



CARDIOMETABOLIC RISK

CONSUMER GUIDE:

SPINAL CORD MEDICINE

Identification and Management of Cardiometabolic Risk after Spinal Cord Injury: What You Should Know

A Consumer Guide for People with Spinal Cord Injury



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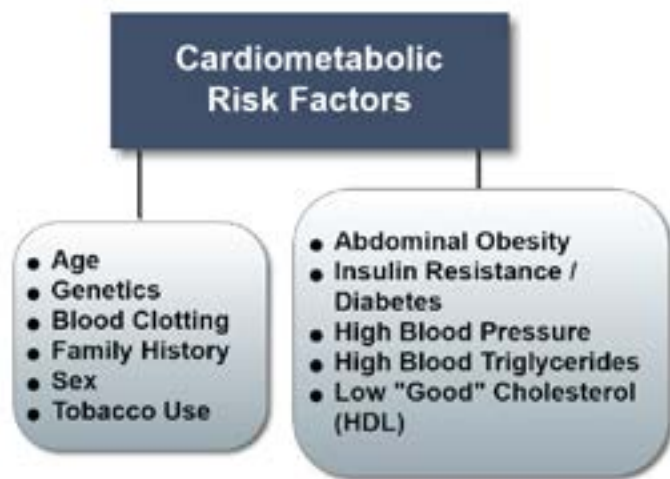
What is a Cardiometabolic Disease?

Cardiometabolic Disease (CMD) is a medical disorder that threatens your heart and blood vessels. Once identified, the CMD places you at the same health risk as having advanced heart disease or Type 2 diabetes (the type of diabetes that does not require that you take insulin).

CMD has five related risks shown below: obesity (overweight), insulin resistance (a condition having high blood sugar - similar to diabetes), high blood pressure, and abnormal levels of two different blood fats (low HDL [i.e., the "good" cholesterol] and elevated triglycerides [i.e., "fat in the blood"]). (Figure 1). These risks may not be obvious to you, as they can develop without any indications until symptoms become noticeable. Once discovered by your physician, they are difficult to treat.

CMD is caused or worsened by an imbalance between having too many calories in your food and not enough energy used for your daily activities or physical activity. Even when you reduce your total daily calories, eating the wrong types of foods may increase your risk of a CMD.

Figure 1. CMD risk factors.



If you meet three or more of the categories in Table 1, you have a CMD:

TABLE 1. GUIDELINE DEFINITION OF CARDIOMETABOLIC DISEASE (CMD)	
RISK CATEGORIES	
THREE OR MORE OF:	Obesity or overweight; Body mass index (BMI) measures your body size. It combines your weight with your height. If you have a BMI greater than 22, this suggests too much weight for your body size.
	Blood Triglycerides (fats): higher than 150 mg/dL (1.7 mmol/L)
	Low blood HDL ("good") cholesterol: <ul style="list-style-type: none"> • Men — Less than 40 mg/dL (1.03 mmol/L) • Women — Less than 50 mg/dL (1.29 mmol/L)
	Blood pressure is higher than 130/85 mm Hg, or is currently using medication to treat high blood pressure.
	Fasting blood glucose (sugar) higher than 100 mg/dL (5.6 mmol/L) or currently using medication to lower your high blood sugar

Foreword

This Consumer Guide is the first published by the Paralyzed Veterans of America and the Consortium for Spinal Cord Medicine to address cardiometabolic disease (CMD) after SCI. An expert panel of physicians and scientists reviewed this topic and found that your risk for heart and circulatory diseases speeds up after an SCI. CMD risks also affect your health and function to a greater degree than people without SCI and are more challenging to treat.

In arriving at the following recommendations, the Professional Guideline Panel felt that it would be best for you to prevent CMD, detect it as early as possible, and treat it as aggressively as possible. The Panel recommended that you undergo relatively simple tests to identify CMD risk during routine physician visits. You should treat the condition with lifestyle changes that incorporate exercise, dietary changes, and medication if necessary.

