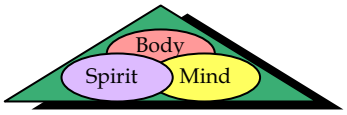
Chapter 10. Exercise



The Next Most Important Key

Most people are aware that exercise is important, but many of us either do not like to exercise or have the time to exercise. To further compound matters, some people exercise incorrectly and for the wrong reasons. Consequently, people stop exercising after becoming bored, frustrated or discouraged due to the lack of progress in their health, weight loss or other health objective. Actuall[illegible] be the closest thing to a "fountain of youth". By taking [illegible] sedentary state you can, in effect, reduce your biological age by ten to fifteen years. Researchers who have conducted extensive studies on fitness and mortality have concluded "moderate levels of physical fitness and exercise are protective against early mortality." Exercise imparts vigor and activity to all organs and maintains the healthful int[illegible]eir functions by improving the tone and quality of muscl[illegible]stimulating the processes of digestion, absorption, metabolism, and elimination. Exercise also strengthens the blood vessels, lungs, and heart, resulting in improved transfer of oxygen to the cells and increased circulation of the vascular and lymph systems. In addition, studies indicate that physical activity promotes the growth of mitochondria (the cell "energy factories"), leading to increased adenosine triphosphate (ATP), the molecule that transfers energy between living cells; and, this increase in cellular energy can trigger fat burning.

Years ago, the physical activity from farming, steel mills and other labor industries served many purposes, including stress reduction, removal of food congestion and toxins, and the slow down of the aging process. But, when our society shifted from this industrial state to more of a service state (office work, computers), our level of physical activity and our

children's level of physical activity decreased dramatically. According to Mark Fenton (the walking guru), "We are living in an epidemic of physical inactivity and improper nutrition." Interestingly, exercise is a form of physical activity that was "created" to address this loss of physical activity. It was discovered that the loss of physical activity led to early deterioration of the body and its parts, and eventually degenerative diseases/ailments such as backaches, constipation, headaches, chronic fatigue, high blood pressure, obesity, heart disease, stroke, cancer, diabetes, arthritis and osteoporosis.

In general, aerobic exercise is important for improving your cardiovascular health. *However*, **anaerobic** exercise (weight-resistance training) as part of a circuit-training regimen that includes aerobics is the *optimum* form of exercise that provides the maximum health benefit. Unfortunately, many people overdo the aerobic exercising to try to lose weight, and they end up l scle tissue, which lowers their metabolism rate, making it cult to lose weight.

But, if you have been livi lifestyle, walking is the easiest form of exercise to get your body acclim ated to moving again. You will need to initiate a gradual en to prevent any unwanted injuries that many beginne due to their overcompensating for not exercising in years and low-to-moderate intensity exercise are the ways to introduce your body to exercise and fun; and, you can grow from there by finding other forms of exercise (e.g. gardening, sports, bicycling, skiing, swimming, dancing, trampoline jumping) that you may enjoy and actually not see as just exercise.

Types of Exercise & Variables

There are three major types of exercise: stretching, aerobic, and anaerobic.

Stretching Exercise

Stretching exercise is performed to passively or actively elongate soft tissue and muscles to improve the range of motion (ROM), reduce unnecessary muscle strains and tears, and provide flexibility. Exercise examples include: light stretching, inversion table, yoga, and Pilates.

Aerobic Exercise

Aerobic means oxygen. Aerobic exercise is continuous rhythmic movement of the major muscles groups without intermittent rest periods such that the muscles are working in an oxygen-rich state, which can cause the body to produce fat-burning enzymes under the right circumstances, e.g. after your body has burned off most of the glucose. Examples of aerobic exercise include: walking, step aerobics, running, swimming, other water exercises, bicycling, dancing, skiing, jumping, cardio kick-boxing, and rowing.

Anaerobic Exercise

Anaerobic means lack of oxygen. Anaerobic exercise consists of short bursts of body movements with some resistance such that the muscles are working in an oxygen-deprived state, which causes the body to produce glucose-burning enzymes. Because you are expending energy faster than the body can repla[illegible]olizing oxygen, intermittent rest periods are required durin[illegible]session. Anaerobic exercise puts the body into an anaboli[illegible] state that b[illegible]lds lean muscle tissue and burns fat. Muscles that are already condition[illegible]ned rely less on glycogen (stored glucose) and more on fat for fuel, so the muscles of a trained individual burn more body fat [illegible]eople who do not exercise. Examples of anaerobic exer[illegible] weight/resistance training, interval strength training, water exercise, and weight lifting.

