

WORK OUT!

**Why and how to make
exercise work for you and
your diabetes control**

BY D. BURACK

Do you view exercise as a lifestyle activity that some people do, and some people don't? Like being a coffee drinker, or a scarf wearer? It often seems that the world can be split into two groups: those who are committed to exercise, and those who sink further into the couch with mention of the E word. Where do you declare membership? It's time to make an educated decision.

As with all decisions, consider the pros and cons. Most of us are familiar with the cons of regular exercise: it takes time, it takes money, it takes energy. Now for the pros (drum roll, please): improved muscular strength and flexibility, lower risk of heart disease, better bone health, increased HDL cholesterol levels and decreased LDL,



enhanced brain function, improved sleep quality, reduced triglycerides, higher sensitivity to insulin, lower blood pressure, a natural mood lifter, strengthened immune system, a way to help to control stress... and more!

What are we talking about when talking about Exercise?

Exercise is defined as any form of bodily exertion, or engaging in any activity that requires physical effort. There are 3 types of exercise:

Flexibility exercises, or stretching, help decrease your chance of injury during other physical activities by keeping your joints lithe and bending smoothly. A short stretching session of 5-10 minutes is a good way to warm up before aerobic activities, and recommended highly for cooling down and protecting your muscles after exercise. Yoga and Pilates can both be practiced as flexibility exercises.

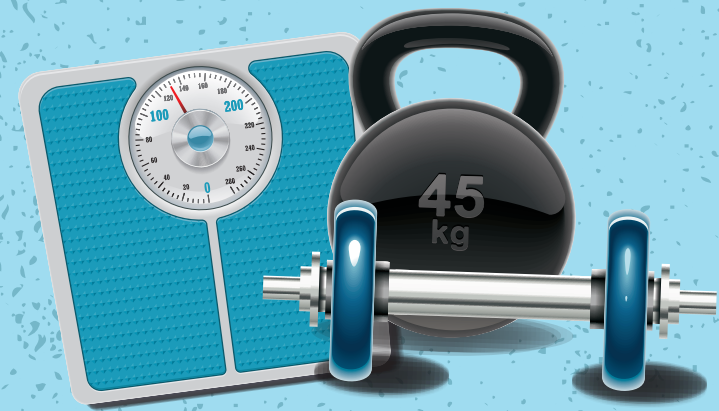
Aerobic exercise works your muscles, and speeds up your heart and breathing rate. Examples of moderate aerobic exercise are brisk walking,

swimming, bicycling, or even washing windows and scrubbing floors.

Anaerobic exercise, or resistance training, will strengthen muscles and bones. The greater your muscle mass, the more calories your body burns – even at rest. Weight lifting and calisthenics can therefore be used to help prevent weight gain.

Alan Freishtat, A.C.E. CPFT, Co-Director of LoseIt!, stresses that a balance of both aerobic and anaerobic exercise are necessary for all people with diabetes. A research study published in “Diabetes Care,” in November, 2012, found that people who had lifted weights in addition to aerobic exercise maintained lower sugars for longer over the next 24 hour span, probably because muscle mass helps use and store glucose.

The intensity of the exercise also makes a pronounced difference. “Although moderate intensity exercise is helpful for a person with type 2, if the person can work up to a more vigorous intensity, they’ll see a much better result in their blood sugar levels,” says Mr. Freishtat. He cautions though



that reaching a higher level of intensity should be gradual. “Starting too intense can cause injury and may be too exhausting for a beginner, which can be discouraging.” At the beginning, 10 minutes/day is a good starting point that should be increased slowly (add a few more minutes each week) until reaching at least 30 minutes/day, 5 days/week. For the same health benefits, this amount can be split up into 10+ minute spurts throughout the day, which many people find easier to fit into their schedule.

EXERCISE CAN HELP YOU LOSE, AND GAIN.

Aerobic exercise, especially high intensity, can certainly assist with fat-burning weight loss and weight maintenance. Yet don’t make the mistake of viewing exercise only as a means to lose weight! Not all of the benefits gained can be measured by the number on your scale.

Sometimes a situation arises when you cannot exercise safely without eating more carbs. You may wonder if it’s better to simply forego the exercise rather than add more calories to your day. Chavi Kramer, Lose It! Dietician, advises that exercise takes precedence, due to the greater positive health impact it has, in addition to the specific benefits of increasing metabolism and building muscle.

