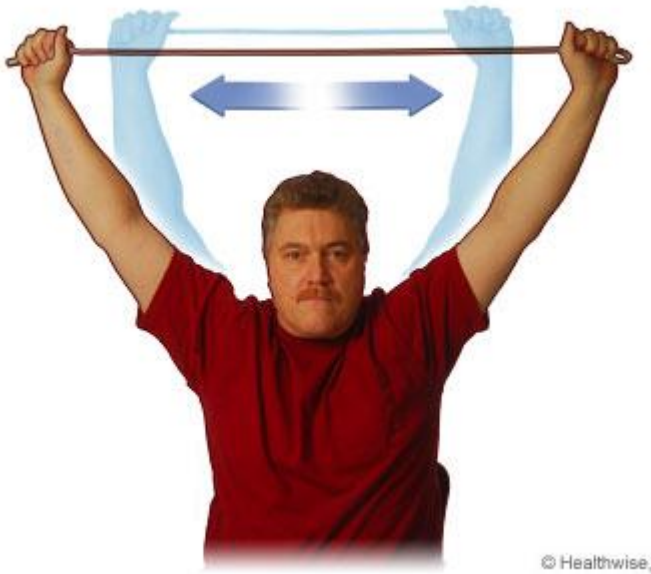
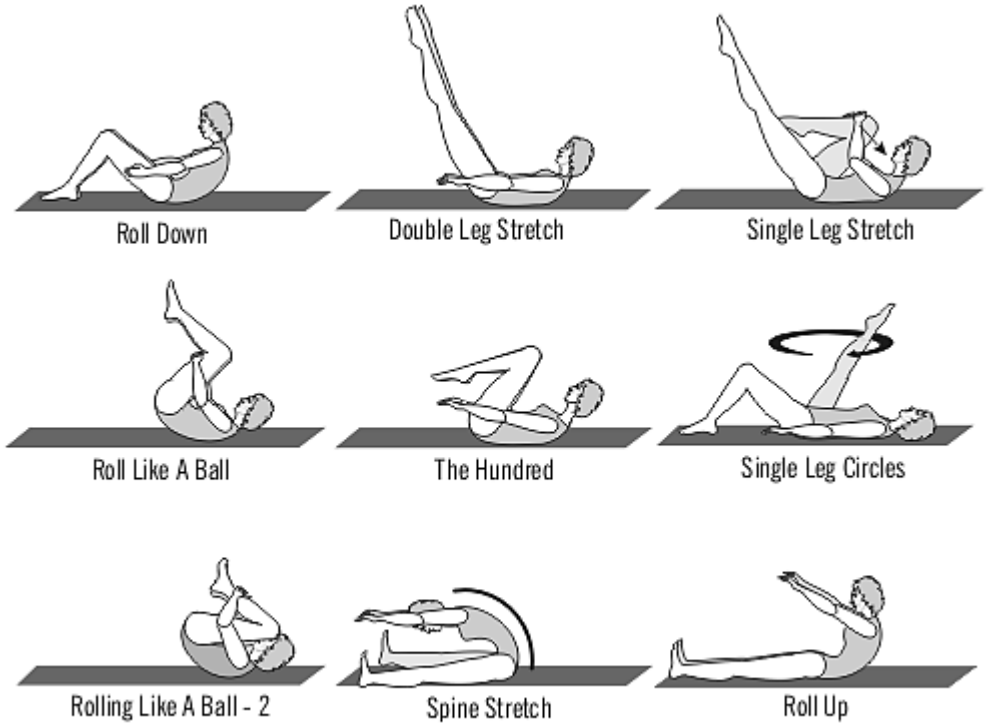
Reverse Diabesity-strength training

