



**Team:** Floriann H. Stankovich, Lissa Bauer, Niyanta Arora, Michael Addis, **Advisors:** Ali Cinar, Emmanuel Opara, Ray Trygstad, Meriyan Eren, Salman Mohiuddin, David Zaboli, Benson Okeiyi, Tina Chiu, Russell Derrick, Jung Kim, Byung Kim, Shailvi Tyagi

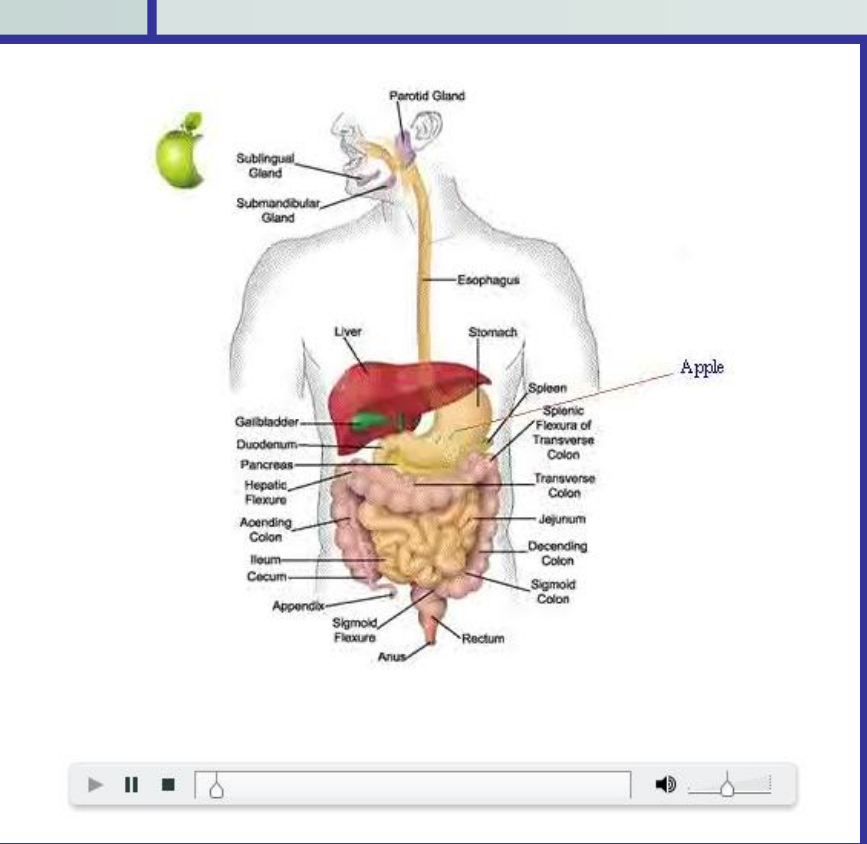
## GlucoSim

A web-based educational simulation package for glucose-insulin interaction in the human body, may be used by healthy and diabetic patients.

- Enhanced the Graphical User Interface of the web-pages
- Provided more functionality to the web-site
- The Glucose-Insulin level simulations were enhanced
- The graphs were separated by individual body parts depicted by click-able regions
- More explanations provided

Before After

Simulation inputs for a person with type 1 diabetes using multiple insulin injections



Added: Information of diabetes (slide show, animation, video clips on interview)

Result Page: Click-able body generates different graphs

## Diabetes

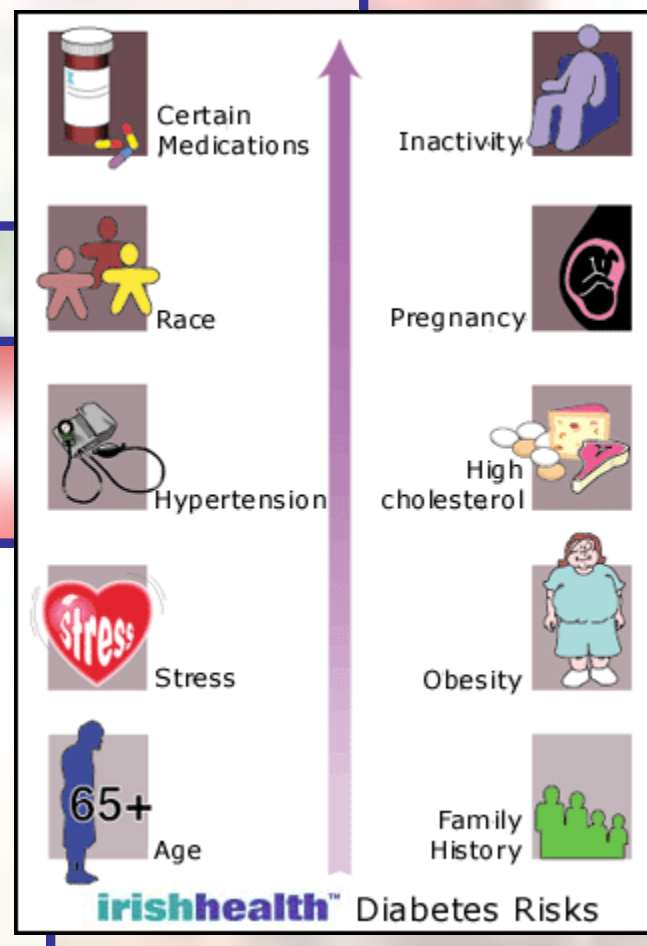
Diabetes is a life-long disease characterized by high levels of blood sugar levels. It is a result of too little insulin, resistance to insulin, or both.

