

# Engineered Food

**Clyde Wilson, PhD**

## **We all know there is no better food designer than nature**

Nature is the best food designer because the complexity within natural fresh food matches the complexity of the human body. No amount of research or intellectual power can match that complexity. For this reason, when we put together more than one food from nature (as opposed to just grabbing an apple) the thought process should not focus on what to extract from the foods as ingredients, but on how to minimize changing the original food. For example, if you want something more than just an apple, eat it with almonds or put it on yogurt. The apple was selected over generations to be bigger and more sugary by humans, and it might be contaminated by harmful bacteria if organic, and is almost certainly contaminated by pesticides if not organic, but at least it comes straight from a tree. The almonds might be lightly roasted, and the yogurt is manufactured, but at least their processing is minimal compared to most almond and yogurt products on the market. The closer a food is to its “natural” source, the closer it will bring your body to a healthier place.

## **Cooking**

Cooking kills harmful bacteria and can open up the cells in our food to make their nutrients more available to us during digestion, so as long as the cooking does not destroy more nutrients than it makes available or blacken any of the food (create free radicals, increasing cancer risk), then cooking can actually make eating healthier in many instances. I know this from personal experience traveling in regions where vegetables are contaminated by bacteria so to avoid food poisoning most vegetables have to be cooked. I also know this from the published research on nutrient availability increasing with moderate cooking. Ironically, the same plant nutrients (phytonutrients) that are so good for us, killing off harmful things including cancer cells in our body, kill off some of our healthy cells, particularly in the lining of our intestine. As a result, some raw plant foods, such as legumes, are so high in healthy compounds that they hurt our intestinal lining and therefore reduce the absorption of all nutrients we are consuming. When nutrients are in such high concentration that they hurt us, in

Dr. Clyde Wilson

particular when they reduce nutrient absorption by hurting the lining of our intestines, they become “anti nutrients.” Lentils and beans are an example of this, but cooking these foods eliminates the harm, leaving the amount that increases health, including reducing cancer risk, so long as they are not burned or blackened, which increases cancer risk. Lightly roasted almonds or peanuts might be healthier than raw ones, unless they roasted to the point of being dark brown.

### **Minimal processing mind-set**

When taking into account all of the conflicting considerations, the best mind-set is not to eat everything raw, or everything cooked, and certainly not to replace natural food with synthetic food-like concoctions loaded with purified vitamins and minerals (like most things on the store shelves), but to replace all of that with the mind-set of “minimally processed.” I use this term to define the conservative perspective of allowing for roasting almonds, cooking broccoli, processing milk into yogurt, steel-cutting oats, farming larger and sweeter apples than nature provided, or almonds that have less cyanide than wild almonds (which contain enough to kill us). In other words, the “minimal processing” mindset does just enough to the food we receive from nature to make it a bit better for our eating and health experience, but no more. If you can eliminate all the bad bacteria on food, then by all means eat raw, but be careful of anti-nutrients. If you cannot, then eat everything lightly cooked. If you are somewhere in the middle, then eat somewhere in the middle. Just don’t make the mistake of thinking that you absolutely must eat one and only one way because someone told you so. The only truth in food selection, creation, cooking and consumption is that a minimal processing mind-set (not necessarily a zero processing mind-set) is the most likely to optimize your health.

### **Putting natural minimally-processed foods together for optimal health**

It is an entirely different question to ask what natural and minimally-processed foods should be put together (and in what amounts) to optimize human health. We are all different, with different physiological needs and different food likes and dislikes, and we should therefore all eat differently from each other. However, scientific studies over the last century have slowly led us to some conclusions about the basic components of healthy eating, which I discuss in “Key Concepts,” which the following charts summarize.