In publishing the Consumer Guide, we extend thanks for the dedicated work and meaningful contributions of the Panel Members from the Professional Guide; Drs. Trevor Dyson-Hudson, David Gater, Suzanne Groah (Co-Chair), Jesse Lieberman, Jonathon Myers, Sunil Sabharwal, and Allen Taylor. We also thank the Professional and Consumer Panel for this Consumer Guide: Drs. Kimberly Anderson-Ehrisman, Lance Goetz, Jessie Lieberman, Trevor Dyson-Hudson, and Suzanne Groah. We further appreciate the contributions of Ms. Cheryl Vines, Dr. Thomas Bryce (Consortium Chair), the Paralyzed Veterans CPG Steering Committee, and the Consortium Partners, who recognized the importance of this topic and supported the development of this document.

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Purpose and Use of this Consumer Guide

This Guide attempts to improve knowledge about your health status and find ways to preserve it throughout your life. Recommendations in this Guide will help you be a better-informed user of medical and health-related information. It may also benefit your family and caregivers by allowing them to adopt or maintain their healthy lifestyles.

This Guide does not force you or your physician to undertake a specific lifestyle or healthcare plan. Instead, it's a starting point for discussions with your physician and other healthcare team members. It also recognizes that it can be hard to change your health behaviors, which you can adapt slowly. You can make the best decisions about your health by considering these recommendations combined with the clinical judgment of your physician, nutritionist, and therapists. These professionals will guide you in evaluating the benefits, risks, and challenges of making lifestyle changes. The plan should consider your specific risk factors for CMD and how you can use exercise, nutrition, or medication to assist your journey toward a healthy - or healthier - life.

Recommendations at a Glance: A Rapid Overview of the Professional Panel Findings

This section will provide a rapid overview of the Professional Panel findings and recommendations.

Summary of CMD Definition, Findings, and General Recommendations:

- The CMD has five risk hazards of overweight/obesity, insulin resistance, blood fat disorders (including individual risks for low levels of the "good" high-density lipoprotein cholesterol (HDL-C) and elevated levels of blood triglycerides (TG)), and high blood pressure.
- Any three of the five risks mean a diagnosis of CMD.
- Because of your SCI, you have a greater risk for CMD than people without disabilities. Once identified, your risks and CMD may be more serious and harder to treat.



Overweight/Obesity Recommendations:

- It would be best if you underwent evaluation when discharged from rehabilitation. If that's not possible, evaluation should take place as soon as you can after that:
 - Adult men with more than 22% body fat and women with more than 35% body fat are classified as obese and at high risk for CMD.
 - When the relationship of height-to-weight - known as the body mass index (BMI) - is used as a convenient marker for overweight/obesity in persons with SCI, a BMI greater than 22 kg/m² is the cutoff point for obesity.

$$\text{BMI} = \text{body weight (in kilograms)} / (\text{height (in meters)})^2$$
- Follow-up evaluation for overweight and obesity should be conducted at least every three years following the initial assessment when you are NOT considered overweight or obese. The follow-up can occur more often when you are overweight or obese, including once a year when there are other symptoms or risks of CMD, including sugar metabolism, blood fat disorders, or high blood pressure.

Impaired Fasting Glucose (Sugar), Pre-diabetes, and Diabetes Recommendations:

- If your blood sugar levels are normal, you should be screened for diabetes and pre-diabetes at least every three years.
 - A fasting blood sugar level below 100 milligrams per deciliter (mg/dL) is considered "normal."
 - A fasting blood sugar level in the range from 100 to 125 mg/dL (5.6 to 7.0 mmol/L) is considered pre-diabetes. This finding is sometimes called "impaired fasting glucose."
 - A fasting blood sugar of 126 mg/dL (7.0 mmol/L) or higher signals Type 2 diabetes and a need for you to undergo treatment with lifestyle changes of exercise, nutrition, and medications.
- You should undergo annual testing for fasting blood sugar when your physician first verifies diabetes or pre-diabetes.

