

December 2019

How to Lower Risk Factors for other Chronic Disease with Type II Diabetes

A Guide on Reducing the
Predisposing Factors of
Hypertension, Heart Disease,
and Chronic Kidney Disease
with Type II Diabetes

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Section 1: Type II Diabetes

Type II Diabetes is a chronic disease where a person has elevated blood sugar (Harvard Medical School).

In the pancreas, in the body, the cells are not getting enough insulin as needed which leads to insulin resistance (Harvard Medical School). This insulin begins to build up in the blood while the pancreas continues to make more insulin to a point of exhaustion (Harvard Medical School).

If you experience:

- Feeling dizzy, shaking, disorientation, hungry, seizures, and fainting (Harvard Medical School).
- These symptoms can be fatal. It is important to have medical attention if these things happen to you.
- Medication enhances insulin sensitivity and decreases glucose production in the liver are the typical types of treatment (Mayo Clinic).

Source: Arla Foods Ingredients



Type II Diabetes: Are You More Susceptible to Other Diseases?

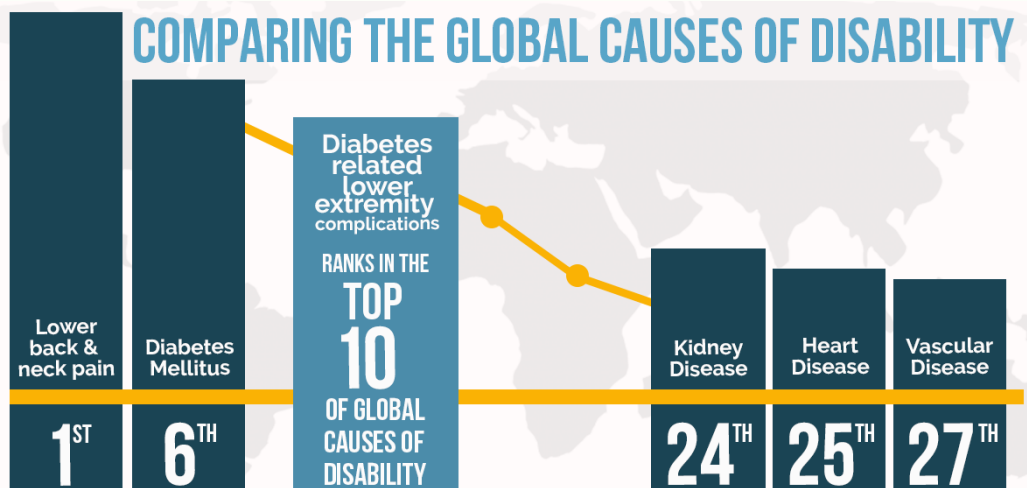
With type II diabetes, the liver and the muscles that usually utilize blood sugar for energy begin to lose their sensitivity to insulin, leading to a rise in more insulin resistance (Mayo Clinic). In addition, the excess blood sugar found in the blood vessels can cause complications, such as severe damage to the eyes, kidneys, nerves. It also increases the risk of heart attack and stroke by two-fold (Mayo Clinic).

Due to hormone fluctuations occurring as a result of this condition, sexual drive in both men and women can be affected. Type II diabetes can lead to reduced testosterone levels in men, often resulting in the inability to maintain an erection, otherwise known as erectile dysfunction (Maiorino, Bellastella, & Esposito, 2014). In women, diabetes can frequently lead to mood changes and elevations in depressive symptoms, painful intercourse, and vaginal dryness (Maiorino et al., 2014).

Eventually, insulin-producing cells can shut down and stop producing the hormone completely (Maiorino et al., 2014). This results in excess glucose spilling into the urine, known as hypoglycemia, and if left untreated, neurological damage and even death may occur (Maiorino et al., 2014).

It is important to identify any symptoms early on to prevent the development and progression of these diseases.

Source: Diabetic Foot Care



Type II Diabetes: Identifying the Susceptible Diseases

The three main diabetes-related susceptible diseases are hypertension, cardiovascular disease, and chronic kidney disease.

1

Hypertension

Hypertension, otherwise known as high blood pressure, is often referred to as the "silent killer", as it is very hard to detect it without medical equipment (Medical News Today, 2019). Hypertension occurs when the body's blood vessels narrow, causing the blood to exert extra pressure against the vessel walls (Medical News Today, 2019). Causing the heart to work overtime can lead to a myriad of complications, including heart attack, stroke, and kidney failure (Medical News Today, 2019).

2

Cardiovascular Disease

Cardiovascular disease, otherwise known as heart disease, generally refers to conditions that involve narrow or blocked blood vessels that increases risk of heart attacks, strokes, and chest pains (Heart, 2016). Cardiovascular diseases are the number one cause of death worldwide; more people die from heart diseases than any other disease (WHO, 2017).

3

Chronic Kidney Disease

Chronic kidney disease is characterized by a gradual loss of function in the kidneys (National Kidney Foundation, 2016). The kidney is used to filter waste and excess fluids and excretes them through the urine (National Kidney Foundation). If kidney functioning levels get worse, waste can build in your blood and make you sick (National Kidney Foundation, 2016).

