

The Natural Diet Solution for PCOS and Infertility

Use Healthy Foods to Reduce PCOS Symptoms and Become Pregnant

**By
Nancy Dunne, N.D.
and
Bill Slater**



(Portion of Chapter 3.2) What Makes You Hungry?

As a woman who has polycystic ovary syndrome, you may have discovered that you have a hard time staying away from food, especially if you are overweight. In spite of tremendous willpower, you are driven to eat.

Or, even if your willpower prevails and you don't overeat, you are usually hungry and cannot lose fat weight.

The reason that you are having these problems is that the hormones that govern your appetite and fat regulation are just not working properly.

There are dozens of hormones and other signaling molecules that either stimulate or inhibit food intake. They form an exceedingly complex web of interrelationships.

You may have heard that if you could just get control of your insulin, you will not feel as hungry and your weight will melt away. While this is partially true, it's an oversimplification. In fact, you may have numerous hormones or signaling molecules that are out of balance -- either overactive or underactive.

There is no single factor that governs your weight, your fat metabolism or your hunger. It is a bewildering combination of factors, all interacting or influencing one another. An imbalance or disturbance of one signaling molecule will affect others, which in turn will affect still others.

No one, including research scientists and doctors, fully understands the functions and relationships of all these various signaling molecules, particularly as they exist in each unique woman. And, there are probably additional signaling molecules that haven't yet been discovered.

However some basic information about this fascinating internal world is clear. In this chapter, we'll briefly review a few of these hormones so that you can better understand the complexity involved and why you are having problems.

How the Hunger Process Works

The amount of food you eat is determined mainly by the intrinsic desire for food called "hunger". Hunger means a craving for food, and is associated with a number of sensations. For example, if you haven't eaten for many hours, your stomach undergoes intense rhythmic contractions called hunger pangs.

The type of food you preferentially seek is your appetite. Your appetite helps you choose the quality of food you eat.

Satiety is the opposite of hunger. It's a feeling of fulfillment in the quest for food.

The hypothalamus, a gland in the brain, is the main control center for hunger and satiety. It tells your body whether it is hungry or not. The hypothalamus is especially important because it produces a variety of hormones that influence or determine the hormone production of other endocrine glands, which in turn tell various cells what to do.

The hypothalamus is sensitive to hormonal and other feedback signals from the body. This feedback is used by the hypothalamus to decide what hormones to produce.

An important feedback mechanism is the level of glucose (blood sugar) in the blood. Much of the food you eat gets converted to glucose -- some is used immediately for energy, some is stored as glycogen, and some is converted by the liver into fat for later use. When the levels of glucose are low, the liver sends signals to the hypothalamus that levels are low. The hypothalamus in turn triggers whatever habits you have accumulated relating to food seeking and consumption.

The hypothalamus actually tells you more specifically what foods you need, and seems to be responsible for many of our "cravings."

There are also certain hormones that are released when food begins to move from the stomach to the intestines that signal the hypothalamus that it's time to stop eating. There is also a hormone released by the fat cells themselves called leptin that decreases appetite via the hypothalamus.

From here on, we'll briefly discuss three of the signaling factors that influence your appetite and your weight. There are dozens of factors that we could discuss, but these may be the ones you have heard about or will hear about.

Ghrelin

Ghrelin is a "hunger hormone" that was discovered in 1999. A lot of research is being done on ghrelin so you may be hearing more about it.

It helps to regulate how much food you eat and how much weight you gain. In normal individuals, ghrelin levels go up before meals, and down after meals.¹ Elevated ghrelin triggers strong feelings of hunger. In addition to regulating eating behavior, ghrelin may slow your metabolism and reduce your ability to burn fat.

Ghrelin is secreted primarily in the stomach and intestines. Very obese people who have a gastric bypass operation to lose weight subsequently produce relatively little ghrelin, since their

stomach is smaller and presumably produces less ghrelin.² This may help explain why their appetites decrease markedly after the surgery.

In slim people, ghrelin typically levels peaks right before a meal but rapidly declines soon afterwards. That's not what happens with overweight people -- their ghrelin remains steady before and after a meal.³ In other words, since their ghrelin does not decline after a meal, they were still hungry after eating.

Also, dieters who lose weight and then try to keep it off make more ghrelin than they did before dieting, which may help to explain why it's so difficult to stay on a diet for a long time, and why so many do "yo-yo" dieting, where they go off the diet to binge for a while, then return to the diet, and then binge again

Ghrelin and Diet

Since ghrelin is a recently discovered hormone, much research still needs to be done to conclusively determine how the composition of the diet would affect ghrelin levels.

However, there is one interesting study from the University of Naples, Italy.⁴ The researchers fed 14 non-obese healthy women meals that were either high-fat or a high-carbohydrate. Ghrelin dropped after both the high-fat and high-carb meals. However, it dropped further after the high-carb meals. In addition, the women reported that the high-carb meal did a better job in suppressing their feelings of hunger.

Another study, from the University of Washington in Seattle, showed that a low-fat diet helped individuals avoid increases in ghrelin and thus avoid hunger.⁵ They also lost weight.

