Educated Movement

Energy Science

The energy we use is produced by food metabolism. The body breaks down food and converts glucose and fatty acids to energy through oxidation in the mitochondria via the Krebs cycle. This energy is stored and transported as ATP. ATP is the “energy currency” of the cells and enables the muscles to do their work. ATP is stored in tiny amounts and is used up within 5-10 seconds. ATP stores take about 3 minutes to be replenished. Beyond stored ATP, phosphocreatine supplies can power the cells for another 10 seconds. When the body runs out of these supplies for quick energy, it begins to use glycogen and fats for energy.

Better Physical Conditioning Leads to Improved Energy Efficiency

- For more sustained physical activities, the body uses a combination of glucose and fatty acids for fuel. Glycogen is a form of glucose comprised of thousands of connected glucose molecules. It is stored in the liver and muscles for use when needed. Conditioned athletes with larger muscles have greater stores of glycogen in their muscles. Those with greater aerobic conditioning can pump more blood and take in more oxygen during exercise. These factors lead to more efficient use of energy and greater endurance.
- The liver helps maintain blood glucose levels, which provides the body, especially the brain, with fuel. Sixty percent of the blood glucose is directed to the brain.

The Ratio of Fat to Glucose Used for Fuel Changes According to the Activity

Triglycerides are the most common form of fat in the bloodstream. They consist of three fatty acid chains linked by a molecule called glycerol. After digestion, they are cleared from the bloodstream and stored in adipose tissue for future use as fuel. Hormones release them when fuel is needed. This process, in which triglycerides are broken down through oxidation into free fatty acids that can power muscles, is called lipolysis. Fat and glucose are utilized for fuel simultaneously, but the ratios change depending on energy needs. The ratio is about 70 percent fat and 30 percent carbohydrates during low-level daily activities. With physical activity, such as walking or light jogging, the ratio of fat to glucose will be closer to 50/50. During high levels of physical exertion, when the person is operating near maximum oxygen demand, the percentage of glycogen to fat used will be 90 percent or higher.

Intense Activities That Require More Oxygen Utilize More Carbohydrates for Fuel. Carbohydrates Are More Efficient in Producing Energy.

- Carbohydrates are more suitable for producing energy than proteins and fats because the breakdown of proteins and fats requires more energy than does carbohydrates. Carbohydrates also release more energy than proteins and fats after they are broken down. One liter of oxygen used to burn fat provides less (8-15%) ATP than when used to burn sugar.
- Glucose also produces ATP two to four times faster than fatty acids. When intense physical activity, such as sprinting, is required, fat oxidation for fuel cannot keep up with the energy demands. Therefore, the body switches to using more stored glycogen for quick energy.

Interval Training

Interval training describes any run or workout where you alternate short periods of faster or high-intensity work with periods of active recovery. Studies that have compared interval training and moderate-intensity training consistently show improvement in cardio-respiratory fitness and capacity for energy metabolism.[3]

The Riddle: How Can People with CFS Do Energy-Efficient Aerobic Exercise Safely

Proposed Methodology

1. Start small
2. Progress slowly
3. Take frequent breaks
4. Use interval training methods
5. Listen to your body
6. Do not run out of breath
7. Avoid crashes

Tiny Steps

Start small to get used to exercising without fatigue and crashing. Stretching exercises or yoga are good ways to start. There are many videos to watch online on YouTube. To begin, do a few minutes at a time and take plenty of rests.

The Charging Exercise

- Lightly hold onto something with one hand for balance and perform knee bends (go only halfway down to make them less energy-demanding), one after the other, until you are breathing deeply while doing them. Start with five or ten repetitions. Then switch to the “Indian dance.” Lightly bounce in place on one foot twice, and then switch to the other foot. Continue for 10 to 20 seconds, or until you feel rested. Then perform additional knee bends. Then, keep alternating between the two exercises and continue for 1 to 2 minutes, or less if you feel tired. Then rest for a minute or two and repeat. Do as many sets as feel comfortable.

Advanced Charging

Once you get used to doing the charging exercise, you can progress to something new and exciting. You can add a new step to the charging exercise by running in place for 5 to 10 seconds or more. (Fast is better than slow.) Then do knee bends followed by the Indian dance as explained earlier. I refer to this method as “advanced charging.” Then repeat… Perform this sequence of exercises for 1 to 2 minutes (or less if you feel tired), then rest for a minute or more. Do several sets if you feel up to it. Listen to your body.

Important Points to Consider

By exercising vigorously, we increase our breathing rate, which activates the more efficient glycogen-burning system. By stopping or slowing down periodically (interval training) during aerobic exercise, we give ourselves a chance to catch our breath and, to a degree, rebuild energy supplies. Additionally, we do not want to push our muscles beyond their limits. Exercising when muscles are tired requires excessive energy input.

Exercising safely with CFS necessitates not allowing yourself to become too fatigued or out of breath. Getting in shape, therefore, must be a very gradual process. Instead of focusing on results such as muscle strength, weight loss, exercise duration, or speed, the primary focus must be on energy efficiency. You will gradually get conditioned, but this goal requires time and patience.

Advanced Aerobic Exercise Menu

Throw a Frisbee

Tennis practice

Pickle ball

Bicycling

Stationary bicycle

Walking up stairs

Alternate brisk walking with slow walking

Cardio glide exercise machine

Alternate jogging with walking

*Take frequent breaks, do not get out of breath or exceed your muscle strength, gentle fatigue only, listen to your body, progress slowly.

Growing Your Energy Supply

Get a good night's sleep.

Take one or two brief rest periods each day where you lie down and close your eyes.

As you exercise regularly and begin rebuilding your energy supply, avoid the temptation to overdo your other activities. Keep pacing carefully!