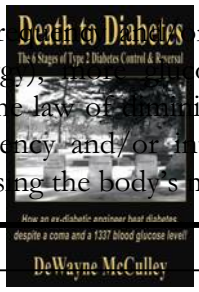
Exercise Variables

There are three major variables that you can adjust to customize your exercise program, based on fitness level, health, age, personal health goals, risk factor profile, medications, behavioral characteristics, and individual preferences.

- Duration: is the amount of time that you spend during an exercise session. In general, you should start with a low duration of 10 to 15 minutes and gradually work up to 30 to 60 minutes, depending on your age, health state and health goals.
- Frequency: is the number of times that you exercise on a weekly basis. In general, you should start exercising on alternate days (4 times a week) and gradually work up to exercising on a daily basis (5 to 6 times a week).

- Intensity: is related to the amount of work and calories expended during the exercise session. The higher the amount of work and the lower the duration, the higher the intensity. For example, walking one mile in 30 minutes has a much lower intensity level than running four miles in 20 minutes. In general, you should start out at a low intensity level such that you are able to speak comfortably while exercising; and, gradually work up to moderate to moderate-high intensity, where it is difficult to talk. When you are exercising at a higher intensity your cardiovascular system is under such a significant amount of stress that the mere act of talking makes you unable to provide your body with enough oxygen. However, if you cannot talk at all, then you have gone too far and need to decrease the intensity. In general, the intensity level should be between 50% and 90% of your maximum heart rate.

Increasing the duration, frequency, or intensity causes the body to burn more calories (energy) and glucose and eventually more fat. However, at some point the law of diminishing returns sets in such that increasing duration, frequency, and/or intensity can lead to the break down of muscle tissue causing the body's metabolism to slow down.



Benefits of Exercise

Beyond reducing your biological age, there are many physical, emotional, and spiritual benefits associated with exercise.

Stretching Exercise

- Increases blood flow to muscles to prepare them for exercise.
- Improves ability of muscles to stretch and elongate (to increase range of motion) and develop functional mobility.
- Increases muscle tone and firmness.
- Increases balance and coordination.
- Increases metabolism.

Aerobic Exercise

- Improves cardiovascular endurance, strengthens the heart and bones.
- Increases oxygen intake, due to more deeply breathing causing oxygen to be received fully into the lungs and, into the blood stream.
- Makes the lungs better conditioned so that activities (e.g. climbing stairs) will not leave you breathless.
- Helps the lymphatic fluids to drain and circulate properly to increase immunity.
- Promotes sweating which helps to detoxify the body via the skin.
- Stimulates the immune system, putting more white blood cells including T-helper cells (made in the thymus gland) and macrophages (from arterial walls) into circulation.
- Helps to lower the total cholesterol, and, may increase the HDL (good) cholesterol, lowering the risk of heart disease.
- Helps to lower blood press[illegible]ing the production of nitric oxide, which relaxes the art[illegible]
- Helps to release enzymes (e.g. hor[illegible]ensitive lipase) to mobilize fat in adipose tissue
- Helps to increase insulin sensitivity so that glucose enters the cells and is burned as fuel.
- Helps to trigger the release [illegible]icals called endorphins that help improve mood, relieve [illegible]e you more productive.

Anaerobic Exercise

- Multiplies muscle strength, tone, and firmness.
- Helps tone the body by increasing muscle strength while burning fat.
- Reduces belly fat; also, reduces body fat, re-shaping the body.
- Develops strength of tendons and ligaments.
- Increases bone density and strength.
- Increases metabolism and intensifies fat loss (especially *belly* fat).
- Makes muscle cells more sensitive to insulin, increasing the uptake of glucose into the muscle cells to provide more energy.
- Boosts stamina, energy, and endurance.
- Develops functional mobility to improve day-to-day quality of life.
- Increases balance and coordination.
- Enhances mental clarity; improves attitude.

Exercise Guidelines

Utilize the following guidelines to optimize your exercise program based on your health goals.