It is important to note that all three diseases stated above can independently increase the risks of having the other two diseases. (Medical News Today, 2019). For example, hypertension is a major risk factor for both cardiovascular disease and chronic kidney disease (WHO, 2017).

Resources

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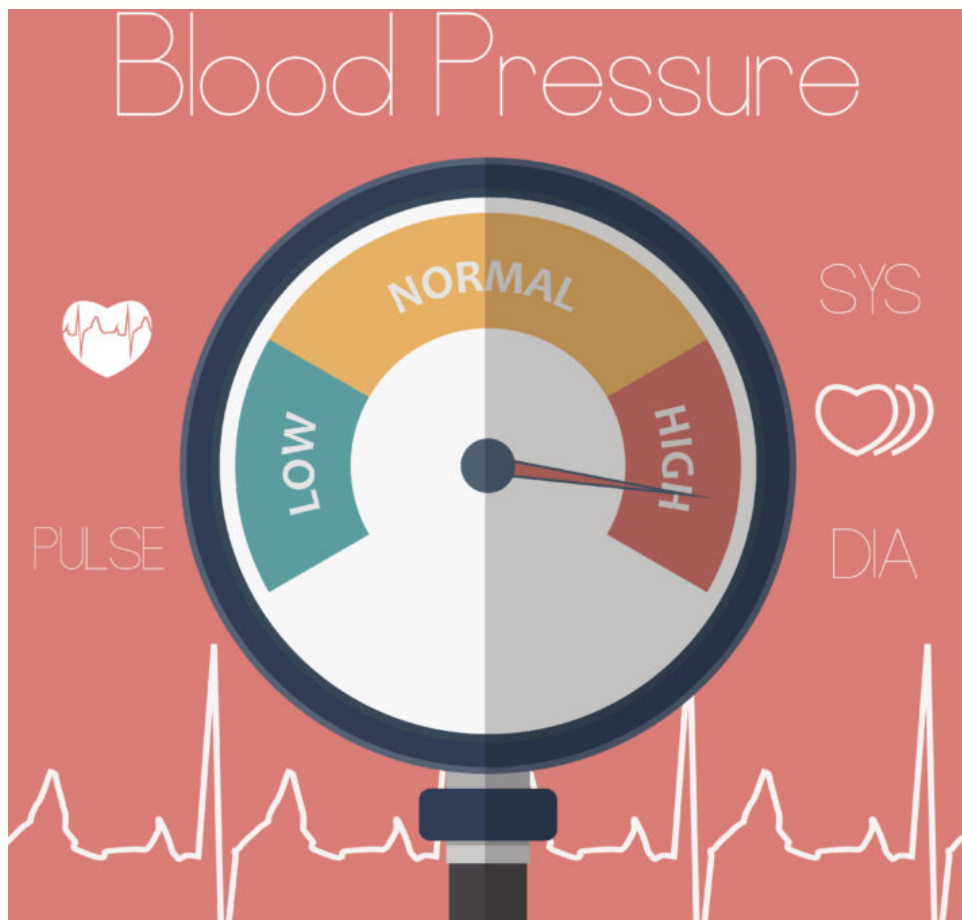
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08

Source: World Kidney Day

Section 2: Hypertension

Type II diabetes is a predisposing factor for hypertension (Healthline, 2018).

The best way to prevent having hypertension is a healthy diet and frequent exercise (Healthline, 2018).

The combination of diabetes and hypertension significantly increases your risk of a heart attack or stroke (Healthline, 2018).

What Are the Risk Factors?

2 in 3 people with diabetes report having hypertension or taking medicine to reduce blood pressure (American Diabetes Association).

There are several risk factors of diabetes-related hypertension to watch out for. Diabetes and hypertension share many common risk factors. There are controllable and uncontrollable factors. It is also important to note that Type II Diabetes itself can cause hypertension (Cheung, 2012).

Controllable risk factors mainly revolve around diet and exercise (Healthline, 2018). A sedentary lifestyle followed by an unhealthy diet are risk factors for developing hypertension (Medical News Today, 2019). An unhealthy diet includes foods that are high in fat and sodium (Healthline, 2018). Obesity can increase the risk of a diabetic to develop hypertension (Healthline, 2018). To reduce the risk of obesity, regular exercise and a healthy diet is necessary.

There are other forms of controllable risk factors that circulate around one's lifestyle. High levels of stress and lack of sleep may result in an increased risk of developing hypertension (Healthline, 2018). Substance use, such as smoking and tobacco, can also further your risk of developing diabetes-related hypertension (Healthline, 2018).

There are also uncontrollable risk factors that contribute to hypertension. Genetic factors, such as family history of hypertension, greatly increases risk of high blood pressure (Medical News Today, 2019). Another factor that is uncontrollable is old age (Healthline, 2018)

Chronic diseases, such as kidney disease, sleep apnea, and especially diabetes can increase your risk of hypertension (Healthline, 2018).

How Does Type II Diabetes Cause Hypertension?

In one study, 58% of patients newly diagnosed with Type II Diabetes already had hypertension (Van Buren, 2011).