### The critical elements of a meal that drive metabolic rate where “Key Concepts” left off

Unsaturated Fats	Protein low in sat fat	Main carb calories	Vegetables
<p><b>Ω-3:</b> Salmon, sardine, flax, chia, walnuts</p> <p><b>Ω-6:</b> all nuts &amp; seeds</p> <p><b>Ω-9:</b> olives, olive oil, avocado</p> <p><b>Saturated fat:</b> from tropical plants healthier than from animals</p>	<p><b>Animals</b></p> <ul style="list-style-type: none"> <li>• Beef, poultry, fish etc</li> </ul> <p><b>Animal products</b></p> <ul style="list-style-type: none"> <li>• Eggs &amp; dairy</li> </ul> <p><b>Plants</b></p> <ul style="list-style-type: none"> <li>• Soy</li> <li>• Legumes: lentils &amp; starchy beans</li> </ul>	<p><b>Needed slow carbs:</b></p> <ul style="list-style-type: none"> <li>• Fruits</li> <li>• High-cal veg (tomato, carrot, beets)</li> <li>• Legumes: lentil beans</li> </ul> <p><b>Fast-digesting starch</b></p> <ul style="list-style-type: none"> <li>• Tubers: yam, potato</li> <li>• Cereals: rice, corn, oats, wheat e.g. bread</li> </ul>	<p>Of course eat them for nutrients. <b>But also eat them to slow digestion of faster starch:</b></p> <ul style="list-style-type: none"> <li>• 1-3 x starch volume to maintain health</li> <li>• Two to three times this for weight loss</li> </ul>

Each dietary fat type should be included in your day (or at least most days) i.e. timing is not critical. Protein, carbohydrate calories, and vegetables, on the other hand, should be coordinated together in meals. Vegetables are less important when the body’s absorption rate of carbohydrates is higher (right after waking and right after exercise) if the carbohydrate calories are kept low (see “Key Concepts”).

#### Nutrient portion starting point: choose one or two from each food group for your meal

The below food volumes correlate to roughly “thumb” volumes of fats, palm volumes of carb calories and of protein foods, and double fist volumes of vegetables. Other than right after waking and right after exercise, use a higher vegetable volume than starch volume any time you eat a starch unless you have a high metabolic rate with no body-fat or disease-reduction goals.

#### Estimate of food portions where “Key Concepts” left off

Unsaturated Fats	Protein low in sat fat	Main carb calories	Vegetables
<p><b>Tbsp volumes since fats are dense:</b></p> <ul style="list-style-type: none"> <li>• 1 Tbsp veg oil or nut butter</li> <li>• 2 Tbsp olives or nuts</li> <li>• 3 Tbsp seeds</li> <li>• 4 Tbsp avocado</li> <li>• Fatty fish: see protein</li> </ul>	<p><b>Animals or Soy</b></p> <ul style="list-style-type: none"> <li>• 1/2-1 cup (1 palm)</li> </ul> <p><b>Animal products</b></p> <ul style="list-style-type: none"> <li>• 2-3 eggs</li> <li>• 1/2 cott cheese, 3/4-1 cup yogurt or milk</li> </ul> <p><b>Plants</b></p> <ul style="list-style-type: none"> <li>• 1 cup lentils or beans</li> </ul>	<p><b>Needed slow carbs:</b></p> <ul style="list-style-type: none"> <li>• 1/2-1 cup fruit or legumes (lentil bean)</li> <li>• 1-2 cups high-cal veg (tomato, carrot, beets)</li> </ul> <p><b>Fast-digesting starch</b></p> <ul style="list-style-type: none"> <li>• To replace losses from physical activity</li> </ul>	<p>Of course eat them for nutrients. <b>But portion to slow digestion of faster starch:</b></p> <ul style="list-style-type: none"> <li>• 1-3 x starch volume to maintain health</li> <li>• Two to three times this for weight loss</li> </ul>

# Summary of How to Engineer Meals from Previous Document

Putting it all together:

- Portions of all foods and food groups are flexible by at least +/- 50%.
- The timing of fats in your day is not critical.
- Your main carb calories should be from legumes (lentils and starchy beans), fruits, and high-calories vegetables (tomato, carrots, beets). Other vegetables should make up roughly half the volume of your meals. If you are eating faster-digesting starches (even if they are whole grain), eat a high volume of vegetables than the starch volume to slow the digestion rate.