Build muscle and enhance insulin sensitivity up to 48%

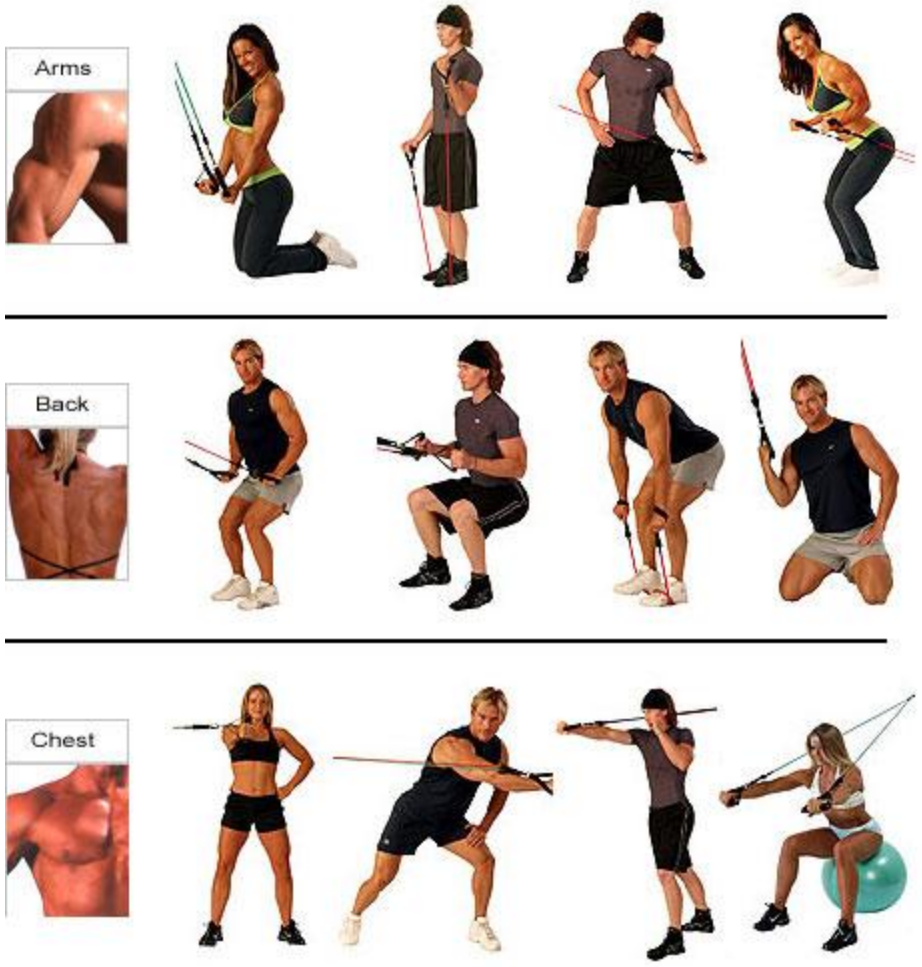
Types of strength training



Types of strength training



Types of strength training rubber resistance

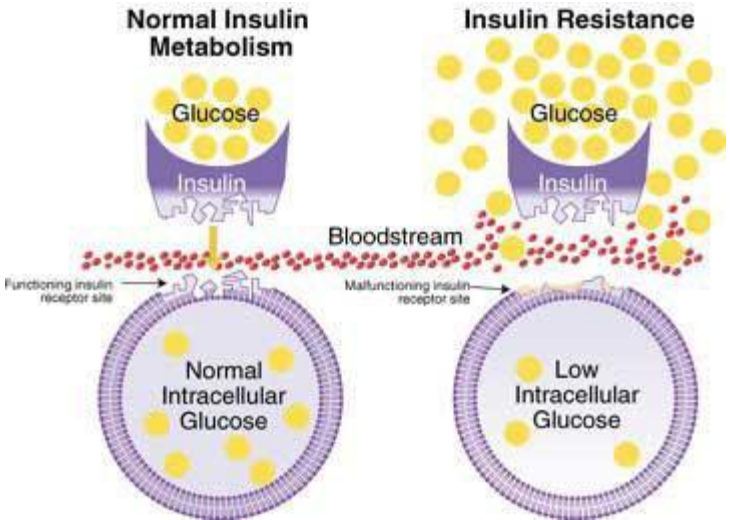


Strength training is a effective way to build and maintain muscle mass

- Strength training is essential for diabetics and should be done two or three days a week. Strength training does not have to involve a lot of expensive equipment. Using a few light **dumbbells** of various weights or **rubber resistance** bands of various tension levels are effective, inexpensive ways to build and maintain lean muscle mass.