Studies, such as the Health Professionals Follow-Up study, tracked 2803 men with diabetes and no physical injuries or challenges. After many years, a 70% reduction in heart disease was seen among those who walked 4-7 times/week. Another notable study, published in Stroke (Dec, 2012), demonstrated that women (not men) reduced their chances of having a stroke by walking an average of 3.5 hours/week, which translates into a half hour daily.

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In a nutshell, aerobic exercise affects your lungs, heart and blood circulation. The rapid breathing rate pulls more oxygen into your blood, and your increased heart rate pumps this blood more efficiently – not only delivering welcome oxygen into the muscles and organs, but also carrying away waste, such as carbon dioxide and lactic acid. Regular exercise leads to extra energy and stamina. Exercise also promotes the release of endorphins, natural painkillers that contribute to

feelings of happiness. If that's not enough, your immune system is strengthened too, which helps fight off viral infections, such as the flu and common colds.

Beyond giving you muscles to shlep hefty grocery bags effortlessly from the car into the house, anaerobic exercise can bulk up your bone strength and density, thereby preventing conditions such as osteoporosis. And the more lean muscle mass you have – the higher your metabolism, making it harder to gain excess body fat.

The EXCARBS FORMULAE

REDUCING INSULIN - WHEN AND HOW MUCH?

ExCarbs refers to the amount of carb grams that you need per every hour of activity. In general, very intense exercise demands approximately $\frac{1}{2}$ gram carb per pound of body weight (1 gm carb/kilo body weight), per hour.

For example: a 150lb person would need ExCarbs of about 75 grams carb/hour to avoid hypos due to strenuous exercise. Yet moderate exercise obviously requires less carbs, and may only require 45 grams carb/hour, and an hour-long casual stroll may need only

an additional 20 grams carb/hour.

The degree to which the body is stressed by a specific activity is highly individual. View these guidelines as your springboard to success. After a few sessions of exercising, checking and recording your sugars, you'll be able to more closely approximate the personal carb intake that you need.

REDUCING INSULIN - WHEN AND HOW MUCH?

Taking less insulin may be preferred over eating more carbs, if weight loss is recommended. A decrease in blood insulin level allows more fuel to be produced by the liver, and fat to be released from fat reserves. In

GETTING STARTED

Ironically, it wasn't his diagnosis of diabetes that inspired Michael to climb up on the bicycle seat. One of his sons won a bike in a raffle and had to learn how to ride. So Michael bought a bike to keep him company, and they began riding together.

Many bonus health benefits soon joined their bike rides. "My A1c, which was 11.8 at diagnosis of Type 2, was 6.5 after three months and 6.0 after six.

I was just tested last month, and it was 5.3 just 9 months after diagnosis. Cholesterol was elevated at diagnosis, but was into normal range at the last test. I am certain the exercise played a big role in achieving those improvements," shares Michael.



order to correctly compute how much insulin to reduce, divide your ExCarbs by your personal carb factor (the amount of carb grams covered by 1u of insulin). The resulting number gives the maximum amount of insulin that could possibly be reduced.

For example: If you need to eat 45 grams carb per one hour of brisk walking, and your carb factor is normally 1u/15gm, then you would reduce your bolus or basal dose by a total of 3 units. Or you could eat 15 grams carb, and only reduce your insulin by 2 units.

Moderate to strenuous exercise is often handled well by a reduction in the basal rate set approximately 1-2 hours before exercise, giving adequate time for

blood insulin levels to drop. (Note: It is inadvisable to suspend your pump totally, because it can cause glucose to spike later in the day.)

Keep in mind that fitness level also has a huge impact on insulin requirements. Someone well-trained and in tip-top shape will probably need a much smaller reduction in insulin, because the body is less stressed by physical activity. It can't be repeated enough that ExCarbs formulae and numbers are only a starting point. The only true way to know the best method for stabilizing your bg, is to start your workout – and work it out!

Michael aims to ride his bike 30-60 minutes daily, with longer rides when he has more free time. "I find that I get extremely big drops in blood glucose... For example, I did a 30-mile ride and had to stop halfway to eat – my BG had dropped to 56 (though I did not feel it until I stopped). On rides longer than 30 minutes, I always carry a meter and some glucose tablets or candy."

A couple months ago, Michael added weight training into his routine. "When I first started weight training, I experienced a slight increase in blood sugars, as many do, but since then I've found it to lower my blood sugars too."