Elevated Blood Pressure (BP) Recommendations:

- You should have your BP measured at every routine physician or clinic visit – and at least once yearly.
- High BP readings – also called hypertension - should be confirmed during two separate physician office exams or clinic visits.

Lipid Disorders (Dyslipidemia) Recommendations:

- You should undergo blood testing at least every three years when you don't have any CMD symptoms or risks.
- It would be best to have testing done once a year when multiple risk factors or evidence of lipid disorders (low HDL or high Triglycerides) is confirmed. You should also have annual testing done if you have started treatment such as exercise, nutrition, or medications.

Summary of Treatment Recommendations for CMD Risk Components after SCI

Lifestyle Intervention:

- Lifestyle changes using nutrition and exercise are the best way to prevent or treat CMD. Medications are the next choice if lifestyle changes are not effective.



Nutrition Recommendations:

- It would be best to undergo an assessment to estimate your daily energy expenditure and assess your daily energy needs.
- Persons with SCI typically require 20-25% fewer daily calories than before the SCI. Other factors, including your age, sex, height, and activity, may affect the correct number of daily calories you need to maintain your health.

To understand your individual daily energy needs, consult with your physician, who may refer you to a nutritionist who has experience working with people with SCI. Institute the following nutritional measures after discharge from rehabilitation or as soon as possible after that:

- Adopt a heart-healthy nutrition plan focusing on fruits, whole grains, low-fat dairy, poultry, fish, legumes (peas and beans), nuts, and non-tropical vegetable oils (like coconut oil, palm kernel oil, and palm oil). You should limit sweets and sugar-sweetened beverages, and red meats.



Figure 2. the target for daily salt use.



- Adopt the Dietary Approach to Stopping Hypertension (DASH) nutritional plan or a Mediterranean healthy plan if you have elevated blood pressure or other CMD risk factors, including overweight and insulin resistance.
- Limit daily salt intake if you have high BP. The daily amount you should use is less than shown in Figure 3.

Physical Activity Recommendations:

- According to ability, you should participate in at least 150 minutes of physical exercise per week, beginning as soon as possible following your SCI.
- A 150-minutes-per-week guideline can use sessions of 30-60 minutes performed 3-5 days per week or exercising for at least three 10-minute sessions per day.
- If you cannot meet these guidelines, you should engage in regular physical activity according to your abilities. ***Most of all, you should avoid being inactive.***
- You should consult your health care team about the amount and types of physical activity that you can do and are best for you.



Medications for Cardiometabolic Risk

Medicines for Treating Obesity

- The Panel discouraged using prescription medications, over-the-counter non-prescription medications, and herbal medicine to manage obesity.
- You should always consult your healthcare team about any over-the-counter and herbal appetite-lowering pills, water loss pills, and pills that block your food digestion.

Medicines for Treating High Blood Sugar, Pre-Diabetes, and Type-2 Diabetes

- An HbA1c level greater than 7% indicates poor blood sugar control and the need for lifestyle intervention.
- Your physician may prescribe medication if you cannot lower your blood sugar to acceptable levels when using lifestyle intervention. A second medication may help you reach appropriate blood sugar levels if the first medicine does not.
- Be cautious when using more than one medication or a single medication with intense and prolonged exercise and food restriction. Multiple approaches are more likely to lower your blood sugar to levels where you become lightheaded. You should work closely with your healthcare team to report and monitor any new symptoms when taking medications that may result in low blood sugar, low blood pressure, swelling of your limbs, or urinary tract infections.

Medication Treatment for Blood Lipid Disorders

- Your risk of heart and blood vessel disease leading to heart attack and a stroke may be under-recognized. The standard methods for assessing this risk in people without an SCI may not be accurate.
- Other factors affect how your healthcare team decides to manage your blood fat disorders. You may need a so-called "statin" drug to correct your blood fat levels and lower your risk status.