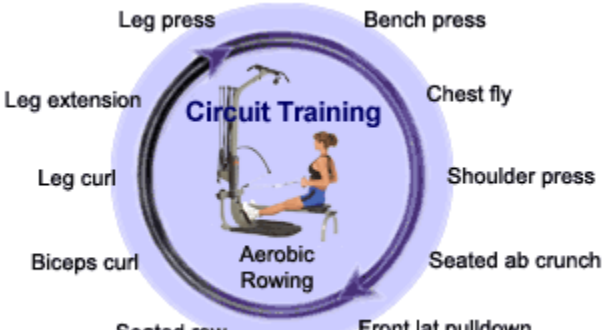
Benefits of strength training

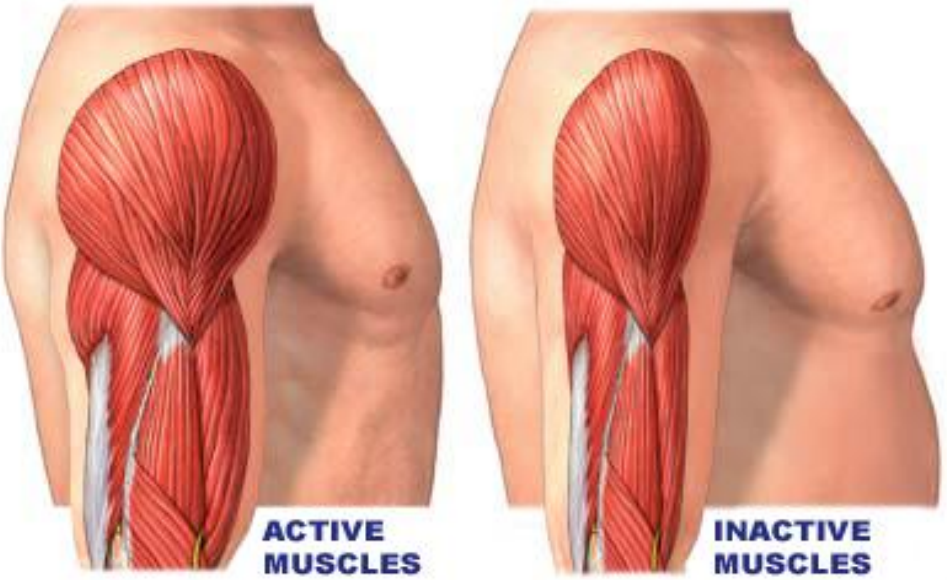
- Improve insulin sensitivity
- Improve glucose tolerance
- Help you lose weight
- Lower your risk for heart disease
- strength training in combination with aerobic exercise may be even more beneficial



Strength training study findings

- The researchers found that circuit weight training was responsible for improvements in blood glucose level control and that these improvements were significantly related to training-induced muscle hypertrophy. This study also showed that increases in muscle mass from strength training are important in the management of diabetes, as well as decreasing the risk for developing complications associated with diabetes.