The harsh truth is that often times people will develop Type II diabetes and hypertension simultaneously (Van Buren, 2011). Patients with diabetes are resistant to insulin, which can cause complications in sympathetic activity, renal absorption of sodium, or vascular tone (Patient Care, 2010). The most common reason people with diabetes develop hypertension is because diabetes damages arteries and hardens them in a disease known as atherosclerosis (WebMD, 2019). High glucose levels in the blood prevent the blood vessels from stretching

normally and increase fluid in the body (Medical News Today, 2019).

Inversely, hypertension can cause diabetes due to factors such as hyper inflammation, oxidative stress, and insulin resistance (Cheung, 2012).

Obesity has been identified as the most important risk factor for hypertension and diabetes (Cheung, 2012). Studies, however, have shown that obesity is largely determined by genetic predisposition and not controllable factors (Cheung, 2012).

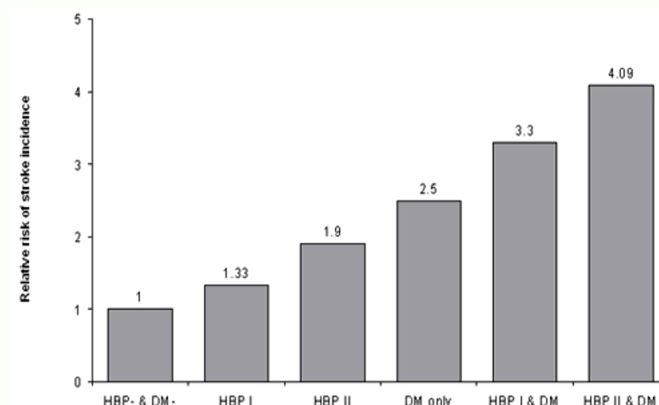
Dangers and Complications of Diabetes-related Hypertension

The combination of Type II diabetes and hypertension can lead to increase in risk of cardiovascular disease, kidney disease, stroke, and other health problems. (Medical News Today, 2019).

Having diabetes and hypertension greatly increases your risk of developing chronic diseases (Medical News Today, 2019). One particular disease of concern is cardiovascular disease, which will be discussed more in the later sections. When hypertension coexists with diabetes, the risk of cardiovascular disease increases by 75% (Govindarajan, 2006). The cause of this may be attributed to the fact that diabetes and cardiovascular disease share common risk factors, like

microalbuminuria, obesity, hypercoagulation, and inflammation (Govindarajan, 2006). Diabetes with hypertension can also lead to decreased kidney function, which ultimately leads to chronic kidney disease (World Kidney Day, 2017).

Recent studies show that although diabetes and hypertension both are independently linked to stroke incidence, these risks are greatly increased in patients with both conditions (Hu, 2006).



Source: Tuomilehto

Preventing Diabetes-related Hypertension

Morbidity and mortality have decreased for people with diabetes since 1990, due to improvements in blood pressure control (de Boer, 2017).

There are a multitude of approaches to preventing hypertension, but the three main ways are controlling and managing, dieting, and exercising.

Preventing: Control and Manage

Because hypertension or pre-hypertension often have no symptoms and are hard to detect, it is imperative that people with diabetes check their blood pressure often (CDC, 2014). If you are dealing with pre-hypertension, a good step to take is to set daily blood pressure goals. A blood pressure of 120/80 is considered normal, while anything above that is considered pre-hypertensive (de Boer, 2017).



Preventing: Diet

Known as the DASH method (Dietary Approaches to Stop Hypertension), this diet encourages people to reduce the overall amount of sodium in their diet and increase foods that are high in potassium, calcium, and magnesium (Mayo Clinic, 2019).

This healthy diet includes:

- food that is low in fat and cholesterol
- dairy products that contains
- fat-free or low-fat milk
- fish and poultry instead of red meat
- food that is rich in nutrients, protein, and fiber



Source: Indianapolis Recorder

Preventing: Exercise

Studies show that consistent aerobic exercise can result in reductions in blood pressure of 5-7 mmHg (ACSM, 2019). These reductions further translate to a 20-30% reduced risk of cardiovascular disease (ACSM, 2019).

The American Heart Association recommends either 150 minutes of moderately intense exercise per week, 75 minutes of vigorous exercise per week, or a combination of both. It is important to remember that the best way to exercise is to just get moving (Heart, 2016). In order to add a consistent exercise routine in your schedule, you must do something you enjoy (Heart, 2016). Some activities that are especially beneficial when done regularly are:

- jogging, running, rowing, swimming, or bicycling
- brisk walking, hiking, or stair-climbing
- fitness classes
- team sports, dance classes, or fitness games



Treatment of Diabetes-related Hypertension

While some people can improve their type 2 diabetes and hypertension with lifestyle changes, most require medication. Depending on their overall health, some people may need more than one medication to help manage their blood pressure (de Boer, 2017). Most high blood pressure medications fall into one of these categories (Healthline, 2019):

- angiotensin-converting enzyme (ACE) inhibitors
- angiotensin II receptor blockers (ARBs)
- beta-blockers
- calcium channel blockers
- diuretics

