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Aging Well – Part III Basal Metabolism Rate

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Consider the following facts. If you are five-foot-eleven-inches tall, your basal metabolism rate (BMR) is:

Age	Male	Female
20	1952	1663
40	1816	1569
60	1658	1475

If you are a 20-year-old male, who is 71-inches tall, you need 1952 calories each day to carry on normal bodily functions. Any extra activity – exercise, strenuous work etc – adds to that need, but just to “stay alive” you need 1952 calories. By the time you are 60 years old, your basal metabolism rate (BMR) has dropped by almost 300 calories a day. If you continue to eat the same amount of food at 60 as you ate at 20, without changing your activity level, you will gain one pound every 10-12 days, which means that you will gain 30 or more pounds a year.

Look at the difference if you are female. Assume that you are a 71-inch-tall female and at age 20 you weighed 180 pounds, your basal metabolic rate (BMR) is only 1663, almost 300 calories a day less than a male of equal height and weight. Now, you will notice that the difference in BMR between a 20-year-old female and a 60-year-old female is only 192 rather than the 292 difference between a 20-year-old and a 60-year-old male. The BMR for a female is less than a male, but it drops less over time as well.

Two Issues – Gender and Age

As we discuss how to affect your BMR and how it affects your body composition, the differences between male and female and the decline in BMR over time must be understood. Let’s look at gender first.

The following gender differences exist between male and female:

- The BMR of adolescent boys is 6% higher than girls and increases to 10% higher after puberty.
- Girls convert more energy to stored fat, while boys convert more energy to muscle and expendable circulating reserves.
- At 18, girls have about twice as much body fat as boys.
- At 18, boys have 50% more muscle mass than girls.
- Males often continue eating protein and fat-rich diets after the body-building years and years of high activity resulting in high cholesterol and triglycerides with all of the diseases associated therewith.
- Women, whose metabolism favors fat storage, have more trouble eating enough to maintain their needed vitamin and amino acid requirements without putting on fat as well.

Both sexes have androgens and estrogens. Males begin producing gonadal testosterone at about the sixth or seventh week of gestation. This has immediate effect on the heart rate, respiratory rate, red blood cell counts and brain structure, all of which are already sexually divergent at birth.

The male testosterone level is two to three times that of the female until puberty, at which time it becomes on the average, fifteen times higher. Females produce about twice the estrogen of males prior to puberty and eight to ten times the estrogen after puberty. Whether it is because of hormonal differences or other causes, women generally have a lower core body temperature which may also contribute to their lower BMR.

These complex hormonal relationships, some of which we will discuss in great detail in coming weeks, result in females having a lower BMR than males. It's not fair, but it is a fact that men naturally have 10-20% more muscle and less fat than women of the same age and size. And because muscle burns more calories than fat, a man's metabolism will be 5-10% higher than a woman's.

Three other sex-defined bodily functions significantly affect the BMR. They are:

1. Menarche – when a girl begins her menstrual cycle she will experience an increase basal caloric requirement of 100-300 calories per day.
2. Pregnancy – during pregnancy a woman will have approximately a 300-calorie-per-day increase in BMR.
3. Breast Feeding – while nursing a baby, a woman will need about 500 calories a day more than normal.

And, here is another problem which women have. Once these needs are no longer present, continuing the increased caloric intake increases stored fat. Also, when these increased caloric needs are not met with a proper balance of protein, fat and carbohydrate, they can contribute to excessive hunger which can result in large amounts of stored fats which become more and more difficult to shed.

Age and BMR

After the age of 25, adults who are not on a safe, effective strength-training program will experience an annual half-pound loss of muscle and half-percent reduction in BMR. This gradual decrease in muscle and BMR is related to the increase in body fat that most people gain as they get older. With a decrease in muscle, less energy is used for daily metabolic functions, so calories previously required to perform the activities of daily living now end up stored as fat.

The aging process results in a number of changes which will increase fat stores, often by directly affecting the BMR. Other aging phenomenon indirectly affect the BMR by affecting the muscle mass. Several of these are:

1. Decreased activity will affect both exercise-induced caloric consumption and the muscle mass, which will decrease the BMR. Smaller muscles mean fewer calories needed. When caloric intake is not decreased this results in increased fat stores and in many of the illnesses and diseases associated with obesity.
2. In males, decreasing testosterone levels also affects lean body mass by a decrease in muscle mass which also decreases the BMR.
3. In both males and females the decrease in Growth Hormone with aging results in decrease lean body mass due to decrease in muscle mass which decreases the BMR.

