

## Application to Chronic Diseases

### Diabetes Mellitus ("sweet urine"):

Metabolic disorder characterized by high blood sugar (**glucose**) levels resulting from defects in insulin secretion or action

Two types:

**Type I (juvenile onset)** –  $\beta$ -cells of pancreas are incapable of producing insulin (**need insulin shots**)

**Type II (adult onset)** – Insulin is produced, but cells have become insulin resistant (**resulting in abnormally high blood glucose levels**)

\*lifestyle related

## Application to Chronic Diseases

### Diabetes Mellitus:

Diabetes is the **6<sup>th</sup>** leading cause of death in the U.S. and the leading cause of blindness, kidney failure, and limb amputation

**80% of type II diabetes related to obesity**



## Application to Chronic Diseases

### Diabetes Mellitus:

Figure 20.20

**76% increase in type II diabetes in adults 30-40 since 1990**

Currently **16 million** American afflicted, with number expected to rise to **23 million** by 2025

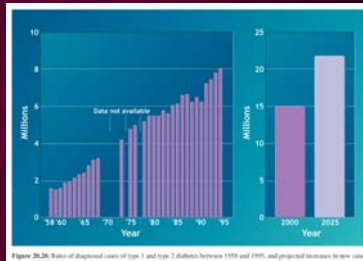


Figure 20.20. Rates of diagnosed cases of type I and type II diabetes between 1980 and 1990, and projected increases between 2000 and 2025. Data not available for 1980-1989. Source: U.S. Department of Health and Human Services, National Center for Diabetes Prevention and Control.

## Application to Chronic Diseases

### Diabetes Mellitus:

**In children:**

**1 out of 4 children show signs of type II diabetes**

**Disease has more than tripled in the past 3-5 years**

**4% of diabetes in children was type II in 1990; now it is 20%**

**Of children diagnosed with type II diabetes, 85% are obese**

## Application to Chronic Diseases

### Problems with high blood glucose levels:

Decreased cellular uptake of glucose causes blood sugar (**200-350 mg/dl**) to spill over into urine

Decrease in cellular glucose causes diabetic to rely on fatty acid metabolism (**but cannot metabolize fatty acids completely**)

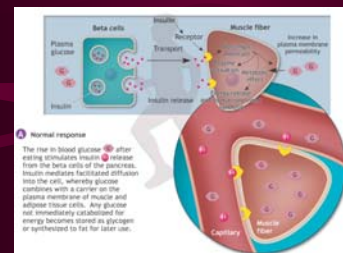
**Ketone bodies (highly acidic)** are result of incomplete fatty acid metabolism and result in cellular acidosis

Over time, decrease in pH can lead to diabetic coma

## Application to Chronic Diseases

### How does Type II diabetes develop?

Figure 20.21

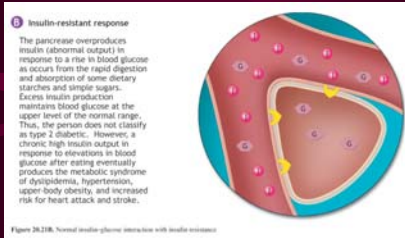


Normal Response

## Application to Chronic Diseases

### How does Type II diabetes develop?

Figure 20.21



**Insulin Resistant**

## Application to Chronic Diseases

### How does Type II diabetes develop?

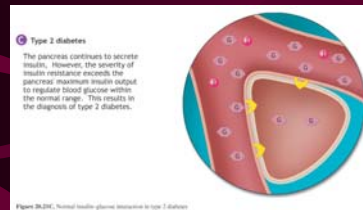


Figure 20.21

**Type II Diabetes**

Diagnosed:

Fasting glucose of 126 mg/dl (**twice**)

Random test shows glucose at 200 mg/dl (**and thirst, frequent urination, fatigue**)

Glucose tolerance test shows glucose at 200 mg/dl at 2 hours

## Application to Chronic Diseases

### How does nutrition impact diabetes mellitus?

Foods with high glycemic index cause insulin "spike", which can result in peripheral tissues becoming insulin resistant (**hyperinsulinemia**)

## Application to Chronic Diseases

### How does nutrition impact diabetes mellitus?

Diet high in fiber may reduce risk for developing type II diabetes:

6 year study of **67,173** women showed that women who ate a low-fiber diet with high glycemic index (**potatoes, white bread**) had 2.5 times the rate of type II diabetes than women who ate more fiber-rich food (**whole grains, fruits, vegetables**)

Because fiber slows carbohydrate digestion it minimizes surges in blood sugar throughout the day

Fewer surges in blood glucose decrease insulin demand and further decrease insulin resistance

## Application to Chronic Diseases

### How does nutrition impact diabetes mellitus?

To reduce risk of type II diabetes, consume more slowly absorbed, unrefined, complex carbohydrates (**with low glycemic index**)

These foods provide "slow-release" carbohydrate without triggering rapid fluctuations in blood sugar