	Unsaturated fat	Protein	Main carb calories	Main vegetables
<b>Balanced meal for raising metabolism:</b>	<p><b>Ω-3:</b> salmon, chia, flax, walnut</p> <p><b>Ω-6:</b> nuts / seeds</p> <p><b>Ω-9:</b> olives, EVOO, avocado</p> <p><b>AF:</b> animal fat listed just for awareness</p>	<p>Omnivore</p> <ul style="list-style-type: none"> <li>• Animal tissue</li> </ul> <p>Vegetarian</p> <ul style="list-style-type: none"> <li>• Dairy</li> <li>• Eggs</li> </ul> <p>Vegan</p> <ul style="list-style-type: none"> <li>• Soy</li> <li>• Legumes</li> </ul>	<ul style="list-style-type: none"> <li>• Legumes</li> <li>• Fruit</li> <li>• High-Cal veggies</li> </ul> <p>Faster-digesting starches: lower volume than main vegetables except right after waking or exercise</p> <ul style="list-style-type: none"> <li>• Tubers</li> <li>• Cereals i.e. grains</li> </ul>	<p>All meals (except right after waking or right after exercise) should have vegetables play a central role: they take on the taste of the rest of the meal so they <i>very</i> easy to make taste good</p>
Extra metabolism:				Vegetables at least 1/2 meal's volume
Activity weight loss:			1 slice bread OR 1/3-1/2 cup any starch (rice potato corn pasta etc.)	Higher vegetable volume to slow the starch digestion rate
<b>Making the meal as a salad:</b>	Fats may be put onto a salad differently than they would be put into a meal	Salads tend to have less protein on them than a meal would have in them	Carb calories go well on salad e.g. legumes, fruits, tomato, or faster starches (yam, corn, bulgur, slice bread)	Specific lettuce suggestion and possible changes to 1 or more of the veggies in dish

# Engineering Healthy Snacks

It is not as important for snacks to be balanced as it is for meals. This is because a balanced meal will provide enough protein to last the body until the next meal. However, if a meal is low in protein, then this can be compensated for a few hours later with a snack that contains protein. Since the timing of fats is not critical (unless you suffer from incessant hunger then include fats in every meal), fats are not central to either meals or snacks and can be distributed however is best for each individual. The remaining food groups are carbohydrate calories and vegetables. How to juggle these depends on your motivation for snacking. If you are craving one particular snack, then there is no question of optimization: you know what you want so little “engineering” is needed. However, if you are interested in engineering your snack to optimize the benefit to your body, it is likely that you would eat two or three foods in combination, not just one.

If you are eating a snack to help you stay mentally focused or boost your energy, you will eat a food that will boost your blood sugar without a blood-sugar swing that drops you into a lower pit than you started, meaning you would eat a piece of fruit instead of candy, or you would eat 5 crackers instead of 10 crackers. If you were trying to boost your recovery from exercise, you would boost your blood sugar but also include a bit of protein, such as a hard-boiled egg (with 5 crackers) or some yogurt (with the fruit). If after eating one of these snacks you were still distracted by hunger, your snacking has just shifted its focus from a physiological need to a perceived need. Hunger is a perception triggered by a complex set of inputs, including blood chemistry, hormone levels, and stomach fullness (chemical and pressure sensors). Carbohydrate calories will boost blood sugar and the fastest hormonal response to reduce hunger perception, protein and fats produce the longest lasting hormonal suppression of hunger, and vegetables provide the greatest stomach filling effect per calorie and slow the digestion of the entire snack to increase the entire physiological benefit of the snack.

**Typical snack foods:** Generally more portable than foods we think of making up meals

Unsaturated Fats	Protein low in sat fat	Main Carb Calories	Main Vegetables
<p><b>Ω-3:</b> Walnuts</p> <p><b>Ω-6:</b> All nuts &amp; seeds</p> <p><b>Ω-9:</b> Olives, olive oil e.g. hummus or pesto with snack</p>	<p><b>Omnivore</b></p> <ul style="list-style-type: none"> <li>• Jerky (high salt, possible carcinogens)</li> <li>• Protein powder (possible carcinogens)</li> </ul> <p><b>Vegetarian</b></p> <ul style="list-style-type: none"> <li>• Yogurt</li> <li>• Hard-boiled egg</li> </ul> <p><b>Vegan</b></p> <ul style="list-style-type: none"> <li>• Soy nuts</li> </ul>	<ul style="list-style-type: none"> <li>• Fruits</li> <li>• High Cal Veg: Carrots, cherry tomatoes</li> </ul> <p><b>Fast-digesting starch</b></p> <ul style="list-style-type: none"> <li>• Yam</li> <li>• Cereal: crackers, granola</li> </ul>	<p><b>Vegetable pieces</b></p> <ul style="list-style-type: none"> <li>• Broccoli spears, bag lettuce, celery sticks</li> </ul> <p><b>Slightly sweeter options</b></p> <ul style="list-style-type: none"> <li>• Snap peas, bell pepper, jicama, cucumber</li> </ul>

Since most snacks are not only to boost energy or recovery, but almost always include the target of reducing hunger, it is best to include a fat or protein WITH a carbohydrate (a carb calorie and/or vegetable). This is because the fat or protein will reduce hunger for several hours, whereas the carbohydrate will reduce hunger almost immediately (carb calories by boosting blood sugar, vegetables by increasing stomach volume). If you only eat an apple to reduce hunger, an hour later you will need another, and then another, and another. If you only eat almonds to reduce hunger, you won't feel a significant reduction in hunger for at least a half hour, by which time you will over-eat almonds. By combining the apple with the almonds you achieve both an immediate and a long-term hunger suppression. If you were extremely hungry or also interested in exercise recovery, you would put the apple and almonds on yogurt to get some protein as well.