These hormonal changes are real, common and widespread. Other hormonal changes which are real and common but not necessarily widespread are those of the thyroid. Many “weight loss” clinics gain clients by giving everyone thyroid pills whether they need them or not. This will artificially increase the BMR but at the cost of your health. Super-physiological doses (doses which raise blood levels above normal values) of any hormone are dangerous and ill-advised. Yet, there is a very small group of people who have abnormally low BMRs due to a condition called “hypothyroidism.”

Thyroxin (produced by the thyroid gland) is a key BMR-regulator which speeds up the metabolic activity of the body. In fact, thyroid hormones are the most important determinant of BMR. They increase the oxygen consumption and heat production of most body tissues except the brain. The more thyroxin produced, the higher the BMR. If too much thyroxin is produced (a condition known as thyrotoxicosis) BMR can actually double. If too little thyroxin is produced (myxoedema) BMR may shrink to 30-40 percent of normal. Like thyroxin, adrenaline also increases the BMR but to a lesser extent.

If the thyroid is low, as evidenced by specific blood tests, it should be replaced, but if it is within the normal range, taking thyroid medicine is not only unwise, it is potentially dangerous.

Genetics

There is an unchangeable element to your BMR which is your genetic make-up. Some people have a genetic predisposition for a low BMR. There is nothing you can do about that, but that doesn't mean you have to be fat. It only means that you have to eat and exercise consistent with your body composition.

One of the functions of your genetic makeup is your body surface area, which is a reflection of your height and weight. The greater your Body Surface Area factor, the higher your BMR. Tall, thin people have higher BMRs. If a tall person and a short person of equal weight follow a diet calorie-controlled to maintain the weight of the taller person, the shorter person may gain up to 15 pounds in a year. This is because of the difference in their BMR.

Changing Your BMR

Within the limitations established by your gender, age and genetics, there are ways in which you can affect your BMR. Some of these are;

1. Food – ingestion of food increases the BMR 10-20% for a few hours after eating. Breakfast is essential because your body has been deprived of food throughout the night; therefore your metabolism has been slowed. When you fast, your metabolism actually decreases as your body tries to conserve energy and heat. If you have been dieting or skipping meals, your body's metabolism slows down to compensate for the lack of nutrients. When lean people overeat their metabolism speeds up and when obese people diet their metabolism slows down. The key is a balance of exercise and diet.
2. Exercise – The best way to “jump start” your BMR is to exercise. Exercise will reduce body fat and increase lean muscle mass. By increasing lean muscle mass, metabolism will increase and aid in the weigh-loss process. Aerobic exercise, like walking, swimming, cycling, has the added bonus of speeding up your metabolism for 4-8 hours after you stop exercising. Additional calories will be burned off long after you stop exercising.

Weight lifting, resistance or strength training, does not speed up your metabolism but it does burn fat and increase your lean muscle mass which increases your resting metabolic rate. A combination of aerobic exercise and resistance training is best for optimal fat burning and metabolism boosting.

Strenuous exercise can increase the metabolic rate up to fifteen times BMR, as in a lumberjack. The BMR is about 77 kcal/hour in a 170-pound person. The metabolic rate can increase to 570 by jogging and over 800 in rowing.

Exercise in the morning and you will reap the benefits of a faster metabolism through out the day, or exercise in short 10 or 15-minute bursts every couple of hours to keep your metabolism pumping. By exercising just a little more

than usual you can speed up your metabolism and use up stored fat in the process.

Other factors which affect our metabolic rate are:

1. Fever – often associated with shivering, which itself consumes large amounts of energy, increased body temperature increases the BMR but at a cost to the health of the individual.
2. Stress – adrenal cortical hormones and particularly epinephrine cause a temporary increase in metabolic rate.
3. Climate – people who live in chronic cold temperature zones have a BMR 20% higher than those who don't.

It is possible to change your future health by paying attention to your present condition. Changing your body composition – increasing your lean body mass with exercise and decreasing your body fat with weight loss and proper nutrition – can change your BMR. This can make it possible for you to achieve a life-long goal – ideal body weight, weight control and no more weight gain.

If your goal is to age well, whether you are 18 or 80, changing your body composition is the first step. Remember, it is your life and it is your health.