Medication Treatment for Elevated Blood Pressure

- Your physician or nurse should check blood pressure at every office visit or clinic exam. Your physician will set a goal for your blood pressure and treat it with medication according to this goal. For most adults with SCI, the level for beginning drug treatment is higher than 140/90 mm Hg.
- Some blood pressure-lowering medications can cause unintended risks. For example, the thiazide class of diuretics might affect your bladder function. Other drugs may lower your blood pressure, especially when changing your body position from lying down to sitting up. You should work closely with your healthcare team to evaluate the best strategies for managing your blood pressure and overall health.

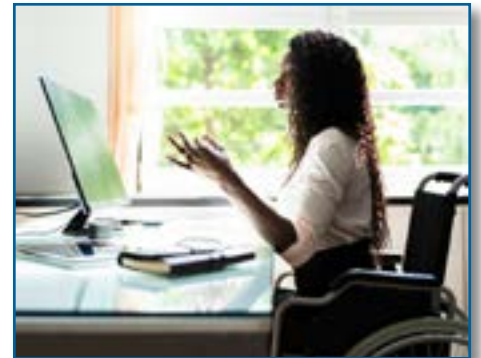
Bariatric Surgery Recommendations for CMD Risk:

- You should consider surgery as a last resort to reduce the amount of food your stomach can hold or surgically remove fat from your body. The surgical procedures may cause significant medical risks during and following the surgery.

A Deeper Dive into the Thinking of the Guideline Panel

Up to this point, the Guide has mainly focused on "what you should do." The following pages share "why" this is important and "how" to do it.

The Professional Panel strongly recommended that you modify your lifestyle using exercise and nutrition as a first goal for preventing and treating CMD. A healthy lifestyle after rehabilitation discharge is better than using medications and surgery.



Explanations for the Physical Activity Guidelines

Low fitness levels are typical after an SCI and result from many factors. Some factors may be under your control, and some not. Inactivity, the need for special equipment and assistance when performing exercise, physical and financial barriers, pain, and the possibility of an exercise-related injury are common

Engaging in physical exercise and activity improves fitness, reduces the risk of developing CMD, and lessens the severity of the five CMD component risks.

Guidelines for exercise after SCI have been established and are widely available. (Table 2.) The Professional Panel recommendations support these guidelines, including the U.S. Department of Health and Human Services (DHHS) Physical Activity Guidelines for Individuals with Disabilities.

FITNESS GUIDELINE

For cardiorespiratory fitness and muscle strength benefits, adults with a spinal cord injury should engage in at least:

20 Minutes of moderate to vigorous intensity aerobic exercise 2 time per week

AND

3 sets of strength exercises for each major functioning muscle group, at a moderate to vigorous intensity, 2 times per week

CARDIOMETABOLIC HEALTH GUIDELINE

For cardiometabolic health benefits, adults with a spinal cord injury are suggested to engage in at least:

30 minutes of moderate to vigorous intensity aerobic exercise 3 times per week

Reasons for the Nutrition Guidelines

Too much abdominal fat is a serious health risk that often occurs as soon as the first year following injury. Your body uses less energy after an SCI. You store the calories you consume over your daily needs as body fat.

While physical activity described in the previous section can burn some of your excess dietary calories, it will usually not burn all of them. For this reason, many people with SCI find it challenging to balance energy intake using exercise alone.

Nutritional modification may represent a more practical and effective way than exercise alone to achieve weight management and reduce your CMD risk after SCI.

The Professional Panel did not recommend a single nutritional plan. It noted success in weight loss using the Mediterranean diet and the DASH Diet, which is more effective for blood pressure management but may also result in weight loss. These plans have some factors in common. They both incorporate fish and lean red meats – although fewer times weekly, and focus on eating vegetables and fruits rich in fiber and low in sugars. Red meat, poultry, and fish are allowed. You don't need to become a vegan or vegetarian to use these nutritional plans, but limit them in your eating plan.



