with low FF's are less likely to satisfy your hunger.



Nutrition Data.com



- In the graph, each blue bar represents the range of reported satiety values for each experimental food. (Approximately 12 human subjects participated in each food test, and results varied from one subject to another.)
- The black line represents the calculated Fullness Factors.
- The methodology of this particular study may have contributed to an artificially high satiety value for potatoes.
- Per the study's design, the participants were separately fed 220-Calorie servings of each food.
- A 220-Calorie serving of plain potatoes is larger and much less palatable than the other foods studied.
- The size of this serving may have influenced a repulsion to this test food that goes beyond the normal satiating response.

Soup

- Soups have a significant satiety effect and studies have demonstrated that compared to solid foods, soup ingestion decreases the amount of energy intake
- Compared to having no soup, it has been shown that eating soup reduces total energy intake of a meal
- When soup is consumed before a meal, a decrease of 20% of energy is consumed in the meal



- Fruits and vegetables have been shown to increase satiety and decrease hunger
- These foods have a low energy density, which is mainly due to the high water content and partly due to the fiber content
- The reduction of energy density has been shown to enhance satiety.
- The water adds weight, without adding calories and the fiber slows gastric emptying.
- Both of these factors contribute to the satiating effect of vegetables and fruits. Studies have also shown that the fiber decreases hunger and also decreases total energy intake

Fiber in Fruits and Vegetables

- Dietary Fiber is wonderful for increasing satiety, and promoting secretion of gut hormones.
- Due to the high volume or water content of fiber-rich foods, fiber displaces available calories and nutrients from the diet
- Consumption of viscous fibers delays gastric emptying, which may cause an extended feeling of fullness
- Satiety is also induced by increasing chewing, which limits food intake by promoting the secretion of saliva and gastric juice resulting in an expansion of the stomach



Fiber

- In addition, hormone secretion is affected during fiber ingestion.
- Insulin response is reduced and cholecystokinin (CCK) in the small intestine is increased
- Insulin regulates blood glucose levels while CCK adjusts gastric emptying, pancreatic secretion and gall bladder contraction.
- There is direct correlation between CCK and satiety after foods of different fiber contents are consumed
- Large intakes of dietary fiber at breakfast are associated with less food intake at a lunch

Resistant Starch

- Starches are long chains of glucose that are found in grains, potatoes and various foods.
- But not all of the starch we eat gets digested
- Sometimes a small part of it passes through the digestive tract unchanged
- In other words, it is *resistant* to digestion
- Many studies in humans show that resistant starch can have powerful health benefits
- This includes improved insulin sensitivity, lower blood sugar levels, reduced appetite and various benefits for digestion

Resistant Starch

- Resistant starch is a type of non-digestible, fermentable fiber that is resistant to digestion in the small intestine, and is broken down to short-chain fatty acids by microflora in the large intestine.
- It is commonly found in cooked and cooled potatoes, green bananas, beans and legumes.
- Resistant starch dilutes energy density of food intake, has a bulking effect similar to fiber, and increases the expression of PYY and GLP-1 in the gut: the satisfaction hormones
- The increase in gut hormones can affect long-term energy balance by affecting neuronal pathways in the brain as well as improved overall health of the intestines
- Based on developing research, consumption of resistant starch can be an effective means of weight management.

Resistant Starch

- There are 4 different types
- **Type 1** is found in grains, seeds and legumes and resists digestion because it is bound within the fibrous cell walls.
- **Type 2** is found in some starchy foods, including raw potatoes and green (unripe) bananas.
- **Type 3** is formed when certain starchy foods, including potatoes and rice, are cooked and then cooled. The cooling turns some of the digestible starches into resistant starches via a process called retrogradation
- **Type 4** is man-made and formed via a chemical process.

Resistant Starch

- Resistant starch has various benefits for metabolic health.
- Several studies show that it can improve insulin sensitivity, as in how well the body's cells respond to insulin
- Resistant starch is also very effective at lowering blood sugar levels after meals
- It also has a "second meal effect" – meaning that if you eat resistant starch with breakfast, it will also lower the blood sugar spike at lunch
- The effect on glucose and insulin metabolism is very impressive. Some studies have found a 33-50% improvement in insulin sensitivity after 4 weeks of consuming 15-30 grams per day

Resistant Starch

- Resistant starch has fewer calories than regular starch (2 vs 4 calories per gram).
- So... the more resistant starches found in a food, the fewer calories it will contain.
- Several studies show that soluble fiber supplements can contribute to weight loss, primarily by increasing feelings of fullness and reducing appetite
- It looks like resistant starch has the same effect. Adding resistant starch to meals increases feelings of fullness and makes people eat fewer calories.
- There are some studies in animals showing that resistant starch can cause weight loss, but this hasn't been studied properly in humans yet.