EXERCISE AND THE IMPACTS OF TYPE 1

In addition to the proper gear and footwear, there's key information you should acquire before beginning to exercise.

Pay attention to your starting blood glucose level. For optimal performance it's best to start with a bg of 100-180. Lower sugar levels can put you at risk for severe lows, and if your bg is elevated due to a forgotten injection or meds, or a faulty infusion set, then exercising at higher than 180 can cause excess glucose and fatty acids to enter your bloodstream, elevating sugars further and leading to extreme fatigue. However, if your bg is high due to an overload of carbs and you still have insulin on board (IOB), then exercise will simply assist the insulin to move glucose into your muscles more efficiently, and lower your bg.

Your blood insulin level is just as important as bg level, if not more so. When a person without diabetes engages in moderate exercise, their blood insulin level drops to approximately half of what it was, within the

AD



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CONSUME PROTEIN AND CARBS during the first half-hour after exercising

first hour. A high insulin level in your bloodstream, either from IOB or basal, causes more glucose to enter the muscles directly from the blood. This high insulin level also prevents the liver from making and releasing new glucose. Simply put, a high insulin level leads easily to a hypo. Therefore, to maintain a normal bg level- the person must eat or drink extra carbs before exercising.

However, if you use a pump and the high insulin level is caused by a high basal rate, then instead of consuming more carbs - it may be sufficient to set a reduced temporary basal rate approximately 1-2 hours prior to and during exercise.

Know your intended level of exercise intensity and duration. For a better understanding of different forms of physical activity and how they stress the body, see the accompanying list of types of exercise. (Figure A.)

Following exercise, check your bg again. During strenuous exercise, the sugars in your blood stream can be depleted in about 4 minutes, compared to 30 minutes when at rest.

Excess sugar can be supplied by the liver, but the liver's storage can also be depleted after 20-30 minutes of very intense activity. Over the next few hours- your body needs to replenish the stores of reserve sugar in your muscles and liver, which were withdrawn by the exercise. Because this process can take hours, the increased chances of going low are in force for hours after exercise. To prevent a delayed hypo, it's recommended to consume protein and carbs during the first half-hour after exercising. (A small bolus may be necessary to cover these carbs, but it will still prevent hypos later on.)

Unless you feel symptoms of a hypo, it is also advised to wait 20-30 minutes after exercising before checking to see how your fitness routine affected your bg. Many people with CGMS have noticed that sugars often stabilize on their own within the first half hour after physical activity.

Altogether – the info above equips you with the tools needed to balance exercise and blood sugar levels. There's

SCHEDULING YOUR EXERCISE following a meal of carbs may prevent the postprandial sugar spikes that many experience

a steep learning curve to use these tools successfully and it's driven by a lot of trial and error. Formulae known as ExCarbs, are a great starting point for every computation you may need to make (see sidebar for a full explanation on ExCarbs).

Get a good grip on these tools and formulae, and use them to help decide whether to 1) increase your carb intake, or 2) take less insulin. Then, as you exercise and check your bg before and afterwards, you'll be able to tweak and fine-tune the computations to match your personal experience.

If all this information is intimidating, take heart that keeping stable bg while exercising only gets easier! A new activity requires more glucose than an exercise for which your body is already trained. Training builds glycogen stores in the muscles, so fuel is readily available when

the muscles are used again. Sugar will therefore stay more stable after your body adjusts to the activity.

EXERCISE AND THE IMPACTS OF TYPE 2

We've already established unequivocally that regular exercise improves bg control in people with type 2 diabetes. In general, this is because exercise enhances the body's reaction to the insulin it produces. A single session of aerobic activity can affect insulin sensitivity for the following 24-72 hours. When combined with resistance training 2-3 times a week (not on consecutive days), Mr. Freishtat has found that his patients are able to reduce type 2 meds significantly, or eliminate them altogether.

Sometimes sugars rise after exercise, due to "liver dump." During physical activity, muscles and organs are exerted and

need extra fuel to keep going strong. When this causes a drop in bg levels, the body often turns to the liver to release glycogen as fuel for the body. Unfortunately, glycogen tends to provide more sugar than necessary, and bg levels rise too high. The best way to stay off this bg rollercoaster is to keep level - avoid the dips and drops, and you'll avoid the rises and slopes. Some people cope successfully with this by eating a little carb snack before starting, and then munching on small amounts of carbs periodically while exercising.