Figure 3. The Mediterranean Pyramid of Food Groups and their Consumption



Weight loss programs designed for the non-disabled population may not be appropriate for the SCI population's specific health and nutritional needs, especially in the total number of calories they recommend. A pilot study of a weight loss program consisting of education on nutrition, exercise, and behavioral modification in individuals with chronic SCI who were overweight or obese resulted in weight loss and improvements in dietary intake. This study emphasized large intakes of high bulk, low energy-density foods such as fruits and vegetables, high-fiber grains, and cereals. It also highlighted a moderate intake of high energy-density foods such as meats, cheeses, and healthy fats.

[Appendix B](#) provides references to assist with planning meals and maintaining a healthy nutrition plan.

Behavioral Strategies to Help with Lifestyle Intervention

An essential part of CMD prevention involves finding behaviors to sustain your newly adopted exercise and nutritional plans. These strategies play a crucial role in removing barriers that hinder your pathway to a healthier lifestyle. The Diabetes Prevention Program described in this Guide includes a 16-step plan to learn how to include exercise in daily life and benefit from optimal food choices. This behavioral plan has been modified for persons with SCI and appears in Table 3.

Table 3. A Modified Behavioral Outline for Maintaining Exercise and Nutrition Goals

FOCUS AND PRINCIPLE NUMBER	TOPIC
The focus is on nutrition and exercise goals and education	1 Take ownership of your lifestyle intervention. Write your goals.
	2 Plan self-monitoring of weight at home.
	3 Find three ways to eat less fat.
	4 Focus on healthy eating, not just dieting. Find new and exciting foods.
	5 Work with your healthcare professionals to identify ways of exercising.
	6 Tailor your physical activity regimen to your needs.
	7 Learn principles of energy balance between calories and exercise.
	8 Know principles of stimulus control to prevent unhealthy eating and maintain exercise focus.
The focus is on psychosocial and behavioral strategies	9 Be able to problem-solving.
	10 Adopt basic skills for eating and exercising away from home.
	11 Practice identifying negative thoughts and how to counter them.
	12 Accept that slips are part of lifestyle change and learn several tips for behavioral change maintenance.
	13 Use aerobic fitness to help cope with boredom.
	14 Develop strategies for managing social cues, both stressful and supportive.
	15 Adopt at least one stress management principle presented throughout the intervention.
	16 Focus on enhancing motivation and maintaining behavioral change post- lifestyle intervention.

Practical suggestions for maintaining your lifestyle plan include setting realistic goals. Recognize that the lifestyle journey may have some bumps in the road. There's no reason for you to travel this road alone. Finding a peer to support you will lessen your feeling of taking this journey alone. Support groups through the Veterans Administration, the NIDILRR SCI Model Systems, or local hospitals and communities can help plan and maintain a healthy lifestyle. Even partnering with someone over the internet may be an effective way to do the hard work of changing behaviors.

Reading the Food Labels

Shopping for healthier foods can sometimes seem overwhelming. It will help if you can read the labels on foods that describe the good nutrients and nutrients like sugars and saturated fats that you'll want to avoid. Newer food labels have bigger fonts and provide more information. A nutrition specialist can help you find and interpret the information you need and make the best possible choices in what you eat.

Nutrition Facts	
8 servings per container	
Serving size	2/3 cup (55g)
Amount per serving	
Calories	230
% Daily Value*	
Total Fat 8g	10%
Saturated Fat 1g	5%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 160mg	7%
Total Carbohydrate 37g	15%
Dietary Fiber 4g	14%
Total Sugars 12g	
Includes 10g Added Sugars	20%
Protein 5g	
Vitamin D 2mcg	10%
Calcium 260mg	20%
Iron 8mg	45%
Potassium 240mg	6%

* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Mindfulness as Part of Cardiometabolic Health

Another way to achieve behavioral goals is to pursue mindfulness about your life, daily activities, and long-term goals for health. Mindfulness is an essential ability to be fully present at the moment and aware of where we are and what we're doing. Mindfulness has become more important as our lives have become busier and our jobs and daily activities more complicated. People sometimes think of mindfulness as intense meditation or deep self-analysis. Instead, mindfulness can be part of prayer or taking some quiet breathing to become calm.