Resistant Starch

- There are two ways to add resistant starches to your diet... either get them from foods, or supplement with them.
- Several commonly consumed foods are high in resistant starch.
- This includes raw potatoes, cooked and then cooled potatoes, green bananas, various legumes, cashews and raw oats.
- You can add resistant starch to your diet without adding any digestible carbohydrates.
- For this purpose, many people have recommended (and are getting good results with) Bob's Red Mill Raw Potato Starch

Resistant Starch

- **It ups your calorie burn**
- Unlike some types of fiber, resistant starch gets fermented when it reaches the large intestine.
- This process creates beneficial fatty acids, including one called butyrate, which may block the body's ability to burn carbohydrates.
- This can prevent the liver from using carbs as fuel and, instead, stored body fat and recently consumed fat are burned
- In your body, carbohydrates are the preferred source of fuel, like gasoline that powers your car's engine.
- Butyrate essentially prevents some of the gas from getting into the tank, and your cells turn to fat as an alternative.
- One study found that replacing just 5.4% of total carbohydrate intake with resistant starch created a 20 to 30% increase in fat burning after a meal.

Resistant Starch

- **It shuts down hunger hormones**
- Animal studies have found that resistant starch prompts the body to pump out more satiety-inducing hormones.
- A meal with resistant starch triggers a hormonal response to shut off hunger, so you eat less.

Resistant Starch

- **Keep it cool**
- In cooked starchy foods, resistant starch is created during cooling.
- Cooking triggers starch to absorb water and swell, and as it slowly cools, portions of the starch become crystallized into the form that resists digestion.
- Cooling either at room temperature or in the refrigerator will raise resistant starch levels.
- Just don't reheat. That breaks up the crystals, causing resistant starch levels to plummet.

Resistant Starch



- **TRY: Beans**
- RESISTANT STARCH: 8 g per 1/2 cup
- **SMART SERVING SUGGESTIONS**
Snack on chilled pinto bean dip with crudites
Substitute hummus for mayo on sandwiches
Add black beans to garden salads



- **TRY: Bananas (slightly green)**
- RESISTANT STARCH: 6 g per small
- **SMART SERVING SUGGESTIONS**
Slice and mix with yogurt and oats for breakfast
Dip in yogurt, roll in chopped nuts, and freeze as an ice-cream alternative
Dice and toss with lemon juice, salt, sugar, and onion to make tangy banana chutney



- **TRY: Potatoes and yams**
RESISTANT STARCH: 4 g per 1/2 cup
SMART SERVING SUGGESTIONS
Serve cold potato salad as a side dish
Add chilled, chunked red potatoes to a salad
Puree cooked white potatoes to create a chilled garlic potato soup



- **TRY: Barley**
RESISTANT STARCH: 3 g per 1/2 cup
SMART SERVING SUGGESTIONS
Add to chilled lentil salad Mix into tuna, chicken, or tofu salad
Sprinkle onto garden salads



- **TRY: Brown Rice**
RESISTANT STARCH: 3 g per 1/2 cup
SMART SERVING SUGGESTIONS
Order brown rice sushi
Mix chilled brown rice with fat-free milk, raisins, and cinnamon in place of cold cereal for breakfast
Add to chilled marinated cucumbers as a side dish



- **TRY: Corn**
RESISTANT STARCH: 2 g per 1/2 cup
SMART SERVING SUGGESTIONS
Add to a taco salad, burrito, or quesadilla
Sprinkle into salsa Make fresh corn relish

The list below has some general tips on what will keep you filled up for some time

 <p>Choose fruits, vegetables, low-fat or non-fat dairy products and whole grains.</p>	 <p>Prepare dishes with high water content, such as soups, stews and pasta dishes.</p>	 <p>Use sauces that are vegetable-based, e.g. tomato-based, instead of cream-based sauces.</p>
 <p>Get more fibres from vegetables, fruits, whole grains and beans.</p>	 <p>Select foods like fish, poultry, lean meats and beans for your protein source.</p>	<p>Eat your food slowly; this allows your stomach to send a "full" signal to your brain.</p>
 <p>Try to observe which foods keep you satiated (full) longer and make use of this knowledge in your food choices and preparation.</p>		

Let's Get Cooking!