1. Ensure that you are exercising for the right reasons. For example, some people exercise to compensate for overeating. This may work for a while, but eventually, this will stop working; and, you will become discouraged with exercising. The key message here is that you must provide the body with the proper fuel in order to reap the maximum benefits of exercise; otherwise, exercise can be counter-productive and damaging to your health.
2. Increase your daily physical activity – don't sit around all day and expect 30 minutes of exercise to reap any major benefits. Wear a pedometer to keep track of your daily physical activity and to provide motivation to increase y sical activity each week.
   Note: 2000 steps equal c lories for a 150-pound person.
3. Initiate a consistent, ow-intensity exercise program as soon as reasonably possible, wi the consent of your doctor. Try to exercise 4 times a week – once a week for 2 h urs on the weekend is harmful.
   Rationale: Consistent ex ce your insulin resistance, your blood glucose and stre majority of the research shows that women derive a greater proportion of their energy expenditure from fats during low to moderate intensity exercise, relative to men. Thus, this will improve fat metabolism, particularly for women.
4. Take a 10 to 15-minute low-intensity walk an hour or so after dinner. This will burn off some of the meal, provide energy and induce a deep sleep that night. The following morning you will awaken refreshed and full of energy because you will be well rested.
   - In general, walking 2-3 mph burns 250-300 calories per hour.
   - Depending on walking speed, 1000 steps equates to about 10 minutes. You can personalize this by determining exactly how many steps you take in 10 minutes while wearing your pedometer. Then just multiply this number by 3 to 6 to find out how much you might want to increase your daily walking, depending on your personal schedule and goals.

- When you start to exercise you may wake up the next morning with that sore, aching feeling, especially if you haven't exercised in a while. That pain or soreness is called delayed onset muscle soreness, or DOMS. Most people's first reaction is to stop exercising, because they don't want to wake up sore every morning. But, according to a new study from the University of Ohio, the best way to get rid of that soreness is to stay physically active. The University of Ohio researchers found that muscles get stronger the more frequently they are exercised. DOMS occurs when tiny skeletal muscle segments called sarcomeres pull apart as a muscle lengthens. Contractions that lengthen muscles are particularly damaging to sarcomeres. And these contractions occur all the time in humans – when we sit down, walk, run, or even lower heavy objects. The findings also suggest that there will be less post-exercise pa[illegible]orkouts.
- If walking is difficult, t[illegible]hat you can perform while sitting down, e.g. usi[illegible]machine, resistance bands, tension cord/rope or fl[illegible]x-bar.

5. Gradually, move to a low intensity/med[illegible]um duration regimen; and, depending on your health goals, gravit[illegible]e to a medium intensity/ medium duration regimen[illegible]e calories. Use an exercise tracking worksheet to recor[illegible]s and provide motivation.
6. Incorporate some weight-resistance or interval strength training with higher intensity for a shorter period of time at least 3 times a week.
   Rationale: Resistance training causes the muscles to increase their glucose uptake, which is exactly what insulin does. As a result, eventually, this may reduce the body's need for insulin. In addition, as intensity increases, the absolute amount of energy derived from fat is increased, for both men and women.
7. Incorporate various modes of training, referred to as cross-training.
   Rationale: Cross-training prevents the body from getting overly fatigued and from overuse of the same muscles in the same movement patterns. This helps to prevent muscle stress, muscle soreness and injuries. Therefore, a person will be able to safely do more exercise, more frequently, which equates to higher total energy and fat expenditure and much better glucose control.

8. Design a consistent exercise regimen with the following 3 major components:
   - **Stretching/Balancing:** Use yoga, Pilates (2-4 times a week)
   - **Cardio warm-up/Stretching:** (5-10 min)
   - **Strength training (Upper/lower/core body training):** Anaerobics (10-20 min) on alternate days
   - **Cardio training/Cool-down:** Aerobics/anaerobics: (15-30 min)
9. Once you design your initial exercise program, vary the workouts every other week or at a frequency that meets your needs.
   Rationale: Varying the workouts provides a new stimulus to the body's cardiovascular, muscular, skeletal and respiratory systems, preventing muscle fatigue, soreness, and boredom.
10. Measure/check your blood glucose before and after each exercise session.
    - If your blood gluco[illegible] (BG) i[illegible]ater than 300, do not exercise. Contact your docto[illegible]
    - If your BG is less than 90, eat a snack before you exercise.
    - Know the signs of low blood sugar (hypoglycemia) and how to treat it. For example, if you feel weak, dizzy, sweaty, or have the shakes, you may be experiencing a hypoglycemic episode (low blood sugar). Eat [illegible] immediately to raise your blood glucose level. Do no[illegible] exercise.

