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- Obesity
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- Dieting and the Weight-loss Industry
- Eating Disorders and Body Image

**Putting It All Together**
After completing this chapter you should be able to:

- explain the concept of caloric balance in weight control;
- describe the role of exercise and lifestyle modification in maintaining a healthy weight;
- discuss the differences between overweight and obese and implications for health;
- discuss the consequences of dieting and eating disorders.
Weight is an issue for all of us. Many people feel obliged to buy diet books, try fad diets and supplements, attempt special programs, and even consider medical procedures, all in the pursuit of attaining an “ideal” weight. The key to weight management lies not in some vague ideal or perfection but in sensible dietary practices and adequate levels of physical activity.

Despite the efforts of many people, Canadians are clearly in a state of nutritional crisis and in need of sound remedies. The statistics are sobering. Collectively, we have grown fatter over the years. Today, more than 35 percent of adults and 30 percent of children are considered overweight or obese. Too many children and young adults are facing an epidemic of numerous obesity-related diseases that were unheard of just a generation ago.

We live in an environment where physical activity has been engineered out of day-to-day life, and the food environment has become more “toxic” by the day. Eating disorders have also emerged in greater numbers as the social pressure to be thin has increased, especially among adolescents and young adults.

**Energy Balance Equation**

The energy balance equation (Figure 17.1) describes the relationship between energy input and expenditure. On one side of the equation are the calories we burn through exercise and other bodily processes; on the other side are the calories we consume in food. Weight will remain constant if caloric input and output are the same – the body is said to be in caloric balance (Figure 17.1 A). Excess calories are stored as fat at the rate of 3,500 calories equalling one pound. A person gains weight when energy input exceeds energy output (Figure 17.1 B) and loses weight when the opposite occurs (Figure 17.1 C).

Although it is more common to hear about people who want to lose weight, there are those who have the desire to put on a few pounds to look better, or to “bulk up” for athletic events, and so on. Just as weight loss is based on your balance of calories, so is weight gain. This can be achieved by increasing your food intake while participating in an activity program aimed at developing muscular strength. In this case, the increase in mass is due to an increase in functional muscle tissue, not fat.

**Energy Needs of the Body**

Of the total calories you require on a daily basis, the highest proportion is used for basal metabolism. Your basal metabolism or basal metabolic rate (BMR) is defined as the minimum amount of energy the body requires to carry on all vital functions (including blood circulation, respiration, brain activity, and so on). Thus, your basal metabolism will vary throughout your
life. As a general rule, your BMR is relatively high at birth and continues to increase until the age of two, after which it will gradually decline as your life progresses (except for a rise at puberty).

**Figure 17.1** The energy balance equation.

### Calculating Basal Metabolic Rate

Basal metabolic rate (BMR) reflects the amount of energy in calories (C) needed to maintain basic body functions such as breathing and blood circulation. A simple equation can be used to help you determine your approximate BMR. NOTE: a woman’s BMR is approximately 5 percent lower than that of a man the same age.

**Example:** 70-kg man

BMR per day = 1 C x body weight (kg) x 24

= 1,680 C

This individual needs approximately 1,680 calories to maintain his body at rest. Of course, any additional activity above this level raises calorie requirements accordingly.
Other variables also affect your BMR, such as body composition (muscular bodies have higher BMRs), physical fitness (fit people have higher BMRs), sex (the BMRs of men are 5 percent higher than those of women), sleep (BMRs are 10 percent lower during sleep), pregnancy (a 20 percent increase in BMR), and body temperature (a one degree rise in body temperature increases BMR about 7 percent). Among all these factors, age is probably the most significant because many people fail to recognize their changing metabolic needs, and do not adjust their food intake to reflect these changes. Many people put on extra pounds as they grow older for this very reason.

