Obesity and hormones

Hormones are one factor in obesity. The hormones leptin, insulin, sex hormones and growth hormone influence appetite, metabolism and body fat distribution. Obese people have levels of these hormones that encourage abnormal metabolism and the accumulation of body fat.

The endocrine system is made up of glands that secrete hormones into the bloodstream. Hormones are chemical messengers that regulate body processes. The endocrine system works with the nervous system and the immune system to help the body cope with different events and stresses. Excesses or deficits of hormones can lead to obesity and, on the other hand, obesity can lead to changes in hormones.

Leptin, the fat hormone

The hormone leptin is produced by fat cells and is secreted into the bloodstream. Leptin reduces appetite by acting on specific centres of the brain to reduce the urge to eat. It also seems to control how the body manages its store of body fat. Since leptin is produced by fat, leptin levels tend be higher in obese people than in people of normal weight.

The issue being researched at the moment is why obese people are obese, considering they have higher than usual levels of an appetite-reducing hormone. One theory is that obese people aren't as sensitive to the effects of leptin. Research is focusing on why leptin messages aren't getting through to the brain in obese individuals.

Leptin and dieting

Various studies have shown that blood leptin levels drop after low-kilojoule diets. Reduced leptin levels may increase appetite and slow metabolism. This may help to explain why crash dieters usually regain their lost weight. It is possible that leptin therapy may one day help dieters to maintain their weight loss in the long term, but more research is required before this becomes a reality.

Insulin

Insulin is a hormone produced by the pancreas and important for the regulation of carbohydrate and fat metabolism. Insulin stimulates glucose uptake from the blood in tissues such as muscle, liver and fat. This is an important process to ensure energy is available for everyday functioning and to maintain normal levels of circulating glucose.

In obesity, insulin signals are sometimes lost and tissues are no longer able to control glucose levels. This can lead to the development of type II diabetes and the metabolic syndrome.

The sex hormones

Body fat distribution plays an important role in the development of obesity-related conditions such as heart disease, stroke and some forms of arthritis. Abdominal fat is a higher risk factor for disease than fat stored on the bottom, hips and thighs.

It seems that oestrogens help to decide body fat distribution. Oestrogens are sex hormones made at highest amounts by the ovaries. They are responsible for prompting ovulation every menstrual cycle. Men and postmenopausal women do not produce substantial amounts of gonadal oestrogens, instead, the main site of oestrogen production becomes the fat, albeit at much lower amounts than what is produced in premenopausal ovaries. In younger men, androgens are produced at high levels in the testes. As they get older, levels gradually decrease.

These changes in sex hormone levels with age in both men and women are associated with notable changes in body fat distribution. While women of childbearing age tend to store fat in the lower body ('pear-shaped'), older men and postmenopausal women tend to increase storage of fat around the abdomen ('apple-shaped'). Postmenopausal women on oestrogen supplements don't accumulate fat around the abdomen. Animal studies have also shown that a lack of oestrogen leads to excessive weight gain.

Growth hormone

The pituitary gland in the brain produces growth hormone, which influences an individual's height and contributes to bone and muscle building. Growth hormone also affects metabolism (the rate at which kilojoules are burned for energy). Researchers have found that growth hormone levels in obese people are lower than those in people of normal weight.

Obesity hormones as a risk factor for disease

Obesity is associated with the increased risk of developing a number of diseases, including cardiovascular disease, stroke, several types of cancer, and with a decreased longevity and quality of life. For example, the increased production of oestrogens in the fat of obese older women is associated with an increase in breast cancer risk, indicating that the source of production is important.

Behaviour influences these hormones

Obese people have hormone levels that encourage the accumulation of body fat. It seems that behaviours such as overeating and lack of regular exercise, over time, 'reset' the processes that regulate appetite and body fat distribution to make the person physiologically more inclined to gain weight.

The body is always trying to maintain balance, so it resists any short-term disruptions such as crash dieting. However, there is evidence to suggest that long-term behaviour changes, such as healthy eating and regular exercise, can retrain the body to shed excess body fat and keep it off. Weight loss is also associated with a decreased risk of developing heart disease, stroke, type II diabetes and cancer.

Where to get help

- Your doctor
- An Accredited Practising Dietitian, contact the Dietitians Association of Australia

Things to remember

- The hormones leptin, insulin, oestrogens and androgens, and growth hormone influence appetite, metabolism and body fat distribution.
- Obese people have hormone levels that encourage the accumulation of body fat.
- Obesity is a risk factor for disease.
- Obesity-related disease is preventable with weight loss.

This page has been produced in consultation with, and approved by:

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