Step up

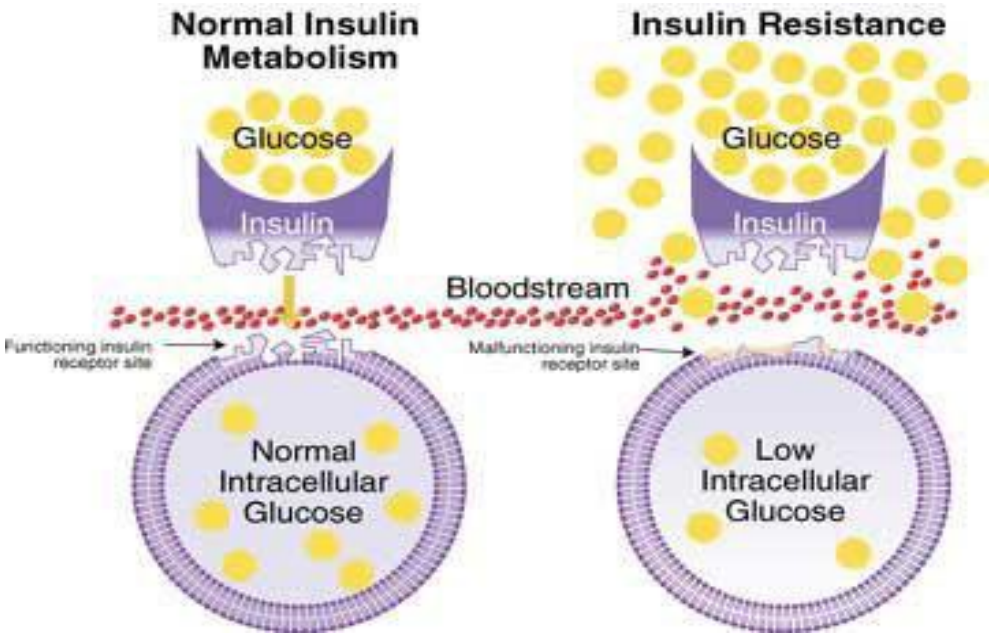
Split Squat Jumps

Leg Raises

Chair Squat

Insulin sensitivity increases up to 48% with strength training

- The researchers reported that the rate of blood glucose entry into the working muscles increased after training. This study demonstrates that moderate-intensity, high volume training improved insulin sensitivity by 48% in these individuals.



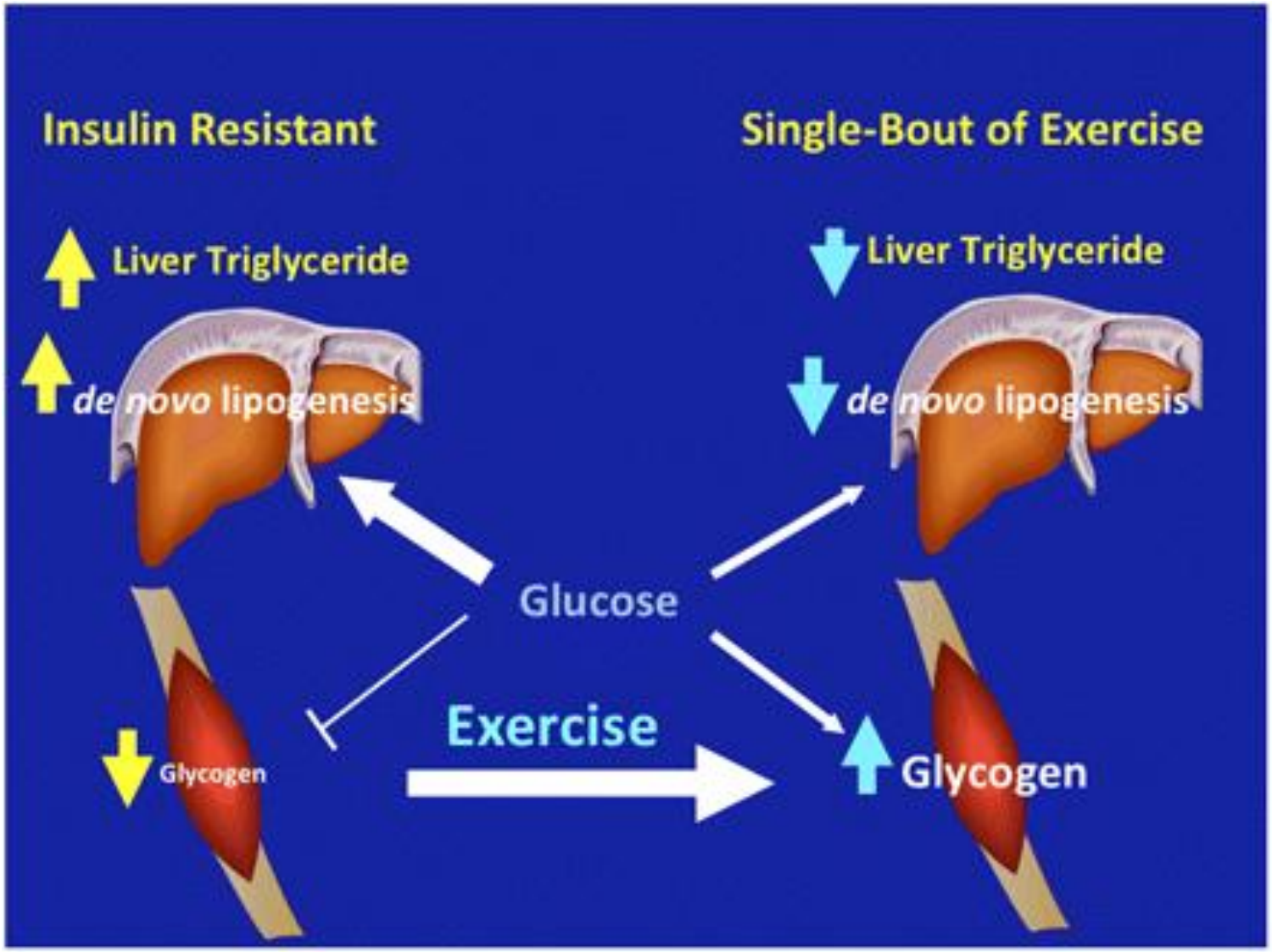
Strength training recommended by American Diabetes Association

