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### Diabetes Mellitus

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# Diabetes Mellitus

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## Introduction

Diabetes Mellitus is becoming a worldwide pandemic and the two most devastating types are type 1 and type 2. Type 1 diabetes is a dysfunction of the pancreas that an individual is usually born with and affects about 10 percent of the diabetic population. Type 2 diabetes is a product of obesity and age that affect the body's sensitivity to insulin, not a problem with its production, and affects the remaining 90 percent of the diabetic population (Chesworth, 2019). The hyperglycemia that comes with the decreased production of insulin or sensitivity to it can lead to a whole assortment of complications if not taken care of. Living in a constant state of hyperglycemia (if the individual is not controlling their diabetes) is incredibly hard on the body's cardiovascular and nervous systems especially.

## Signs and Symptoms

The signs and symptoms of diabetes are the same regardless of the type of diabetes. The onset of the symptoms usually happen a little earlier in life for type 1 diabetics compared to type 2 diabetics. The symptoms may be similar in both types but the rate of the onset of these symptoms varies depending on the age of the person inflicted. In younger persons with type 1 diabetes, the onset of symptoms is more rapid over a few days or weeks to the point where that person will become very ill if not treated (Mayo, 2016, p. 58-59). For adults with type 2 diabetes it is a much slower onset and many of the symptoms can be thought to be brought on by other factors of life, for example feeling tired could be related to a long day's work (Mayo, 2016, p. 58-59).

The following are the signs and symptoms of diabetes mellitus and rationale for why these happen to people with diabetes:

- Polyuria or excessive urination
  - The kidneys attempt to excrete excess glucose and restore blood glucose levels to normal (Mayo, 2016).
- Polydipsia or excessive thirst
  - As the kidneys excrete glucose, large amounts of water are lost from the body causing dehydration and the person to become extremely thirsty (Mayo, 2016).
- Glycosuria or glucose in the urine
  - Depending on the person's renal threshold, glucose may be excreted in the urine (Mayo, 2016).
- Weight loss or tiredness or lethargy
  - Glucose cannot be used as energy because of the shortage or resistance to insulin. In the absence of insulin the liver metabolizes fatty acids to use as fuel and this causes weight loss (Mayo, 2016).
- Ketonuria or "pear drop breath"
  - Excessive breakdown of fatty acids produces ketones which cause acidosis. The renal and respiratory systems attempt to excrete ketones which can be detected in the urine and a person's breath (Mayo, 2016).
- Blurred vision
  - As blood glucose levels increase, the osmotic pressure in the eye changes which changes the shape of the lens (Mayo, 2016).
- Skin infection and genital soreness
  - Bacteria thrive on excessive amounts of glucose in the body and urine (Mayo, 2016).

While the symptoms of both types of diabetes may be the same, the ability of a person to prevent each type differs. Type 1 diabetes is not a preventable disease, it is a dysfunction of the pancreas that cannot be reversed, it is only treated with close glucose control using exogenous insulin. Type 2 diabetes, however, is preventable with good lifestyle choices. The increase in a person's weight increases their resistance to insulin and the loss of pancreatic function (Brannick & Dagogo-Jack, 2018). Some people become type 2 diabetics as a product of age, and this cannot be prevented either.

## Underlying Pathophysiology

### Type 1 Diabetes

Type 1 diabetes is a combination of environmental factors and genetic susceptibility. When a younger person is experiencing rapid growth which causes an increase in insulin demand and that person is genetically susceptible, an autoimmune response is triggered that destroys the B-cells of the pancreas (Chesworth, 2019). The genetic role in type 1 diabetes has a lot to do with the autoimmunity factor. There are many genes that will make a person's cells destroy other normal cells within their body, including B-cells in the pancreas (Skylar, et al, 2017, p. 243). These B-cells are responsible for insulin production (Mayo, 2016, p. 56). Without the ability to produce insulin, a type 1 diabetic is required to replace their body's insulin with exogenous insulin via an insulin pump or by injecting themselves subcutaneously. This requires keeping a close eye on their blood sugar and diet to attempt to not be in a hyperglycemic state.