11. Consume adequate fluids and foods that provide key antioxidants, vitamins, minerals, and other nutrients that are needed to perform exercise. And, since exercise increases the production of toxins in the body, it is even more important to replenish the body with these critical fluids and super foods – to facilitate removal of the toxins and to nourish the body and prepare it for the next exercise session.
    Important Note: If you do not eat properly, your muscles will not be properly nourished and will remain sore and not recover after exercise. Consequently, you will become discouraged with exercise and eventually stop exercising.
12. **Warning:** Measure your blood glucose level *before* you exercise. If your blood glucose is too low (e.g. below 90 mg/dl), eat a small sandwich before you exercise.

Exercise Regimen

Cardio Warm-up/Stretching

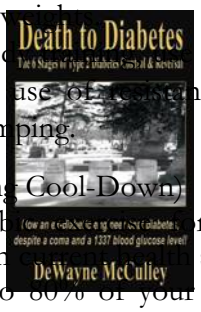
1. Spend 5 to 10 minutes walking as an easy way to first warm up the body, muscles and joints.
2. Perform balancing activities such as standing on one foot 2-4 times a week, or use yoga or Pilates.
3. Perform flexibility stretching exercises to further warm up the body, muscles and joints.
   Caution: Do not stretch cold muscles without first warming them up by walking for several minutes! This is a common source of injury.
4. Do not bounce during stretching – maintain good form and hold your stretch in a static position.
5. Stretch the muscles: quadriceps, hamstrings, calfs, back, arms.
6. If necessary, work with a [illegible]ch or go to your local YMCA/YWCA to get goin[illegible]rection.

Strength Training (Core & Upper/Lower Body)

1. If your health goals include building lean muscle tissue to change your body composition, perform some form of weight-resistance or interval strength training (a[illegible]can be something as simple as carrying a small can of co[illegible]mall object in each hand and slowly moving your arms up and down as you walk.
   Rationale: This combination of aerobics and anaerobics will multiply the benefits of both. Strength training will maintain and build lean muscle mass, which starts to decrease one pound every two years after the age of 35. Also, lean muscle mass increases the metabolism and enables the body to burn more calories.
2. To burn maximum glucose and to increase your metabolism, ensure that you are exercising with proper core, shoulders and hip alignment to engage more muscles during your exercise.
3. Perform strength training exercise after the cardio warm-up for 10 to 20 minutes. Otherwise, work different muscle groups every 2 to 3 days to allow recovery time and prevent injuries to the muscles.

Note: If anaerobic and aerobic exercises are being performed on the same day, this enables the body to burn up the glycogen in the muscles, so that the body will burn fat during the aerobic exercise.

4. Perform 8 to 12 repetitions at least three times before moving to the next body part – a total of 24 to 36 resistance motions for the same body part. Strength for bones and muscle is gained by the amount of resistance and the intensity, but straining is not necessary or beneficial.
   - Perform exercises that support an increase in spinal elongation, lean muscle tissue, core strength and the range of motion without causing injury, e.g. Pilates.
   - Perform the repetitions until the muscle fails if the objective is to build muscle mass.
5. For upper body training, use one or more of the following: weights, resistance bands, wrist w
6. For core and lower bo one or more of the following: stair climbing, squats, use of resistance bands, use of ankle/thigh weights, trampoline jumping.



Cardio Training (including Cool-Down)

1. Finally, perform aerob r 15 to 30 minutes, low to moderate depending on state and your health goal.
   a. Exercise at 50% to 80% of your maximum heart rate (MHR), based on general health and endurance. Use of the MHR is only a guideline – you may need to exercise at a different level, depending on your health state and your health goal.
      - To calculate your MHR, subtract your age from 220. For example, if you are 50 years old, your MHR will be 220 – 50, or 170 beats per minute.
      - To calculate the range of 50% to 80%, multiply the MHR by 0.5 and 0.8. For this example, the range would be 170 x 0.5 to 170 x 0.8 or 85 to 136 beats per minute. Verify these numbers with your doctor, especially if you have any heart problems.
   b. Start slow. Work up to 20 to 30 minutes over several weeks/months.
      Rationale: This will improve your cardio health; and, can also help to burn excess fat.