- The American Diabetes Association (ADA) recommends that people with type 2 diabetes start a strength training program to help with blood sugar control. The program can begin with a moderate schedule (one set of 10-15 repetitions with weights up to three times a week). Once you become accustomed to the moderate schedule, you can move on up to three sets of 10-15 repetitions with weights up to three times a week.

One bout of resistant exercise results in muscle glycogen up 3 folds, improved insulin sensitivity, liver TG synthesis reduced by 40% -study by Yale University

- **Aging is closely associated with muscle insulin resistance, hyperlipidemia, nonalcoholic fatty liver disease (NAFLD), and type 2 diabetes. We examined the hypothesis that muscle insulin resistance in healthy aging promotes increased hepatic de novo lipogenesis (DNL) and hyperlipidemia by altering the distribution pattern of postprandial energy storage. Healthy, normal weight, sedentary elderly subjects pair-matched to young subjects were given two high-carbohydrate meals followed by $^{13}C/^{1}H$ magnetic resonance spectroscopy measurements of postprandial changes in muscle and liver glycogen and lipid content, and assessment of DNL using $^{2}H_2O$. Net muscle glycogen synthesis was reduced by 45% ($P < 0.007$) in the elderly subjects compared with the young, reflecting severe muscle insulin resistance. Net liver glycogen synthesis was similar between groups (elderly, 143 $\pm$ 23 mmol/L vs. young, 138 $\pm$ 13 mmol/L; P = NS). Hepatic DNL was more than twofold higher in the elderly than in the young subjects (elderly, 14.5 $\pm$ 1.4% vs. young, 6.9 $\pm$ 0.7%; P = 0.00015) and was associated with approximately threefold higher postprandial hepatic triglyceride (TG) content ($P < 0.005$) and increased fasting plasma TGs (elderly, 1.19 $\pm$ 0.18 mmol/L vs. young, 0.74 $\pm$ 0.11 mmol/L; P = 0.02). These results strongly support the hypothesis that muscle insulin resistance in aging promotes hyperlipidemia and NAFLD by altering the pattern of postprandial carbohydrate storage away from muscle glycogen and into hepatic DNL.**

Schematic of whole-body energy distribution after a carbohydrate-rich meal at rest and after one bout of exercise in young, lean, insulin resistant subjects