### Types of Diabetes

- Type 1**
- Usually diagnosed in childhood
  - The body makes little or no insulin
  - Daily injections of insulin are required to sustain life.
- Type 2**
- Usually occurs in adulthood
  - The body does not respond properly to insulin, resulting in adequate glucose levels
  - Far more common than type 1
  - Makes up 90% or more of all cases of diabetes
  - Becoming much more common due to:
    - Growing number of older Americans
    - Increasing obesity
    - Failure to exercise
- Gestational diabetes**
- High blood glucose
  - Develops at any time during pregnancy in a person who does not have diabetes.
- Pre-Diabetes**
- Occurs when the blood glucose levels are above average
  - Not high enough to be counted as diabetes
  - Often a precursor to type 2 diabetes

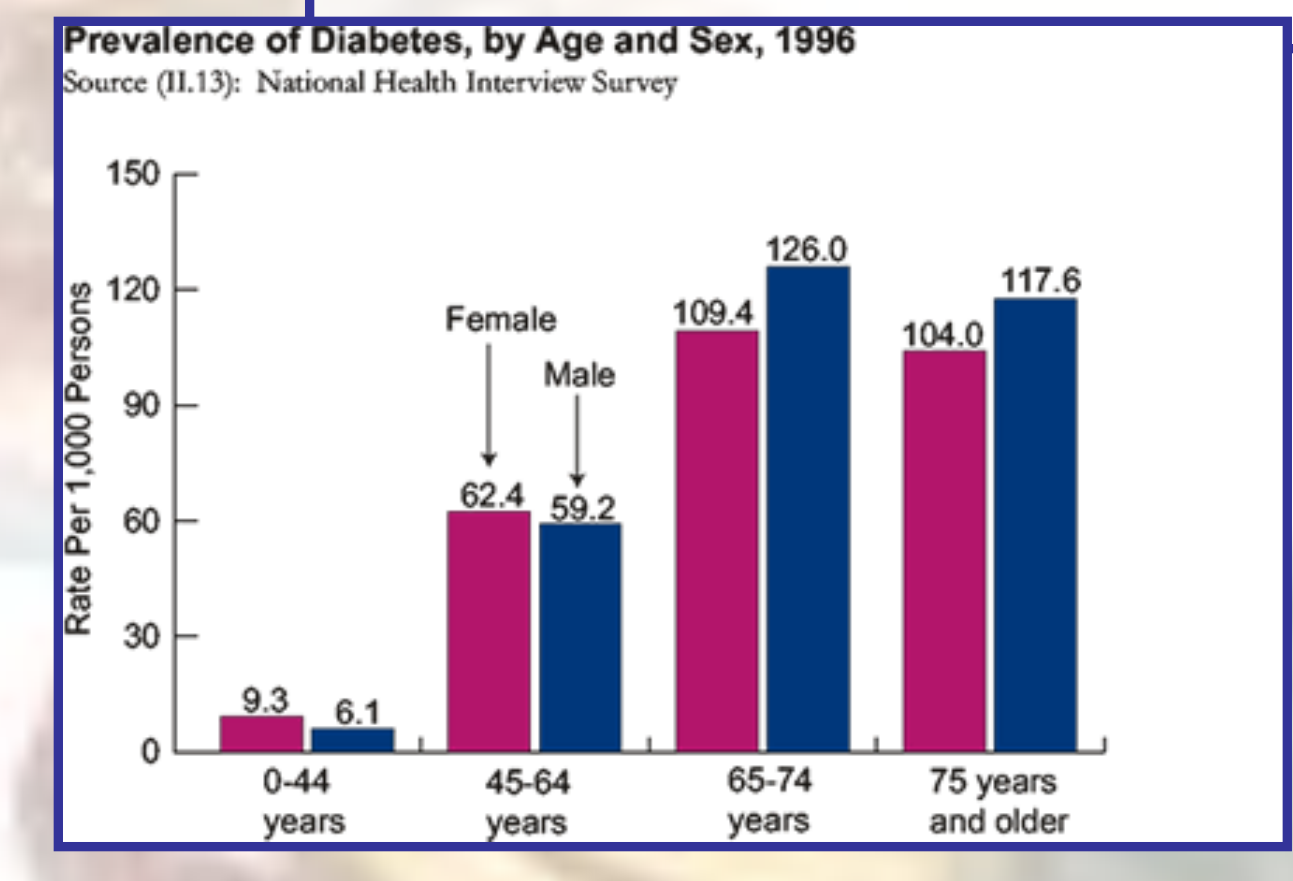
### Who is at Risk?

