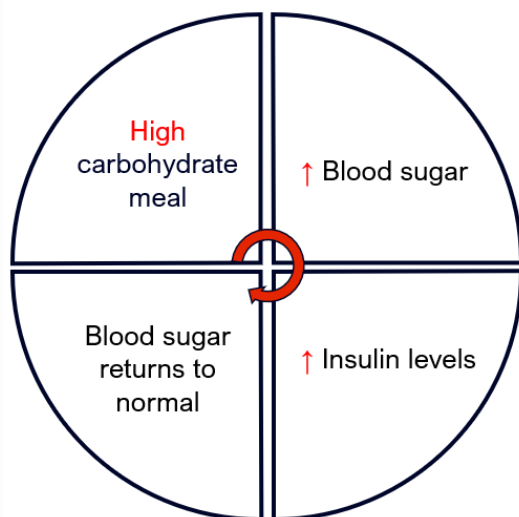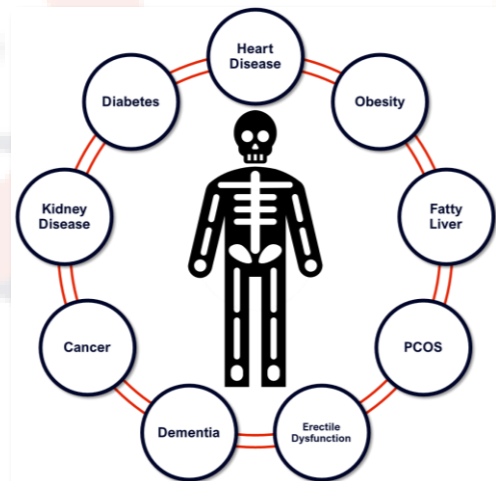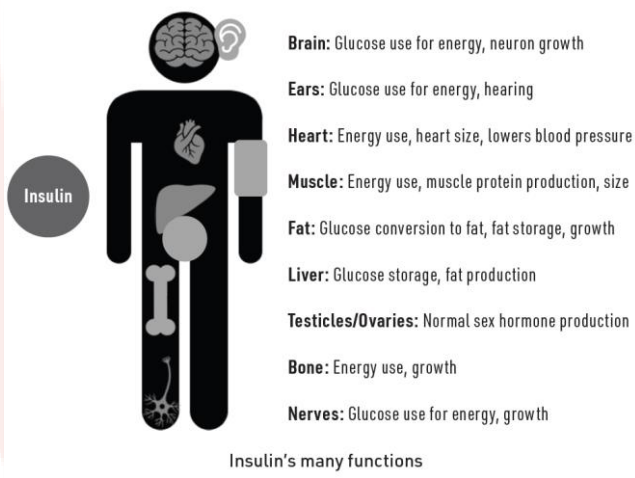## Introduction

Only **10% of United States adults are considered "metabolically healthy,"** leaving 90% in the category of "metabolically unhealthy." Metabolic health is comprised of 5 components: minimal belly fat, normal blood pressure*, normal blood sugar*, normal cholesterol*, and full mobility involving your muscles, bones, and joints (* = without medications). Metabolic syndrome, or metabolic illness, is dangerous because it's silent. Most people have no symptoms and don't realize that there are microscopic changes happening inside their body. One of these, and arguably one of most important, is insulin resistance.

What is Insulin Resistance?

Insulin is a hormone released by the pancreas in response to a meal. Insulin is often called the "master hormone" because it affects every cell in your body and you cannot survive without it.
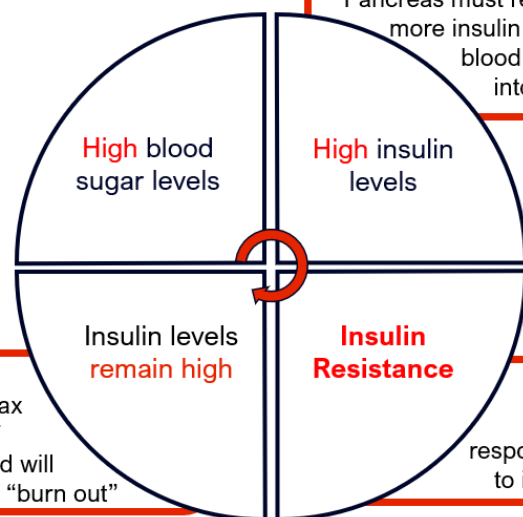
Insulin is a complex hormone that is most known for its impact on blood sugar. To simplify this complex process, here are the highlights of what happens when your body is healthy:	Unfortunately, if your body is not working as it should, this system can start to break down. Here are the highlights of what happens in that scenario:

Insulin

Brain: Glucose use for energy, neuron growth

Ears: Glucose use for energy, hearing

Heart: Energy use, heart size, lowers blood pressure

Muscle: Energy use, muscle protein production, size

Fat: Glucose conversion to fat, fat storage, growth

Liver: Glucose storage, fat production

Testicles/Ovaries: Normal sex hormone production

Bone: Energy use, growth

Nerves: Glucose use for energy, growth

Insulin's many functions

Heart Disease, Diabetes, Obesity, Kidney Disease, Fatty Liver, Cancer, PCOS, Dementia, Erectile Dysfunction

High carbohydrate meal | ↑ Blood sugar

Blood sugar returns to normal | ↑ Insulin levels

Over time →

Pancreas creates max amount of insulin, and will eventually "burn out"

Pancreas must release more insulin to get blood sugar into cells

High blood sugar levels | High insulin levels

Insulin levels remain high | **Insulin Resistance**

Cells stop responding to insulin

Main Contributors

Contributor	How it Contributes	How to Prevent/ Reverse

Diet
• Sugar-sweetened drinks (Soft drinks, sports drinks, juice)
• Added sugar (candy, cakes, cookies, sweet rolls, pastries, donuts, ice cream)
• Ultra-processed foods (above plus cereal, grits, oatmeal, bread, chips, crackers, bars)
• Alcohol
	Poor dietary intake increases blood sugar and therefore the production of insulin.	• **Avoid mentioned foods**
		• **Therapeutic carbohydrate reduction**
		  • See TCR handout
		• **Adequate protein intake**
		  • Aim for 0.8-1 gram of protein per pound of ideal body weight

Sedentary Lifestyle
• Sitting, learning, laying with limited physical activity
• Watching TV
• Playing video games
• Using a computer
• Sitting at school/ work
• Commuting/ traveling
	If you are not using enough blood sugar by being physically active and participating in regular exercise, then your body will need to rely on more insulin to move your sugar from the blood into your cells. This can lead to higher insulin levels, your liver and muscle filling up with sugar, and your body making more fat, leading to insulin resistance!	• **Resistance training** 2 to 3 days/ week
		  • Weights, machines, push-ups, pull-ups, squats, bands
		• **Aerobic activity** 3 to 4 days/week
		  • Brisk walking, running, hiking, swimming, biking

Chronic Stress • Chronic pain • Poor sleep • Stressful job • Shift workers • Bad relationships • Toxic home life • Living in high crime area • Chronic health problems	Small amounts of "stress hormones" are good and your body is well equipped to handle this. However, if you are under chronic stress or have poor sleep, then you are constantly making more and exposing your body to higher levels of stress hormones. This can lead to higher blood sugars, higher insulin levels, and insulin resistance.	• **Adequate sleep**: 7 to 9 hours/ night • **Breathing exercises** • **Do activities you enjoy**

How Do You Know if You Have Insulin Resistance?

While there is no definitive test to say whether you have insulin resistance or not, there are many signs, including skin changes such as **skin tags** and **darkening of skin folds**. If you have at least one of the metabolic abnormalities in the following chart, then there is a good chance you are insulin resistant even if your weight is normal. For more information on metabolic health, visit **The SMHP™**.

Factor	Excellent	Okay	Bad
Waist Circumference	<32" (men) <28" (women)	32-36"(men) 28-31" (women)	>40" (men) >35" (women)
Blood pressure (no meds)	<120/80	120-130/80-90	>130/90
Fasting blood sugar (no meds)	<100 mg/dL		>100 mg/dL
A1c	<5%	5-5.6%	>5.6%
Fasting insulin	<6 µIU/mL		>6 µIU/mL
Triglycerides	<70 mg/dL	70-150 mg/dL	>150 mg/dL
HDL	>60 mg/dL	40-60 mg/dL	<40 mg/dL