**Exercise and Weight Management**

When you exercise, the body’s needs for energy increase significantly beyond basal metabolic needs. The amount of extra energy or calories required depends upon the volume of exercise (how long you exercise or the quantity of exercise performed), the intensity of exercise (the rate of exercise per unit of time), and the type of exercise performed (Table 17.1). However, it must be stressed that exercise on its own can be a slow way to lose weight.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Male (70 kg)</th>
<th>Female (55 kg)</th>
<th>Calories/hour/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sporting Activity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basketball</td>
<td>581.0</td>
<td>456.5</td>
<td>8.3</td>
</tr>
<tr>
<td>Cycling (racing)</td>
<td>714.0</td>
<td>561.0</td>
<td>10.2</td>
</tr>
<tr>
<td>Ice hockey</td>
<td>875.0</td>
<td>687.5</td>
<td>12.5</td>
</tr>
<tr>
<td>Running 8 min/mile</td>
<td>868.0</td>
<td>682.0</td>
<td>12.4</td>
</tr>
<tr>
<td>7 min/mile</td>
<td>959.0</td>
<td>753.5</td>
<td>13.7</td>
</tr>
<tr>
<td>6 min/mile</td>
<td>1050.0</td>
<td>825.0</td>
<td>15.0</td>
</tr>
<tr>
<td>Cross-country skiing</td>
<td>679.0</td>
<td>533.5</td>
<td>9.7</td>
</tr>
<tr>
<td>Soccer</td>
<td>546.0</td>
<td>429.0</td>
<td>7.8</td>
</tr>
<tr>
<td>Squash</td>
<td>889.0</td>
<td>698.5</td>
<td>12.7</td>
</tr>
<tr>
<td>Swimming breaststroke</td>
<td>686.0</td>
<td>539.0</td>
<td>9.8</td>
</tr>
<tr>
<td>Tennis (singles)</td>
<td>462.0</td>
<td>363.0</td>
<td>6.6</td>
</tr>
<tr>
<td>Weight training</td>
<td>294.0</td>
<td>231.0</td>
<td>4.2</td>
</tr>
<tr>
<td><strong>Leisure Activity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cycling 10 km/hour</td>
<td>266.0</td>
<td>209.0</td>
<td>3.8</td>
</tr>
<tr>
<td>15 km/hour</td>
<td>413.0</td>
<td>324.5</td>
<td>5.9</td>
</tr>
<tr>
<td>Canoeing</td>
<td>182.0</td>
<td>143.0</td>
<td>2.6</td>
</tr>
<tr>
<td>Dancing</td>
<td>350.0</td>
<td>275.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Golfing</td>
<td>357.0</td>
<td>280.5</td>
<td>5.1</td>
</tr>
<tr>
<td>Hiking</td>
<td>385.0</td>
<td>302.5</td>
<td>5.5</td>
</tr>
<tr>
<td>Jogging (11 min/mile)</td>
<td>553.0</td>
<td>434.5</td>
<td>7.9</td>
</tr>
<tr>
<td>Rowing ergometer</td>
<td>735.0</td>
<td>577.5</td>
<td>10.5</td>
</tr>
<tr>
<td>Walking</td>
<td>329.0</td>
<td>258.5</td>
<td>4.7</td>
</tr>
</tbody>
</table>
If you doubt the importance of exercise to a program geared at weight loss, consider this. Not only does regular exercise (especially endurance type) strengthen the heart, improve endurance, provide a means of managing stress, and help prevent osteoporosis, it also burns calories and keeps your metabolism using food for energy rather than storing calories.

As described earlier, a higher amount of fat-free mass (muscle) and a higher level of physical fitness are associated with higher metabolism. These can both be achieved by engaging in regular physical exercise. Individuals with elevated or normal metabolic rates are less likely to become overweight. When your metabolism is more active, you can eat more without necessarily gaining weight, and your body will burn more calories even when you are not exercising. Weight management becomes much easier with a lifestyle that includes regular exercise.

**DID YOU KNOW**

Exercise on its own can be a slow way to lose weight. For example, a woman weighing 55 kg would need to walk for more than two hours or cross-country ski for more than one hour to burn off the calories consumed in a large vanilla milkshake (Figure 17.2). But exercise combined with controlled eating patterns involving calorie reduction greatly enhances the chances for success.

**Practical Tips for Lifestyle Changes**

An understanding of metabolism and the mechanism of energy input and output will help you develop possible strategies for developing healthy habits and maintaining a healthy weight. Whether you are looking to lose weight or add weight (gain muscle), here are six variables or components to consider in the energy balance equation (Table 17.2):
Energy intake – the number of calories ingested from all sources

Basal metabolic rate (BMR) – energy expended due to ongoing processes within the body (liver, kidneys, heart, brain)

Thermic effect of food (TEF) – energy expended in the digestion of food

Non-exercise activity thermogenesis (NEAT) – energy expended due to daily activities

Thermic effect of physical activity (TEPA) – energy expended due to planned physical exercise

Excess postexercise oxygen consumption (EPOC) – energy expended after exercise has ceased due to increased metabolic rate

With these variables in mind, there are several ways to swing the balance towards increased energy consumption:

- Eat five or six healthy meals a day including breakfast, with a reduced caloric content and more fibre.