**Example Snacks:** Combine a fat or protein (in grey) WITH a carb (carb calories and/or veggies)

	Unsaturated fat	Protein	Main carb calories	Main vegetables
<b>Boost energy</b>			Fruit or high cal veg	
<b>Boost recovery</b>		Yogurt or jerky or soy nuts	Fruit or granola	
<b>Hunger</b>	Nuts or seeds		Fruit	
<b>Hunger</b>	Hummus			Vegetable pieces
<b>“Mini meal”</b>	Nuts	Yogurt	Fruit, steel cut oats	Celery sticks

### Designing bars, muffins, meal replacements, and smoothies

If you include some foods that will keep the snack stuck together, you can make a raw bar, but if you want the bar to stay fresh for more than a day at room temperature you cannot include fresh fruits or vegetables. If you kill off most of the bacteria with minimal processing (baking without significant browning) then you have a baked bar or in more spherical form a muffin. The low-bacteria ingredients can be a shake packet, but with fresh fruits and vegetables can be a freshly-made shake or smoothie. Any time a significant shelf is needed with any food product, the healthiest, most complex food ingredients, meaning fresh fruits and vegetables, must be eliminated or replaced by their dried versions, which are oxidized, meaning the majority of the phytonutrients (including anti-oxidants) are destroyed, which is a small thing to give up when considering that the alternative is to have a spoiled snack you cannot eat. The bottom line is that the sooner you eat a food to when it is obtained from the Earth the healthier that that food is and the healthier that food even can be to begin with.

## Engineering bars, muffins, meal replacements, and smoothies

	Unsaturated fat	Protein	Main carb calories	Main vegetables
<b>Ingredient options for:</b> <ul style="list-style-type: none"> <li>• Raw bar</li> <li>• Very long shelf life baked bar</li> <li>• Meal replacement</li> </ul>	<b>Ω-3:</b> chia, flax, walnut  <b>Ω-6:</b> nuts / seeds	Omnivore or Vegetarian or Vegan <ul style="list-style-type: none"> <li>• Protein powder</li> </ul> Vegan <ul style="list-style-type: none"> <li>• Soy nuts</li> </ul>	<ul style="list-style-type: none"> <li>• Dry (dead) fruit</li> </ul> Faster-digesting starches: cannot be lower volume than main vegetables because spoils fast <ul style="list-style-type: none"> <li>• Cereals i.e. grains</li> </ul>	<ul style="list-style-type: none"> <li>• Dry (dead) veggies</li> </ul>
<b>Ingredient options for:</b> <ul style="list-style-type: none"> <li>• Baked bar</li> <li>• Muffin</li> </ul>	Same as above	Same as above	<b>Can use fresh fruit</b>  Include grains for physical activity	<b>Can use fresh vegetables</b>
<b>Smoothie if consumed soon or pasteurized</b>	Same as above	Same as above but <b>can use soy milk, milk and/or yogurt</b>	Same as above	Same as above

### Bells and Whistles

Any specific ingredients besides those in the previous chart go beyond the complex needs of the human body that are naturally matched by the complexity of natural food. You can think of such added specific ingredients that companies use to differentiate their products from each other as additives such as those you use for your car. Additives in your gasoline, oil, transmission fluid etc might help a little, but they pale in comparison to the importance of clean, quality, uncontaminated gasoline, oil, and fluids.

### It can be more important what is NOT in food than what is in it

If food contains toxins, like mercury in some fish, or carcinogens in water from the bottles they are in, the healthiest foods in the world (like fish and water!) can become unhealthy and you are better off without them. Slightly less toxic is sugar, and yet most of the “health foods” on the market, such as yogurt and oatmeal and energy bars contain added sugars, often in hidden form (e.g. dried fruit), made to sound good for you (“organic cane juice” or “chicory root”), and split into multiple forms so that it is not the first or second ingredient. The irony of the modern food industry’s efforts to provide us “healthy foods” are that slightly less toxic alternatives are combined with the concepts of low fat, low sodium, and low calories with high protein, high vitamins and minerals as if that offers us health, when all it really offers is immediate toxicity.