### Type 2 Diabetes

Type 2 Diabetes is the product of lifestyle choices that will have a similar affect as type 1 diabetes on B-cells in the pancreas. Obesity, mainly excessive fat to the abdomen, is a leading contributor to type 2 diabetes. This central fat is metabolically active and impairs the action of the body's insulin, therefore causing hyperglycemia (Mayo, 2016, p. 56). Inflammatory cytokines released from excessive lipocytes impairs the action of insulin on insulin receptors. With the body in a hyperglycemic state, an increase in insulin production to combat this state causes the B-cells to release chemokines that result in their self-destruction (Levy, 2019, p. 46). Type 2 diabetes is very preventable and can also be reversed with weight management by decreased caloric intake and increased physical activity.

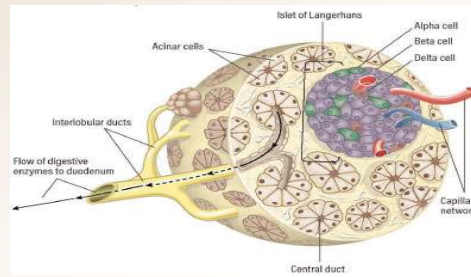


Figure 2. Cross-section of the pancreas (Mayo, 2016)

## Significance of Pathophysiology

Both types of diabetes and their pathophysiology can create a whole host of complications and be tightly linked to other diseases. The state that a diabetic person's body is in most of the time especially if they do not control their diabetes, will make them more susceptible to infection and illness and make it more difficult to get over these infections or illnesses.

Cardiovascular disease and diabetes are closely linked, so much so that hyperglycemia predicts the risk of developing heart failure, and many people with diabetes have heart failure which worsens their prognosis (Packer, 2017, p. 1549). Both disorders are characterized by a decreased sensitivity to insulin and heart failure can cause glucose intolerance by inhibiting the utilization of metabolic fuels peripherally (Packer, 2017, p. 1549).

Gender differences in the prevalence of diabetes, mainly type 2, are important factors when looking at the pathophysiology of a disease. While men and women are very different in a lot of ways, the prevalence of diabetes is not terribly different. Men tend to have more centrally located fat which, as discussed earlier, is a large contributor to type 2 diabetes, but both men and women with a similar degree of insulin resistance show comparable centrally distributed fat (Kautzky-Willer, Harreiter, & Pacini, 2016, p. 2811).

## Implications for Nursing Care

With how prevalent diabetes is now a days, it is important for nurses to understand the disease and how it can affect a person's body long term. Understanding this will motivate them to educate the population they treat and help prevent people from getting type 2 diabetes and help type 1 diabetics keep their disease under control, so they have less complications.

While bedside nurses at the hospital only have so much interaction with the same patient, advanced practice registered nurses (APRNs) working in a doctor's office could have more access to these patients and be able to have more of an impact. Really understanding the pathophysiology of both types of diabetes and knowing the signs and symptoms will help to diagnose the disease as early as possible (Mayo, 2016, p. 60).

Complications from uncontrolled diabetes include:

- Peripheral neuropathy
- Kidney disease
- Retinopathy
- Cardiovascular disease

All these complications can be prevented or greatly decreased by keeping a diabetics blood sugar in a normal range (Skylar, et al, 2017, p. 249). When it comes to type 2 diabetes and obesity, there are cardiovascular diseases that people have because of the obesity, like them having diabetes because of the obesity. Hypertension and hyperlipidemia are two such diseases. Not only will weight control help combat diabetes, it will also help to keep blood pressure and cholesterol in more normal ranges as well (Skylar, et al, 2017, p. 248).

An APRN could make a great deal of difference in a person's life, just by helping them understand how important weight control can be. The amount of medications that they would no longer have to take or pay for would alone improve their quality of life. Not to mention how much better they would feel not being overweight or having the diseases that come along with it.

## Conclusions

Diabetes Mellitus is a terrible disease that affects millions of people worldwide. It affects children, adolescents, men, women, pregnant women, it does not discriminate based on race or religion, it can affect us all. Any APRN working in any setting will face the trials and tribulations of dealing with a patient with diabetes. It is vital that they all know the best way to manage their patient's diabetes during any period of that patient's life. It does not matter if they are sick in the hospital or in the doctor's office for a routine check up, the management of this disease is imperative to their over all health and well being.

## References



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