It may be helpful to set time aside every day, be quiet, let judgments diminish, and be kind to yourself. Like anything else worthwhile, it will take some practice to focus on calming yourself for as little as a few minutes a day. Once achieved, you will find increased mental flexibility, focus, and protection against intellectual decline. Simple breathing exercises are available on several apps such as Calm and Headspace. You can share them with professionals, with peers, or through activities such as wheelchair yoga and wheelchair tai chi.



How Often Should Your Health Be Evaluated?

The evaluation goal should begin as soon as possible after rehabilitation discharge and maintain a schedule throughout your lifespan. This schedule aims to see that you receive the same high-quality health care as people without an SCI while not creating a burden for time or finances. The following tables identify the CMD risks, recommended tests, and when you should have them done. You may take this page to discuss a plan with your SCI physician, therapist, exercise specialist, or nutrition professional.

The following table is the recommended schedule for checks on individual CMD risks:

RECOMMENDED SCHEDULE FOR CMD AFTER SCI			
RISK TO BE TESTED	TEST	FIRST CHECK	FOLLOW-UP
Insulin Resistance, Pre-Diabetes, and Diabetes	Fasting Blood Sugar (Glucose), Oral Glucose Tolerance Test,	Individuals having one or more risk factors and no symptoms	Fasting Blood Sugar (Glucose) annually; Other tests at a minimum of three-year intervals if normal
Obesity	At least a Body Mass Index (BMI) calculation from height and weight; More sophisticated tests if available	Individuals with confirmed pre-diabetes, diabetes, or CMD	Annual testing and ongoing management, if needed
Lipid Disorders	At a minimum: a test for fasting HDL-C (good cholesterol) and fasting Triglycerides (blood fats). The fasting lipid panel is preferred	At discharge from rehabilitation	Annual testing if the risk is known; At a minimum of three-year intervals, if normal
Hypertension	Blood pressure (BP)	At discharge from rehabilitation	Measured at every visit, at least annually

The following table shows the recommended schedule for lifestyle checks on *nutrition* and *exercise*:

RECOMMENDED SCHEDULE FOR LIFESTYLE CHECKS

RISK TO BE TESTED	TEST	FIRST CHECK	FOLLOW-UP
Nutrition	Maintain a stable weight throughout the lifespan	Medically supervised nutrition plan beginning in rehabilitation or as soon as possible	Annually, with continuous follow-up throughout the lifespan
Physical Deconditioning	Exercise testing if practical; Incorporate exercise as best possible	Recommendations for therapeutic or recreational activity by the time of rehabilitation discharge	Annually, with continuous follow-up throughout the lifespan

A Final Message

This Guide provides you with a roadmap for maintaining lifelong health. While sometimes focusing on medical tests, exercise, and nutrition, you will hopefully feel that there is a benefit for this information in improving your quality of life and freedom from CMD and related health challenges.

Some people reading this Guide will be newly injured, and others may be many years into their lives while living with paralysis. Everyone can benefit from this information, as can your family, loved ones, and caregivers.



Appendix A: Selected Resources for Exercise and Recreation after SCI



Model Systems Knowledge Translation Center: Exercise and Fitness after SCI
<https://msktc.org/sci-topics/exercise-fitness-after-sci>

Exercise Recommendations and Considerations for Persons With Spinal Cord Injury
[https://www.archives-pmr.org/article/S0003-9993\(15\)00118-5/pdf](https://www.archives-pmr.org/article/S0003-9993(15)00118-5/pdf)

Evidence-based scientific exercise guidelines for adults with spinal cord injury: an update and a new guideline
<https://pubmed.ncbi.nlm.nih.gov/29070812/>

The Miami Project Healthy Lifestyle Page: Home Fitness Guide
<https://www.themiamiproject.org/participant/healthy-lifestyle/>