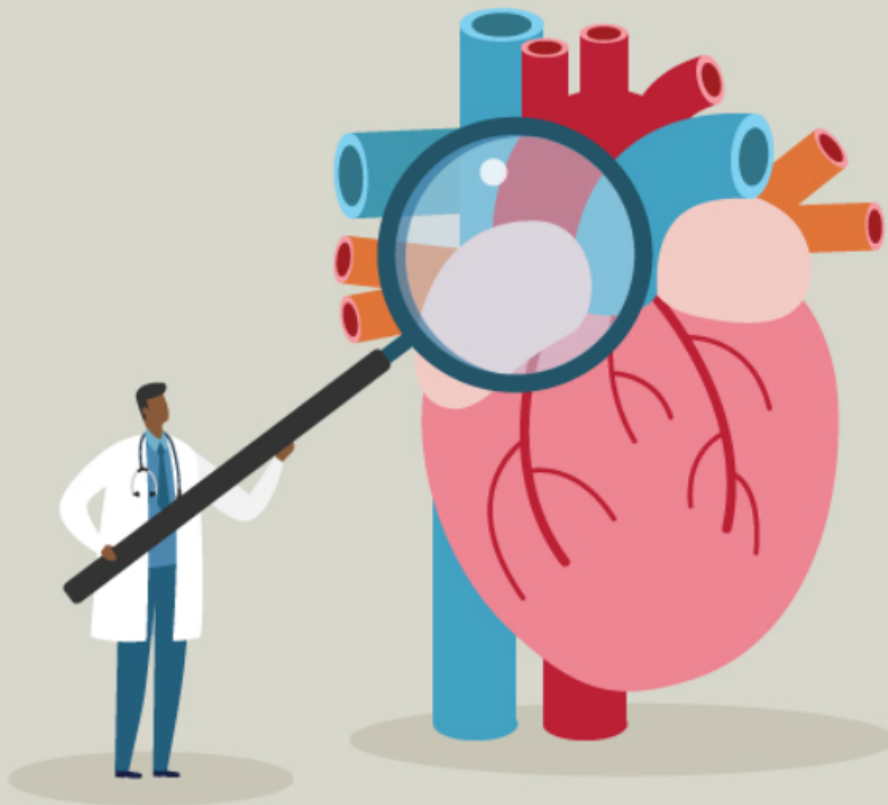


Some medications may cause side effects (Healthline, 2019). Be sure to keep track of how you are feeling when taking specific medications. Make sure to discuss this with your healthcare provider.

It is also important to note that maintaining a healthy diet and consistent exercise are still crucial to treating hypertension (Heart, 2016). Most patients with diabetes and hypertension should be treated to a systolic blood pressure goal of <140 mmHg and a diastolic blood pressure goal of <90 mmHg (de Boer, 2017).

Resources

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Source: Michigan Health

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Section 3:

Cardiovascular Disease

Type II Diabetes is a predisposing factor for Cardiovascular Disease

The best way to prevent Cardiovascular Disease (stroke or heart attack) is to take care of diabetes (National Institute of Health).

Cardiovascular Disease is the leading cause of death for people with Type II Diabetes with a mortality rate of 80% (Abdul-Ghani, DeFronzo, Del Prato, Chilton, Singh, & Ryder, 2017).

How do Cardiovascular Disease and Type II interact:

Type II Diabetes causes high glucose levels in the blood which can lead to damaged blood vessels. These damaged blood vessels are connected to the heart (National Institute of Health, 2017). This relationship can lead to a stroke or other heart diseases. It is important to manage Type II Diabetes because CVD is the most common cause of death for people with and without Type II (Center for Disease Control and Prevention, 2017).

However, there are many ways to manage your risk for Cardiovascular Disease and other chronic diseases with Type II (National Institute of Health, 2017). It is important to see a doctor to check the heart for any signs of heart disease when you have Type II Diabetes as a prevention in addition to maintaining a healthy lifestyle (National Institute of Health, 2017). The purpose of *Section 3* is *give guidelines for people who want to maintain their diabetes and reduce their risk for Cardiovascular Disease.*

Source: Everyday Health



What are the Risk Factors:

People with Type II Diabetes have a higher risk of developing Cardiovascular Disease (Abdul-Ghani, 2017).

There are several different risk factors for developing a Cardiovascular Disease (CVD) with the presence of Type II Diabetes. There are two different types of predisposing factors for people with diabetes which are traditional and nontraditional risk factors. There are Dyslipidaemia, Hypertension, Obesity, physical exercise, Abnormal obesity, and smoking (Martín-Timó, Sevillano-Collantes, Segura-Galindo, & Cañizo-Gómez, 2014). The risk factors for CVD with Type II Diabetes do not act independently and are closely associated with each other (cite).

Dyslipidaemia is an excess of lipids and cholesterol in the body (Martín-Timó et al., 2014). Cholesterol should be tested more at least once a year (American Family Physician, 2016). To lower cholesterol people with Type II should eat unsaturated fats, a higher fiber diet, and physically exercise (American Family Physician, 2016)

Refer to: Section 2 for information about Hypertension.

Obesity and abnormal obesity which are calculated as body mass index, waist circumference and waist to hip ratio are all good indicators of Cardiovascular Disease. Being within a healthy range of these things can reduce your likeliness getting CVD (Martín-Timó et al., 2014).

