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Exercise and Your Heart Part II

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Your Life Your Health

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Heart disease is preventable!!! The incredible design of the heart is such that it does not necessarily ever have to fail. Though the heart moves more than almost any other organ in the human body, unlike machines where moving parts almost always fail over time, the heart is meant to last a life time, even if that life time spans more than 100 years.

In a fourteen part series which ran from June 23 to September 29, 2005, *Your Life Your Health* examined cardiovascular disease risk factors. These can be reviewed at www.jameslhollymd.com. There are limited number of ways in which the heart can be injured. The major ones are:

1. Inactivity
2. Infection
3. Inadequate blood supply
4. Infarction
5. Inflammation
6. Increased work load which persists over a long period of time, such as that which is caused by untreated high blood pressure
7. Enlargement of part of the heart such as that which is just under the aortic valve.
8. Impingement upon the heart's ability to function by external compression such as when the covering of the heart becomes inflamed or diseased.
9. Infiltration of the heart muscle by tumors or other substances foreign to the heart.

A complete heart-protection program must address each of these categories, but the treatment of any of them without addressing a sedentary life style will have little benefit.

Faster is unhealthy but faster is also better?

Inactivity will make your heart routinely beat faster, while artificially making your heart beat fast by regular, intermittent exercise, will make your heart routinely beat slower. A high heart rate at rest is unhealthy, but a high heart rate during exercise is healthy. if we make our heart beat faster by exercise, our resting heart rate will drop, indicating that our heart has to do less work to get the same amount of oxygen to the body and this is healthy.

The Masai and The Amish

Population studies have shown that almost all other cardiovascular risk factors are trumped – improved -- by activity. The Masai tribesmen of East Africa eat a diet high in

saturated fat and they develop the same plaques which westerners do, yet the Masai rarely die of heart disease. Why? They go everywhere by walking or running. As a result of their lifestyle exercise, their coronary arteries are so large, the plaques do not decrease the amount of blood flowing to the heart. The Amish also eat a diet high in saturated fat, but they walk over 18,000 steps a day which not only controls their weight even in the face of a high calorie diet but also protects their heart.

Inactivity more damaging to the heart than Age

The September 18, 2001, *Circulation Journal* published a two-part study entitled, “A 30-Year Follow-Up of the Dallas Bed Rest and Training Study.” (For a more complete review of this work see *Your Life Your Health*, April 4, 2004) In 1966, five healthy young adults (20 years old) were studied and then in 1996, were restudied. The result? Three weeks of bed rest in 1966, caused a greater deterioration in cardiovascular and physical work capacity than did 30 years of aging in these five men. Furthermore, six months of endurance training restored 100% of the age-associated decline in aerobic power previously document in these five men.

Untreated, diabetes is a terrible disease damaging multiple organs including the heart. Yet, a sedentary lifestyle is a greater risk factor for the development of congestive heart failure than is diabetes. There is absolutely nothing which you can do which is as beneficial to you heart as to consistently, for a life time, raise your heart rate for short intervals through exercise.

Exercising the Heart

One of the most important “end points” of exercise is that of improving the function of the heart which requires that the heart rate be increased. To achieve cardiac (heart) benefit with your exercise, your heart rate must increase to at least 50% of your maximum heart rate. Anything beneath that is not providing the challenge to the heart which is needed in order to improve the function of the heart. You can determine your estimated maximum heart rate by subtracting your age from 220. If you are 20 years old, your maximum heart rate would be 200.

The Wellness Continuum and the Five Heart Zones

In the Wellness Continuum model of cardiovascular exercise, five zones are identified which are based on 50%, 60%, 70%, 80% and 90% of your actual or estimated maximum heart rate (MHR). The following table shows the heart rate for each zone of a 20 year old. Remember, to calculate your own, just subtract your age from 220 and multiple by the factor, 50%,60%, etc., for the zone in which you are interested.

<u>Zone</u>	<u>Name</u>	<u>Borg's Perceived Exertion Difficulty</u>	<u>Heart Rate Range</u>	<u>Effect</u>	<u>Percent MHR</u>
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1	Healthy Heart	10-11	100-119	Health	50%
2	Temperate	12-13	120-139	Health	60%
3	Aerobic	14-15	140-159	Fitness	70%
4	Threshold	16-17	160-179	Fitness	80%
5	Redline	18-20	180-200	Performance	90%

*MHR – Maximum Heart Rate

Each zone has a name and will create a certain perception of exercise difficulty, that is, how hard you feel you are working in each zone. The faster your heart rate, the higher the perceived level of work is and the more benefit you get. Also, the table shows the effect of each zone. Zones one and two improve your health; zones 3 and 4 improve your fitness and zone five improves your athletic performance. No one should exercise above zone 3 without knowing the state of their health by visiting a physician who is familiar with the stress of exercise.