Appendix B: Selected Resources for Nutrition Planning after SCI

Nutrition and Spinal Cord Injury: U.S. Veterans Administration
<https://www.nutrition.va.gov/docs/UpdatedPatientEd/NutritionandSCI01-15.pdf>

The U.S. Centers for Disease Control: The Diabetes Prevention Program
<https://www.cdc.gov/diabetes/prevention/index.html>

Mediterranean Diet 101: A Meal Plan and Beginner's Guide
<https://www.healthline.com/nutrition/mediterranean-diet-meal-plan>

National Heart, Lung, and Blood Institute: Your Guide To Lowering Your Blood Pressure With DASH
https://www.nhlbi.nih.gov/files/docs/public/heart/dash_brief.pdf

Nutrition Health Considerations for Persons with Spinal Cord Injuries
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5562027/>

A Primary Care Provider's Guide to Diet and Nutrition After Spinal Cord Injury
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7640911/>

This Guide uses some technical terms and abbreviations. The terms and abbreviations appear in the following glossary:

Abbreviations, Key Words, and Technical Definitions



AHA: the American Heart Association, an organization of physicians and scientists that sets heart and circulatory disease treatment and prevention standards.

Bariatric Procedures: surgical procedures that restrict the amount of food your stomach can hold or the nutrients absorbed from your food.

BF: body fat

Body Mass Index (BMI): a relationship between your height and weight. A BMI measurement can suggest whether you have the correct weight for your height. After an SCI, a BMI greater than 22 kilograms (weight) per meter of your body length (height) squared (kg/m^2) represents an excessive body weight.

BP: blood pressure

Carbohydrates: A nutrient in food, also known as "sugars" or "starches."

Simple Sugars like glucose are easy for your body to digest, taste sweet, quickly raise your blood sugar, and cause a "crashing feeling" after your body uses them.

Complex Sugars like starches, taste less sweet, take longer for your body to break down to simple sugars, and don't raise your blood sugar as quickly as simple sugars. They also make you feel "full" for longer than simple sugars.

Cardiometabolic Disease (CMD): Health risks that combine and promote blood vessel disease, heart attack, stroke, and diabetes.

Cardiovascular Disease (CVD): narrowed or blocked blood vessels resulting in "heart attack," chest pain when undergoing exertion, or stroke.

CMD Risk Components: five health hazards that make up the CMD. These risks include overweight and obesity, insulin resistance (similar to diabetes), high blood pressure, and harmful levels of blood fats. Unhealthy levels of blood fats have low levels of "good" cholesterol (HDL-C) and high levels of blood fats (triglycerides).



DASH Diet: "Dietary Approaches to Stop Hypertension" is an eating plan that lowers blood pressure and body weight. The program recommends that you eat more fruits, vegetables, and low-fat dairy foods and limit foods high in saturated (harmful) fat and cholesterol. The plan encourages the intake of whole-grain foods, fish, poultry, and nuts; and restricts salt, simple sugars, sugar-containing drinks, and red meats.

Diabetes (Db)/Pre-Diabetes: diseases in which the body cannot produce adequate insulin or produces ineffective insulin to lower your blood sugar. These diseases lead to elevated levels of 'sugar' in blood and urine and a higher risk for heart and blood vessel disease. They are the leading causes of blindness, kidney disease, burning limb pain, and limb amputation.

Pre-diabetes is a slightly elevated blood sugar level but still predicts a high risk for ultimately having Type-2 diabetes.

Type-2 Diabetes is when your body cells are less responsive to insulin, causing high sugar levels in the blood and urine. It is commonly seen in overweight people and can also cause inflammation that damages the blood vessels. Exercise, nutrition, and medications treat the condition.

Type-1 Diabetes is when your pancreas stops releasing insulin, and the blood has high sugar levels. Daily insulin injections or an insulin pump, plus exercise and nutrition, treat the condition.

Diastolic blood pressure (DBP): the lower value of the blood pressure measurement.