Physical exercise and smoking are behaviors that predispose people with diabetes to CVD (Martín-Timó et al., 2014). It is important to ensure you are exercising appropriately for Type II as well as eliminating smoking if you have an addiction.

The nontraditional risk factors are from special circumstances that should be monitored by a doctor. They include insulin resistance syndrome or metabolic syndrome, Inflammation, Microalbuminuria, and Hyperhomocysteinemia (Fonseca, Desouza, Asnani, & Jialal, 2004).

What to Eat:

Ways to prevent the onset of Cardiovascular Disease

There are many different types of food that can benefit both Type II Diabetes and prevent Cardiovascular Disease.

Healthy eating is a key component in prevention.

Things to eat:

1. Foods that are high in fiber: rice, lentils, beans, fruits & vegetables
2. Eat more chicken without the skin and drink skim milk
3. Foods that enhance heart health: fish, avocado, & nuts
4. Use healthier oils when baking and cooking

(National Institute of Health, 2015)

Things not to eat:

1. Do not eat salt with food
2. When cooking, stay away from frying food
3. When you want a treat, order the kids sizes instead of a large.
4. Do not use butter or heavy creams to cook

(National Institute of Health, 2015)



Source: Cosmos Magazine

Fill half your plate with non-starchy vegetables.

Spinach, carrots, lettuce, and other greens.



Fill 1/4 of your plate with your choice of protein.

Grilled chicken, fish, lean beef, or pork.

Fill 1/4 of your plate with starchy foods.

Whole grain bread, rice, or pasta.

Source: Everyday Health

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How to Create a Healthy Dinner:

Finding healthy foods that also taste good can feel difficult, but it is not impossible.

There are many different healthy recipes that can fit many different genres of food. For each meal, people with Type II Diabetes should fill half their plate with vegetables, a quarter of the plate with a protein, and another quarter of the plate with a light carb (American Heart Association, 2015a). Drinking water instead of sugar beverages is an easy way to cut out sugar which can increase your risk of cardiovascular disease (Mayo Clinic, 2019). The American Diabetes Association and American Heart Association created a cookbook for people with Diabetes Type II and the recipes inside are compatible for people who are at risk for Cardiovascular Disease.

SECTION 3

Dinner: Sirloin and Broccoli Stir-Fry

What are the Ingredients?

- 1 Tbsp. cornstarch
- 1 Tbsp. soy sauce (lowest sodium available)
- 1 tsp. grated, peeled ginger root
- 1 medium garlic clove (minced)
- 1 lb. boneless steak, all visible fat discarded, cut crosswise into 1/4-inch strips, longer strips halved crosswise
- 1 cup uncooked instant brown rice
- 1 cup fat-free, lower-sodium beef broth
- 2 Tbsp. hoisin sauce (lowest sodium available)
- 1 tsp. toasted sesame oil
- 1 tsp. canola or corn oil
- 3 oz. broccoli florets, broken into bite-size pieces
- 1 medium yellow summer squash, thinly sliced crosswise,
- 4 medium green onions (thinly sliced),
- 2 oz. red cabbage (shredded)
- 1-2 Tbsp. water, as needed

How do I Make It?

1. Put the cornstarch in a medium bowl. Add the soy sauce, gingerroot, and garlic, whisking to dissolve the cornstarch. Add the beef, turning to coat. Cover and refrigerate for 10 minutes, turning occasionally.
2. Meanwhile, prepare the rice using the package directions, omitting the salt and margarine. Set aside. In a small bowl, whisk together the broth, hoisin sauce, and sesame oil. Set aside.
3. In a large nonstick skillet or wok, heat the canola oil over medium-high heat, swirling to coat the bottom. Cook the beef mixture for 5 minutes, or until the beef is browned on the outside (it may be slightly pink in the center), stirring constantly. Transfer the beef mixture to a large plate.
4. In the same skillet, still over medium-high heat, stir together the remaining ingredients except the water. Cook for 2-3 minutes, or until the vegetables are tender-crisp, stirring constantly. If the mixture becomes too dry, stir in the water.
5. Return the beef mixture to the skillet. Pour in the broth mixture, stirring to combine. Cook for 1-2 minutes, or until the broth mixture thickens, stirring occasionally. Serve the stir-fry over the rice.

Nutrition Facts

Calories	400
Total Fat	9 g
Saturated Fat	2.5 g
Trans Fat	0 g
Polyunsaturated Fat	2 g
Monounsaturated Fat	4 g
Cholesterol	60 mg
Sodium	380 mg
Total Carbohydrate	47 g
Dietary Fiber	4 g
Sugars	4 g
Protein	32 g

Recipe Retrieved from: (American Diabetes Association, & American Heart Association, 2014)

How to Eat Out:

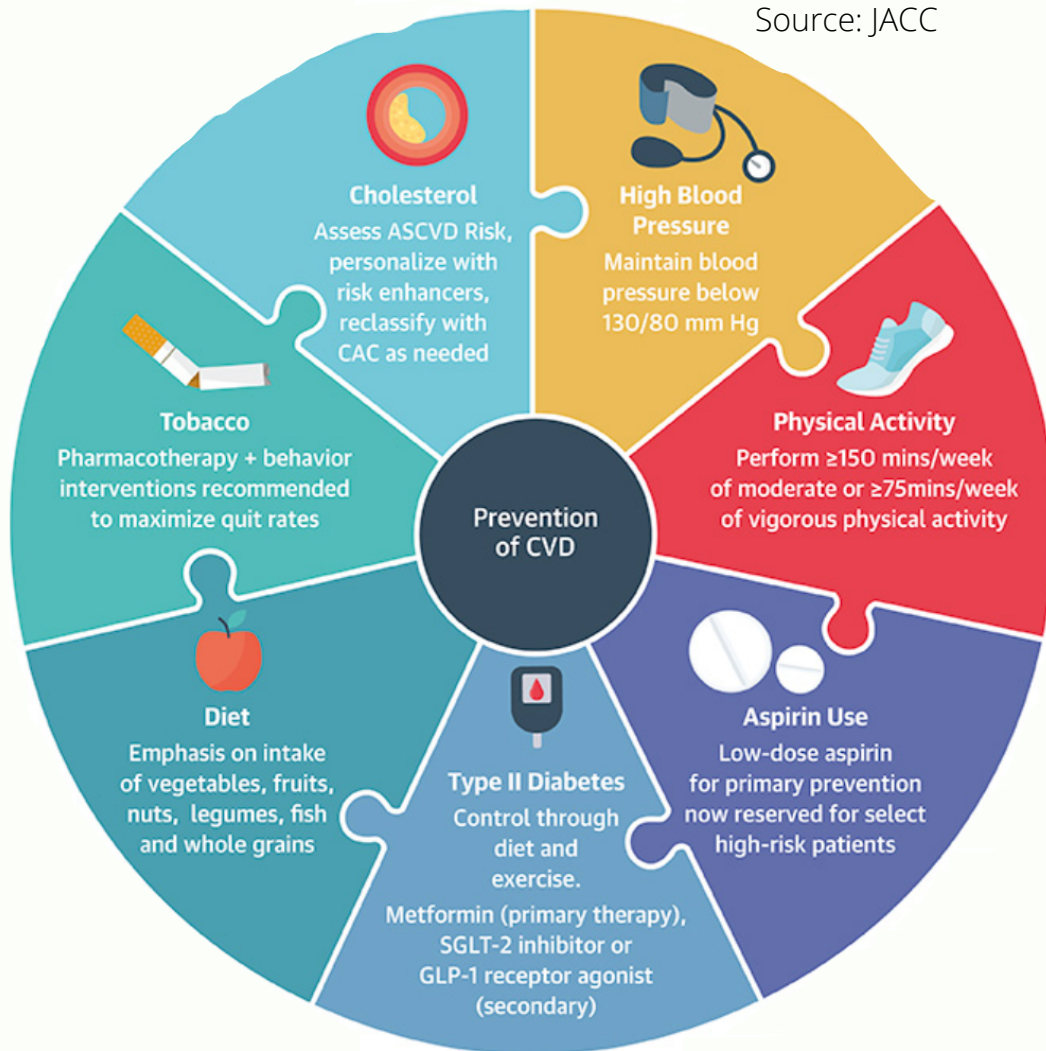
Eating out is not impossible for people with Type II Diabetes who are at risk for Cardiovascular Disease. There are tricks that people can use to eat out and ensure their health is not at stake. A tip from the CDC is to park farther from the restaurant than typical to move around before and after the meal (Center for Disease Control and Prevention, 2017).

Calling ahead and looking online to ensure that there are options like salads, lean proteins, legumes and other high fiber and low fat foods (American Heart Association, 2015a). Look for things on the menu like broiled, steamed, grilled, and roasted (Mayo Clinic, 2019). Instead of ordering an entree for yourself, try a salad and add a protein that best fits your diet and hunger (American Heart Association, 2015a). Use lettuce instead of a bun for turkey or veggie burger and instead of a starch as a side ask for vegetables (My Health Vet, 2019).

How to Snack:

Snacking while maintaining all the other risk factors can seem overwhelming but here are a few options to try. Use measuring utensils to track the food and make sure there are healthy snacks around because it is easier to grab what is in site (American Heart Associations, 2015b).

- Eating an apple with a tablespoon of Peanut Butter (American Heart Associations, 2015a)
- 1 hard boiled egg (American Heart Associations, 2015b)
- 3 cups of unsalted popcorn (American Heart Associations, 2015b)
- 1/4 cup of cottage cheese and 1/2 cup of fruit (American Heart Associations, 2015b)
- 1/2 of a turkey sandwich (American Heart Associations, 2015b)



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What to do:

Exercise, Medication, & Stress Control

Following the exercise schedule below, it provides a sufficient and comprehensive workout for a week. These exercises could also be performed inside or outside of a gym since little resources are necessary. The exercises are 30 minutes in length and of low intensity.

Taking the right medication prescribed by your doctor is necessary in prevention. Aspirin is a primary prevention medication for CVD (Mendy, Vargas, & Zhang, 2017). The treatment is suppose to be in a low dose for men ages 49-79 and women ages 55-79 who have Type II Diabetes (Mendy et al., 2017).