Success stories

- I'm not talking about "toning" or playing around with little 3- and 5-pound weights here -- I'm talking about *weightlifting.* It's one of the best things I've done for my blood sugar and insulin sensitivity.
- Since beginning to train seriously and regularly with weights four days a week (sometimes five if I have time), my insulin requirements have dropped significantly. This is because muscle requires much more "maintenance" than fat. Muscles need more calories to maintain themselves every day compared to fat. I used to need about 6 units of short-acting insulin for a bowl of oatmeal in the morning and now I literally only need 4, and if I'm on my way to a yoga class, I only need 2 units.
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- Let me explain it this way: Muscle is more expensive than fat. It costs more "money" to maintain them... and in your body, "money" is calories. So, the more muscle your body has, the more calories you're going to use up in order to fuel your muscles. When people go on starvation-like diets and don't eat enough calories in a day, the first part of your body to begin wasting away is muscle mass because it costs the most to maintain.
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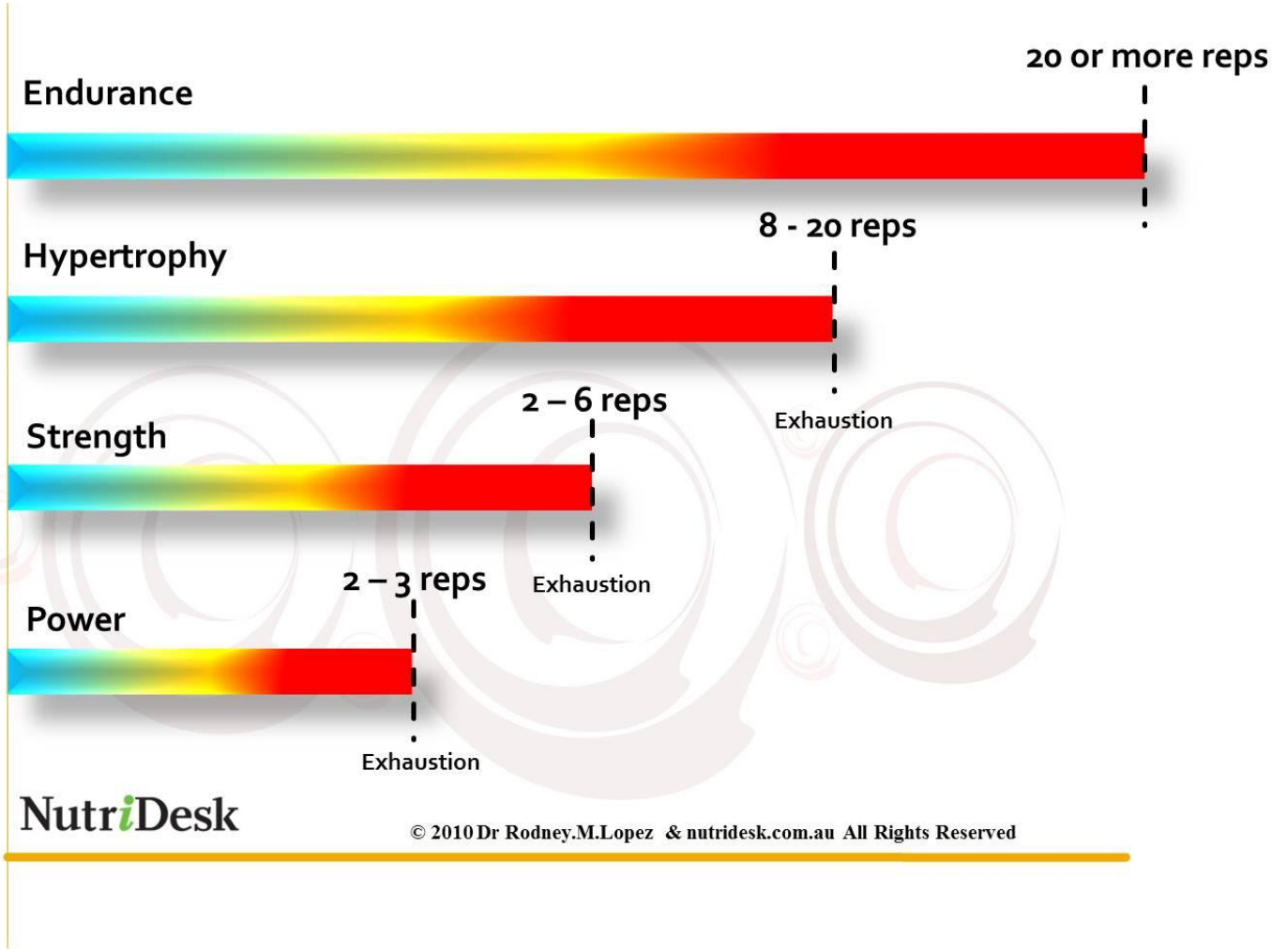
- So, this means, when you spend a minimum of 30 minutes three to five days a week lifting weights and inevitably building more muscle, not only is the food you're eating going to be put to better use, you'll also be increasing your overall daily calorie needs. So, while your body may have once needed 2,000 calories (for example) to maintain your current weight, when you add five pounds of muscle onto your frame over time, you're going to increase the number of calories you can consume each day.

Guidance on strength training

- Individuals with diabetes should always consult their physician prior to beginning any new exercise program.
- According to the University of Maryland Medical Center, or UMMC, patients who take **insulin or medicines** that lower blood glucose levels should take special precautions before starting a workout program.
- Diabetics should **never exercise on an empty stomach**, and be sure to drink plenty of water before, during and after exercising.
- As with any type of exercise, with strength training always warm up before exercising and then take time to cool down afterward.

Way to build endurance



Enjoy sweating enjoy fitness and health