Facts about the Five Heart Zones

There are some special characteristics of the five heart zones that make them what they are. The key fact is that a different thing happens in each of the heart zones. To get each of the benefits, you have to train in different zones.

Fact #1. Zones have size

The size of each zone is a 10% range of your true Max HR. Most zones for most people range from 15 to 20 beats in size; this is big enough to allow for some "wiggle room" when you are working out, but small enough to be on target for your particular training goal.

Fact # 2. Zones have structure.

A zone may be viewed as being made up of two different parts: its top and bottom halves. While the whole Aerobic Zone may be from 70% to 80% of your MHR, the lower half of the zone is 70%-75% (or 140-150 bpm), and the upper Aerobic zone is 75%-80% (or 150-160 bpm).

Fact #3. Zones have dividing lines.

The floor or bottom of the 23 Aerobic zone, for example, is 70% of your MHR. This floor, or lower limit is that heart rate where you first break into this zone. **Seventy percent of your Max HR also happens to be where the Fat Burning zone ends.** The Aerobic zone ceiling, 80% Max HR, is the line at the very, top or threshold of the zone.

At this point you are passing through the Aerobic zone ceiling into the floor of the next higher and more intense zone, the Anaerobic zone.

Fact #4. Zone names correspond with their benefits.

Each zone has a specific benefit that comes from the physiological activities that happen when you exercise within that heart rate zone. For example, the Healthy Heart zone is exactly that, the range of heart rates where most individuals realize the most cardiovascular benefits, leading to improved heart and lung function.

Fact #5. Zones are a subset of the wellness continuum.

The wellness continuum consists of three areas of physical well-being -- health, fitness, and performance -- and we need to keep in mind that we're not all going to have our goals in the same areas. This is why your friend, who's a veteran marathoner, might complain about what kind of "shape" he or she is in, while you would kill to look the way they do and be so fit and healthy. The health area covers those training zones that promote health but don't primarily improve physical fitness and certainly not performance.

- To measure improvements in health, we seek positive changes in blood pressure, body fat, cholesterol, etc.
- To measure improvements in fitness, however, it's positive changes in oxygen utilization, lactate concentrations and heart rate points we're looking for.
- And, to measure improvements in performance, positive changes in completion times, accuracy of movement skill, mental attitude, and other indices are used.

Fact # 6. Zones use time, not distance, as their measurement tool.

That is, the amount of time you spend in the zone is the way you measure your workout, not in miles run, or the number of strokes per minute cycled, or rowed. This measurement is called "time in zone" and is measured in the minutes that you spend in each zone. For example, one day you decide to run for 30 minutes in the Aerobic zone; the following day you might choose to walk for 50 minutes in your Fat Burning zone. Varying your workouts, both in activity and zone, allows you to get multiple benefits from your training.

Fact # 7. Zones have specific numerical values, they are weighted.

When we talk about "exercise by the numbers," that means doing workouts based on the specific numbers that make up your exact zones. For example, if your true, tested MHR is 200 beats per minute, and you wanted a high fat-burning day as a percent of your fuels burned, you would calibrate that workout to be in Zone1-3. If you really wanted to fine-tune your training, you might choose to narrow the window to Zone 3.

Fact #8. Higher zones require less time in zone than lower zones.

At the lower zones--or "cruise" zones as they are sometimes called--you can train in zone for longer periods of time. But, as you move up to higher intensity zones, you need to decrease the amount of time that you spend in that zone, particularly in the top two, the Anaerobic and Redline zones. This simply makes sense -- you can walk farther than you can sprint, and overdoing it is nearly a guarantee of injuries or burnout.

Fact # 9. Zones are relative.

Your five heart rate zones are specific to your maximum heart rate, not anybody else's. With two runners, each maintaining a heart rate of 160 bpm, one might well be in their Threshold Zone and the other may be in their Temperate Zone. It's all relative.

Fact #10. Zones are metabolic, calorie burning zones.

Each heart zone burns a different number of calories per minute based on how fit you are.

Zone 5 20+ calories per minute
Zone 4 17-20 calories per minute
Zone 3 12-17 calories per minute
Zone 2 7-12 calories per minute
Zone 1 3-7 calories per minute

Fact #11. Fat is burned differently in each of the heart zones.

You'll burn a different ratio of fat to carbohydrates in each of the heart zones. Remember, once you've crossed over the exercise intensity threshold called "anaerobic threshold," you are burning no additional fat, though you still burn fat. That is because oxygen has to be present for fat to burn. If there's no additional oxygen present, there's no additional fat burned.

Conclusion

Want your heart rate to come down? Raise it with exercise. Want your heart to be healthy? Work it with exercise. Remember it is your life and it is your health.