Stress management and no smoking are important to reduce the likeliness of Cardiovascular Disease. Exercise, meditation, and positivity can help someone reduce their stress (Harvard Medical School 2013).

Smoking is not only bad for increasing a person's probability of getting Cardiovascular Disease, but it has tremendous affects on all other diseases (Center for Disease Control, 2014). It is not easy to quit smoking; however, the health benefits increase exponentially. For example, if a person quits smoking, after five years, they have the same chance of having a stroke as someone who has never smoked (Center for Disease Control, 2014).

7 Day Exercise Plan

Colberg et al., 2010

1

WALKING FOR 30
MINUTES DURING
YOUR LUNCH
BREAK

2

RUN FOR 20
MINUTES IN A
GYM OR OUTSIDE
AND STRETCH
FOR 15 MINUTES

3

PRACTICE YOGA
AFTER OR
BEFORE WORK
FOR 30 MINUTES

4

USE HOUSEHOLD
EQUIPMENT TO
LIFT WEIGHTS
AND STRETCH
FOR 30 MINUTES

5

SPRINT/ WALK
FOR 2 MINUTES
INTERVALS FOR
20 MINUTES
THEN STRETCH
FOR 10

6

HAVE A TALK OR
BUSINESS
CONFERENCE ON
A WALK FOR 30
MINUTES

7

10 MINUTES OF
RESISTANCE
TRAINING WITH
A BAND
10 MINUTES OF
LIFTING WAITS
AND 10 MINUTES
OF STRETCHING

How to Quit Smoking:

Smoking and Type II Diabetes narrow the blood vessels in the heart increasing the risk for Cardiovascular Disease (National Institute of Health, 2017)

People who stop smoking increase their health status by eliminating co-occurring diseases. Smoking will also help with cholesterol levels, blood pressure, blood glucose, and circulation (National Institute of Health, 2017). Below are methods from the American Cancer Society on ways to quit.

Medication and Counseling

The use of nicotine gum, the patches, and lozenges are been proven to be useful to quit. The use of support groups, doctor visits and family companionship along with medication has been proven most effective.

Reduction to Elimination

Stopping Cold turkey works for some people and not others. Consider eliminating your cigarette usage by a quarter every week until you stop. This will reduce withdrawal and re-lapse.

Smart Phones

There are apps on smart phones that help reduce smoking. The National Cancer Institute's app helps track goals and set up reminders. It even provides support and advice from others about quitting.

(American Cancer Society, 2019)

Where to Start:

Athens Clarke County Resources

Endocrine Specialists of Athens

Endocrinologist
2470 Daniells Bridge Rd, Athens, GA 30606
(706) 389-3180

Endocrinology, Diabetes & Metabolism and Internal Medicine

Endocrinologist
1077 Baxter St Ste K Athens, GA 30606
(706) 613-0313

Athens Nurses Clinic

Prevention Care
240 North Ave, Athens, GA 30601
(706) 613-6976

Athens Heart Center

Cardiologist
2005 Prince Ave, Athens, GA 30606
(706) 208-9700

Crunch Fitness

Gym (10 Dollars a Month)
196 Alps Rd, Athens, GA 30606
(706) 850-9900

Athens Health & Fitness

Gym (20 Dollars a Month)
2361 W Broad St, Ste 2
(706) 369-3111

Planet Fitness

Gym (10 Dollars a Month)
3658 Atlanta Hwy, Ste O Athens, GA 30606
(706) 549-4000

Piedmont Heart of Athens

Cardiologist
Medical Services, 242 King Ave Building,
2nd Floor, Athens, GA 30606
(706) 475-1700

Resources:

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Type II Diabetes: Chronic Kidney Disease Risk Factors:

Chronic Kidney Disease (CKD) is a condition in which an individual will experience a gradual loss of kidney function over time.

When our kidneys fail, waste builds up and our kidneys fail to filter the waste out properly (Maiorino, Bellastella, & Esposito, 2014). These can lead to a variety of issues, prominently malnutrition, due to an absence of proteins circulating throughout the blood, and increased high blood pressure, due to a large volume of blood being collected and pushed throughout the blood vessels (Maiorino et al., 2014).

Risk factors for developing CKD for diabetic patients include:

- 45 years or old
- Family history of diabetes
- African American, Alaska Native, American Indian, Asian American, Hispanic/Latino, Native Hawaiian, or Pacific Islander
- High blood pressure
- Low level of HDL ("good")
- Cholesterol, or a high level of triglycerides
- History of gestational
- Diabetes or gave birth to a baby weighing 9 pounds or more
- Not physically active
- History of heart disease or
- Stroke
- Depression
- Polycystic ovary syndrome
- Acanthosis nigricans—dark, hick, and velvety skin around your neck or armpits (Maiorino et al., 2014))

How to Prevent and/or Treat CKD and Type II Diabetes:

Cut Sugar and Refined Carbs From Your Diet

Eating sugary foods and refined carbs can put individuals at more risk of developing type II diabetes. In those who are at risk of pre-diabetes and type II diabetes, the body's cells are resistant to insulin's action, so sugar remains high in the blood (Fioretto, Del Prato, Buse, Goldenberg, Giorgino, Reyner, Langkilde, Sjöström, & Sartipy, 2018). To compensate, the pancreas produces more insulin, attempting to bring blood sugar down to a healthy level (Fioretto et al., 2018). Over time, this can lead to progressively higher blood sugar and insulin levels, until the condition eventually turns into type II diabetes (Fioretto et al., 2018). Many studies have shown a link between the frequent consumption of sugar or refined carbs and the risk of diabetes. By cutting foods high in refined carbs and sugar, high blood sugar and insulin levels may reduce over time (Fioretto et al., 2018). Avoiding these foods may help reduce one's risk in developing type II diabetes.