- Risk factors for diabetes include, but are not limited to:
- Some ethnic groups (particularly African-Americans and Hispanic Americans)
  - High blood pressure
  - Over the age of 65
  - Having little or no exercise
  - Delivering a baby weighing more than 9 pounds
  - High blood cholesterol levels
  - Obesity
  - Having a parent or sibling with diabetes
- The American Diabetes Association recommends that all adults be screened for diabetes at least every three years. A person at high risk should be screened more often.



### Statistics

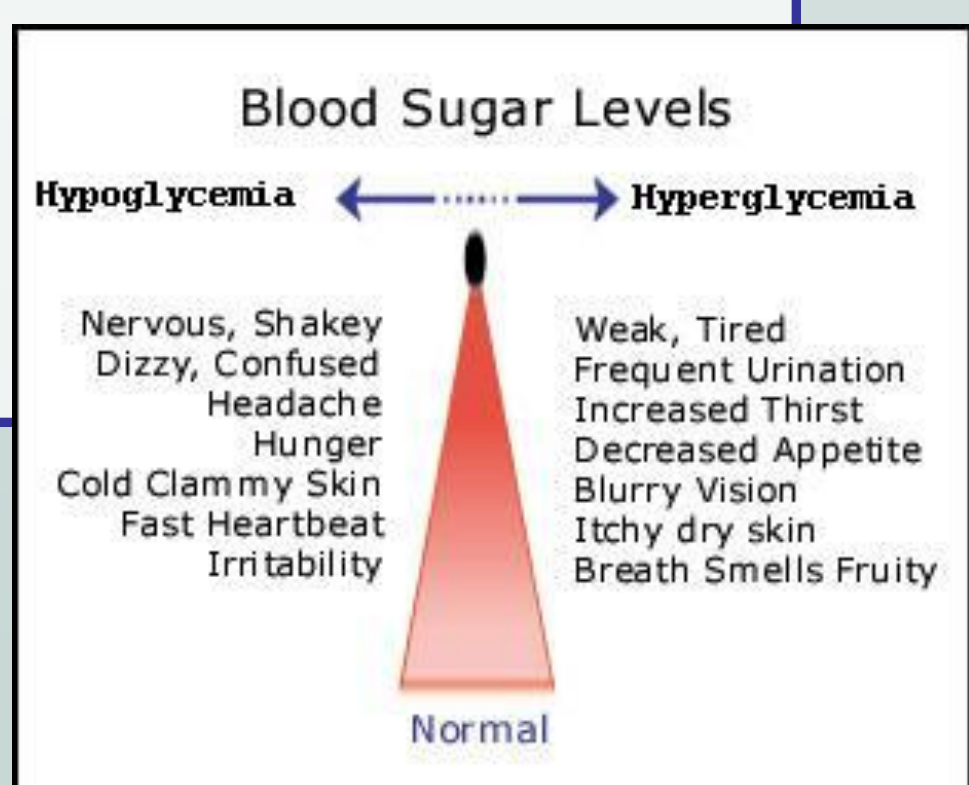
- \*All statistics are from the American Diabetes Association (www.diabetes.org)
- For the USA**
- Total Numbers: 20.8 million people (about 7.0% of the population) have diabetes
    - Diagnosed: 14.6 million people
    - Undiagnosed: 6.2 million
    - Pre-diabetes : 41 million
  - 1 in 3 Americans born in 2000 will develop diabetes in their lifetime
  - Diabetes is the 5th deadliest disease
  - Diabetes is the 6th leading cause of death listed on US death certificates in 2002. However, this number is likely to be underreported



### Complications from Diabetes

- Emergency Complications**
- Hyperglycemia**  
Occurs when the blood sugar levels are too high and when the body has too little insulin. If not treated immediately, coma or death may occur.
- Hypoglycemia**  
Occurs when the blood sugar levels are too low. If hypoglycemia is not treated immediately, serious complications arise. These include confusion, drowsiness, change in behavior, coma, and seizure.
- Long-term Complications and Results**
- Kidney failure
  - Heart disease
  - Limb amputations

Name	Part of Body Affected	May Lead to...
Diabetic retinopathy	Retina and other parts of eye	Loss of sight
Diabetic nephropathy	Kidneys	Kidney failure
Diabetic neuropathy	Nerves	Loss of feeling in toes, legs, hands, and arms
Peripheral vascular disease	Blood vessels	Heart attack and stroke
Hypertension	Heart	Heart disease
Atherosclerosis		



## Meal Planning

A Nutritional software to assist people in planning their meals and instill a tendency to make healthier food choices.

- Enhanced to make it more user-friendly
- Surveyed 30 individuals with diverse backgrounds for feedback on how to improve the Nutritional website
- Sample meals were added to the site to guide the user towards planning his/her healthy meal.
- A body mass index (BMI) was added to help the user assess his/her obesity level.
- Type 1 and type 2 diabetes information pages added
- 1500 entries added of glycemic index values
- Reference document added defining confusing or unknown terms

Profile page: Height was added in order to calculate an individual's BMI along with health type.

Meal Planning Option: some recommended amounts are shown, which flash red when recommended amount is exceeded. And glycemic index values were added to the database.

Nutritional Information Page: Information on how to maintain a healthy balanced diet.