Other studies have shown that consumption of high-glucose meals suppressed plasma levels of ghrelin, whereas this response was less after high-fructose meals.⁶ Glucose and fructose are simple sugars that are found in carbohydrates.

Glucose and fructose have identical chemical formulas but the structure of their molecules is slightly different. Therefore they behave differently in the body. Since fructose is much sweeter than glucose, and very cheap, it is found throughout our food supply. Introducing a lot of fructose into your body will do little to reduce your ghrelin "hunger" hormone, thus propelling you in the direction of eating more food.

We believe that eating the right type, quality and quantity of carbohydrate is important for controlling the hormones that govern your hunger and the behavior of your fat cells.

Ghrelin and PCOS

Several studies suggest that women with PCOS have disordered ghrelin levels, or have an impaired ability to regulate ghrelin.^{7 8} For example, one study conducted at the University of Adelaide in Australia showed that PCOS women were less satiated and more hungry after a meal than normal women.⁹ The ghrelin levels of the PCOS women did not decline after a meal as much as the non-PCOS women. Interestingly, the composition of the test diets (high protein vs. standard protein) had no effect on ghrelin levels.

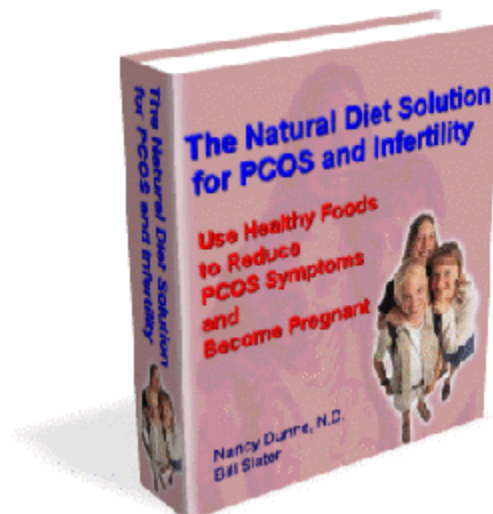
In a study of overweight PCOS women at the Center for Applied Biomedical Research in Bologna Italy, there is a negative correlation between ghrelin and insulin resistance; the worse the insulin resistance, the lower the ghrelin level.¹⁰ However, in overweight non-PCOS women, there was no such correlation. It's not clear to us what this means, although it demonstrates that there is a relationship between ghrelin and insulin resistance.

There appears to be some interplay among caloric intake, glucose, insulin and ghrelin. It is not clear whether ghrelin stimulates or inhibits insulin secretion. The authors also reported a strong correlation between decreased ghrelin and increased androstenedione, which is a precursor to testosterone. Moreover, the ovaries have a high concentration of binding sites for ghrelin, suggesting that ghrelin may play some kind of role in the production of hormones from the ovaries.

There is much to be learned about ghrelin. What we know at this point is that ghrelin imbalances occur in PCOS. We don't know whether obesity causes the ghrelin disorder, or whether the ghrelin disorder causes the obesity.

The diet in this book is intended to reduce insulin resistance. Possibly, as insulin resistance diminishes and you lose some weight, you will also be more sensitive to ghrelin and it will start to normalize.

Yes! I want to learn how to rebalance my hormones with the special diet in this e-book!



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- ¹ Cummings DE et al, A preprandial rise in plasma ghrelin levels suggests a role in meal initiation in humans, *Diabetes*, 2001, 50(8):1714-9
- ² Cummings, DE et al, Plasma ghrelin levels after diet-induced weight loss or gastric bypass surgery. *N Engl J Med*. 2002 May 23;346(21):1623-30
- ³ English, PJ et al, Food fails to suppress ghrelin levels in obese humans. *J Clin Endocrinol Metab*. 2002 Jun;87(6):2984
- ⁴ Monteleone P et al, Differential responses of circulating ghrelin to high-fat or high-carbohydrate meal in healthy women. *J Clin Endocrinol Metab*, 2003, 88(11):5510-14
- ⁵ Weigle, DS et al, Roles of leptin and ghrelin in the loss of body weight caused by a low fat, high carbohydrate diet, *J Clin Endocrinol Metab*, 2003, 88(4):1577-86
- ⁶ Teff KL et al, Dietary fructose reduces circulating insulin and leptin, attenuates postprandial suppression of ghrelin, and increases triglycerides in women. *J Clin Endocrinol Metab*. 2004 Jun;89(6):2963-72
- ⁷ Wasko, R et al, Elevated ghrelin plasma levels in patients with polycystic ovary syndrome, *Horm Metab Res*. 2004 Mar;36(3):170-3
- ⁸ Schofl C, Circulating ghrelin levels in patients with polycystic ovary syndrome, *J Clin Endocrinol Metab*, 2002, 87(10):4607-10
- ⁹ Moran, LJ et al, Ghrelin and measures of satiety are altered in polycystic ovary syndrome but not differentially affected by diet composition, *J Clin Endocrinol Metab*, 2004, 89(7):3337-44
- ¹⁰ Pagotto, U et al, Plasma ghrelin, obesity, and the polycystic ovary syndrome: correlation with insulin resistance and androgen levels, *J Clin Endocrinol Metab*, 2002, 87(12):5625-9