Maintain a Workout Regimen (And Follow It!)

Exercise increases the insulin recognition and sensitivity within the body's cells (Mayo Clinic). So, when you exercise, less insulin is required to keep your blood sugar levels under control.

By performing more aerobic exercise, high-intensity interval training and strength training, people see to work out more frequently, which may lead to overall improvement in insulin response and bodily function.

One study in people at risk of diabetes found that burning more than 2,000 calories a week can simply lead to a significant improvement in health, while another discovered that moderate-intensity exercise increased insulin sensitivity by 51% and high-intensity exercise increased it by 85%.

Substitute Water In Place of Sweetened, Sugary Beverages

Drinking water in place of other beverages may help to control blood sugar and insulin levels. This occurs because sugary beverages like sodas, juices, coffees, and energy drinks have been linked to an increased risk of type II diabetes and other autoimmune diseases (Merker & Kleophas, 2018).

One study showed that overweight and obese adults who replaced sodas with water, and followed a weight loss program, experienced a decrease in insulin resistance and lower fasting blood sugar levels (Merker & Kleophas, 2018).

Quit Smoking

Smoking is strongly linked to the risk of diabetes, as blood toxins due not get properly filtered out by the kidneys (Fioretto et al., 2018). Reducing the quantity of smoking and even quitting to smoke has been shown to reduce this risk over time. In a meta-analysis, several studies sampling a total over one million people as a population, smoking was found to increase the risk of diabetes by 44% in average smokers and 61% in people who smoked more than 20 cigarettes daily (Fioretto et al., 2018).

Achieve High Levels of Vitamin D

Vitamin D is important for blood sugar control, as it is largely known to increase insulin sensitivity throughout the body. Studies have found that people who receive little vitamin D, or whose blood levels are too low, have a greater risk of all types of diabetes (Low, Lim, Wang, Yeoh, Liu, Lim, Shao, Chui, Fun, Chua, Subramaniam, & Sum, 2018). Most health organizations recommend maintaining a vitamin D blood level of at least 30 ng/ml (75 nmol/l). Another study found that people with the highest blood levels of vitamin D were 43% less likely to develop type 2 diabetes than those with the lowest blood levels (Low et al., 2018).

Medical Procedures

For patients that have CKD in conjunction with diabetes, they may need to undergo more intensive procedures, as their kidneys cannot solely rely on self-management techniques to improve kidney function (Merker & Kleophas, 2018). This involves the usage of long-term medical procedures, such as:

Peritoneal dialysis is an at home-based therapy that uses the natural lining of the abdomen as a filter to clean the blood when the kidneys can no longer do so (Merker & Kleophas, 2018). Hemofiltration the process in which a machine filters the kidneys outside the body to clean the blood when the kidneys are injured. Dialysis is the process in using a machine to clean the blood when the kidneys can no longer do so (Merker & Kleophas, 2018).

Medical Supplements

This summary of medical tablets and supplements aid in alleviation of CKD and diabetes. Always consult with your doctor before you take any of these tablets.

Anti-hypertensives, or blood pressure tablets, work to lower your blood pressure. This is because prolonged high blood pressure can damage your blood vessels, heart and kidneys (Balkau, Metzger, Andreelli, Frimat, Speyer, Combe, Laville, Jacquelinet, Briançon, Ayav, Massy, Pisoni, Stengel, & Fouque, 2019).

Diuretics, or water tablets, encourage your kidneys to produce more urine (Balkau et al., 2019). This makes you need to use the restroom more. The most common diuretic is Furosemide (Balkau et al., 2019). Diuretics allow the kidneys to match the healthy kidneys to produce the right amount of urine to match the fluid you take into your body when you eat and drink (Balkau et al., 2019). When taking diuretics, it is important not to drink too much fluid because the medication will be less effective and you will need to take higher doses (Balkau et al., 2019).

Erythropoietin (EPO) is a hormone which is produced by healthy kidneys (Balkau et al., 2019). EPO stimulates the bone marrow to make red blood cells and prevent the individual from becoming anemic or have a decreased amount of red blood cells throughout the body (Balkau et al., 2019). When the kidneys are impaired, not enough EPO and you may then feel tired, weak, cold and generally unwell (Balkau et al., 2019).

Vitamin D helps control calcium in your body and protects your bones (Balkau et al., 2019). It also increases insulin sensitivity throughout the body's cells. Alfacalcidol may be the medication prescribed (Balkau et al., 2019).

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