### Table 17.2: Major components of the energy balance equation.

<table>
<thead>
<tr>
<th>Energy Intake</th>
<th>Energy Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change total number of calories eaten</td>
<td>BMR (basal metabolic rate)</td>
</tr>
<tr>
<td>Exchange high-fat, calorie-dense foods for healthier choices</td>
<td>TEF (thermal effect of food) – calories burned in digestion, absorption, transport</td>
</tr>
<tr>
<td>Read food labels to maintain a balance of nutrients</td>
<td>NEAT (non-exercise activity thermogenesis)</td>
</tr>
<tr>
<td>Drink water and calorie-free beverages</td>
<td>TEPA (thermal effect of physical activity)</td>
</tr>
<tr>
<td>Meal replacement drinks can provide extra calories if weight gain is the goal</td>
<td>EPOC (excess postexercise oxygen consumption)</td>
</tr>
</tbody>
</table>

* TDEE refers to Total Daily Energy Expenditure

**DID YOU KNOW**

Individuals who are engaged in intense physical activity experience increased daily energy needs to match their higher level of daily energy expenditure. Their daily food intake contains the essential and many non-essential nutrients in amounts that are two or more times greater than the amounts eaten by non-athletes. Furthermore, depending on the activity, energy needs of athletes can range from a low of 1,700 to a high of 8,000 calories to meet the special requirements of an athlete.
Add resistance training to build more muscle and raise your BMR.

Be more active in your daily living: stand instead of sitting, walk instead of standing, fidget more.

Add a planned exercise component to your life: attend a fitness class, go jogging, use a treadmill, join a team.

Add an intense workout component to boost EPOC.

When you consider that as many as 50 percent of people drop out of exercise programs within one year, finding ways to add enjoyable activities to your daily schedule is important for long-term success. Yo-yo fitness is becoming as common as yo-yo dieting. If someone quits an exercise program out of failure to reach a particular weight-loss (or reduced body fat) goal, then additional benefits of the exercise program – such as increased strength, endurance, and flexibility – are lost as well. Therefore, an important approach to achieving your weight-loss and health goals is to find ways to be more mobile in your daily life. Making small changes may very well contribute to some desirable profound changes in your overall weight management goals.

The intensity and duration of an activity can be modified to suit individual needs. If time is not a constraint, the duration can be emphasized while exercising at the lower end of the intensity range. Just as effective, however, is high-intensity exercise of only 20 to 30 minutes’ duration, which can be accumulated in bursts of effort that are only 10 minutes long.

If you are not already physically active, there are many ways to incorporate mild physical activity into your daily life to help you maintain or improve your health. The key is finding ways to add enjoyable activities to your daily schedule, and as you become more active, you can participate in moderate to vigorous physical exercise for longer periods of time that will lead to real improvements in aerobic and muscular endurance.

But adding activity to your lifestyle and burning calories in the process need not come in the form of an organized exercise routine. Try some of these suggestions for incorporating a little more activity into your daily life:

- Take the dog for a walk.
- Wash the car by hand.
- Put on your make-up standing up.
- Do sit-ups during commercials.
- Walk during your lunch hour.
- Walk instead of driving whenever you can.
- Avoid labour-saving devices (e.g., ride-on lawn mowers, snow blowers).
- Get off the bus a stop early and walk.
- Work around the house.
- Bicycle to the store instead of driving.
- Sit up straight and stretch at your desk.
- Stand up and walk around when taking a phone call.
- Run when running errands.
- Play actively with the kids you baby-sit or care for.
- Dance to music.
- Stretch before going to bed.
- Take the stairs instead of riding the escalator.
- Walk the beach instead of sunbathing.
- Carry your groceries instead of pushing a cart.
- Lift hand weights while you watch TV.
- Walk through the mall, and shop ‘til you drop . . . pounds.

Remember Your ABCs: Activity Burns Calories

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