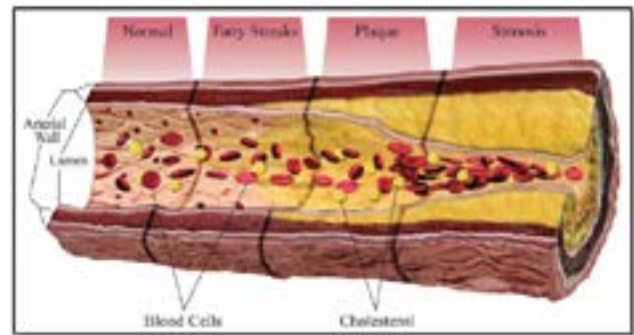
Dyslipidemia: a term that describes abnormal levels of blood fats. When used to describe CMD risks, "abnormal" describes low blood levels of high-density (good) cholesterol and high blood triglycerides.

Fasting Blood Glucose (FBG): A clinical test that measures sugar (glucose) in the blood following an overnight fast. Fasting blood levels are then defined as normal, pre-diabetes, or diabetes.

Glycated Hemoglobin (HbA1c or A1C): a clinical test that determines average blood sugar levels over 3-4 months. Levels above 6.5 - 7% reflect poor blood sugar control and a higher risk for blindness, diabetic kidney disease, limb pain, and amputation. It sometimes substitutes for a test of fasting blood sugar testing.

High-Density Lipoprotein (HDL) Cholesterol: The "good cholesterol" that removes fat from blood vessel walls. High levels of HDL protect you against heart and blood vessel disease. The low-risk blood levels for HDL-C are greater than 40 mg/dl in men and greater than 50 mg/dL in women.

Figure 4. A cross-sectional view of a blood vessel shows blood flow changes with increased artery disease. The cells and blood are free-flowing on the left and become blocked on the right as disease builds. Eventually, the blockage may lead to a heart attack, a stroke, or sudden death.



Hypertension: a continuous elevation of blood pressure higher than 130/85 mmHg or 140/90 mmHg, depending on your other CMD risks.

Insulin Resistance: a CMD risk in which body cells fail to respond to the hormone insulin, resulting in sustained elevation of blood sugar levels.

Low-Density Lipoprotein Cholesterol (LDL-C): "harmful cholesterol" that leaves fat in the artery walls (Figure 2). High levels of LDL-C pose a risk for heart and blood vessel disease.

Mediterranean Diet: Nutritional plans that are typical in Mediterranean countries. They encourage high consumption of vegetables and olive oil and moderate protein (meat, chicken, and fish). Adopting this diet results in less risk to your heart and blood vessels.
mmHg: units of blood pressure measurement;
millimeters of mercury

Non-Component (Other) CMD Risks: health hazards from not getting enough exercise and poor nutrition. They do not define CMD but are lifestyle changes that reduce other risks.

Obesity: a significant risk of CMD from having too much body fat for your height.

Oral Glucose Tolerance Test (OGTT): A clinical assessment to determine how much and how fast the sugar from a test drink can be removed from your blood. The ability of your body to eliminate sugar from the blood is used to diagnose the clinical states of diabetes or insulin resistance.

Paraplegia: loss of some or all movement and/or sensory function in the body due to spinal cord damage. Arm function is unaffected, but the chest, legs, and body organs may be affected depending on the injury level.

SCI: Spinal Cord Injury or Injuries

Statin Medications: an approved class of medicines your physician prescribes to lower bad cholesterol and blood fats.


Systolic Blood Pressure (SBP): the higher number of the blood pressure reading.

Tetraplegia: loss of some or all movement and/or sensory function in the whole body due to spinal cord damage. The arms, chest, legs, and body organs may be affected depending on the injury.

Thiazide Diuretics: a class of prescription medications used to treat high blood pressure or too much water in your body. They eliminate water from the body in your urine.

Triglycerides (TG): the main form of stored and circulating blood fats in your body. Also, one of the five possible risk factors in diagnosing CMD.

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