Scheduling your exercise following a meal of carbs may prevent the postprandial sugar spikes that many experience. According to an article published in Diabetes Care (Aug 8, 2012), it was found that in the 4 ½ hours after a meal, bg in people who didn't walk were 145% higher than in those who did walk.

Care should be taken to avoid exercising when oral medications reach their peak effects,

and a change in medication or dose may need to be discussed with a physician. While most people with type 2 can find a way to exercise safely, a physician should always be consulted before engaging in a new level or type of physical activity.

NICE NEWS FOR LOW CARB-ERS

While the body turns initially to sugar as the prime source of energy for physical activity, fat is next on the list. As one exercises, the percentage of fat (vs. sugar) being utilized as fuel for exercise goes up. "People who follow a low carb diet have already adapted their body to utilize fat for energy – and so they'll have a smoother ride when doing exercise. There'll be less lows and less highs, right from the start," says Rabbi Hirsch Meisels. When a body is used to living off sugars, it takes more time to access the fat stores. Yet with low carb-ers, the body is all set to break down fat for fuel – so there's no need for a switch once exercise is introduced.



Prevent Lows WITH HIGH ENERGY MOVES!



If you crave very intense, quick exercise, such as sprinting – be aware that this prompts the release of stress hormones, which raise blood glucose levels. Additionally, another small study found that after a 10-second sprint, bg in eight people with type 1 increased an average of 22 mg/dl in within 30 minutes. Researchers claim that the rise resulted from a slower rate of glucose absorption from the blood, rather than a sudden influx of glucose into the blood.

Learn how to use this phenomenon to your advantage. Start an extended period of physical activity, such as a long hike, with a 15-20 second spurts of intense activity, and then periodically during the hike - let your legs take off on a few more short sprints.

(Journal of Clinical Endocrinology & Metabolism; Nov, 2012)



[Figure A]

HOW ACTIVE IS YOUR ACTIVITY?

This information, based on a list compiled by the ADA, gives a basic understanding of different forms of exercise. Yet it can't be stated enough - everyone is an individual and reactions to exercise are also highly individual. Get to know your body.

Light-Intensity

1 MINUTE BURNS 3.5 CALORIES.
30 MINUTES BURNS 105 CALORIES.

- Walking slowly
- Golf, powered cart
- Slow treading in the swimming pool
- Light gardening or pruning
- Bicycling, very light effort
- Dusting or vacuuming
- Gentle stretching

Moderate-Intensity

1 MINUTE BURNS 3.5 - 7 CALORIES.
30 MINUTES BURNS 105 - 210 CALORIES.

- Walking briskly
- Golf, pulling or carrying clubs
- Swimming, recreational
- Mowing lawn, power motor
- Tennis, doubles
- Bicycling (or using a stationary bike) 5 to 9 mph, level terrain, or with a few hills
- Scrubbing floors or washing windows
- Weight lifting, machines or free weights

High-Intensity

1 MIN. BURNS MORE THAN 7 CALORIES.
30 MIN. BURNS MORE THAN 210 CALORIES.

- Race walking, jogging or running
- Swimming laps
- Mowing lawn, hand mower
- Tennis, singles
- Bicycling more than 10 mph, or on steep uphill terrain
- Moving or pushing furniture
- Circuit training

STICKING WITH IT

Many people are intellectually committed to exercise, but find it a huge challenge to stick with any physical activity on a routine basis. One tip is to find a friend for fitness – join a gym together, or pair up with a walking partner mutually dedicated to exercise. Setting clear and attainable goals for each week (write them down and post in a prominent place, such as on the front door) is also effective at keeping people on the move. Buy a pedometer and aim for 10,000 steps a day. You'll be surprised how this little gadget is such a fun and forceful motivator.

Another strategy is to change the way you think. Remember that physical activity refers not only to formal "exercise," but to any bodily movement that burns extra calories. Weeding the garden, dusting and

sweeping the house, pacing with ankle weights (instead of slouching on the couch) while on the telephone, and even pushing your cart up and down every supermarket aisle counts! Put more zest into these daily chores, and you can increase your level of physical activity substantially. The better you feel, the more energy you'll want to channel into exercise.

Success is the strongest inspiration. After many years of working as a personal trainer for patients with pre-diabetes and diabetes, Mr. Freishtat has countless tales of triumph. "Once people understand how to exercise properly and eat properly, they experience a renewed quality of life... We have watched people at all ages and stages of diabetes turn their lives around." ■

