Type 1 Diabetes
(“Juvenile” Diabetes)

What is Type 1 Diabetes?

Type 1 diabetes, also known as juvenile-onset diabetes, is one of the three main forms of diabetes affecting millions of people worldwide. Type 1 diabetes is a chronic condition in which the pancreas produces little or no insulin, a hormone needed to convert sugar (glucose) into energy. Warning signs of type 1 diabetes include extreme thirst, frequent urination, drowsiness or lethargy, increased appetite, sudden weight loss for no apparent reason, sudden vision changes, sugar in urine, fruity odor on breath, heavy or labored breathing, stupor or unconsciousness. These may occur suddenly. People with type 1 diabetes must inject insulin every day to live. Treatment for type 1 diabetes also includes making wise food choices and being physically active. The prevalence of type 1 diabetes is about 5% to 10% of the total number of diabetes patients in the U.S. White non-Hispanic youth in the U.S. have the highest rate of new cases of type 1 diabetes in the world. An estimated 100,300 white youth in the U.S. had type 1 diabetes in 2001, according to data from the national SEARCH study.

Type 1 Diabetes is major cause of disability and death in North Carolina and in the nation. A new European research shows that the overall increase in incidence of type 1 diabetes was 3.9% per year from 1989 to 2003. The increase was greatest among children under the age 5. This study predicts that if present trends continue, the number of cases of type 1 diabetes (prevalence) among children under age 15 years will rise by 70% from 94,000 in 2005, to 160,000 in 2020, and the incidence of type 1 diabetes among very young children will double during that time. Adequate health-care resources are needed to meet these children’s needs. There are no known measures to prevent type 1 diabetes. New research shows that stem cell treatment may be effective in majority of type 1 diabetes patients. However, FDA has not approved this treatment.

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i Prevalence= the total number of cases of a disease in a given population at a specific time

ii The SEARCH for Diabetes in Youth Study, funded by the Centers for Disease Control and Prevention (CDC) and National Institutes of Health (NIH), began in 2000 to describe childhood diabetes among the five major race and ethnic groups in the U.S. to estimate the prevalence and incidence of diabetes in youth and to characterize key risk factors for diabetes complications. Most of the data for this fact sheet came from the SEARCH study.

iii Incidence= the number of newly diagnosed cases during a specific time period
Three main forms of diabetes

<table>
<thead>
<tr>
<th>Type 1 Diabetes</th>
<th>Type 2 Diabetes</th>
<th>Gestational Diabetes (GD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generally develops in children and young people under the age 30</td>
<td>Occurs after the age of 30; now increasingly seen among youth and young adults</td>
<td>Occurs in some pregnant women who never had diabetes before but have high glucose levels during pregnancy</td>
</tr>
<tr>
<td>Type 1 diabetes is controlled with insulin injections</td>
<td>Type 2 diabetes is controlled with diet, exercise, and pills that reduce blood-sugar levels</td>
<td>Although gestational diabetes usually goes away after the baby is born, a woman who has had it is more likely to develop type 2 diabetes later in life</td>
</tr>
<tr>
<td>Comprises about 5% to 10% of all diabetes</td>
<td>Comprises about 90% to 95% of all diabetes</td>
<td>Affects about 4% of all pregnant women — about 135,000 cases of GD in the U.S. each year</td>
</tr>
</tbody>
</table>

A Picture of Type 1 Diabetes

**Overview**

- As many as 3 million Americans may have type 1 diabetes.

- One in ten people with diabetes has type 1 diabetes.

- Type 1 diabetes typically occurs during childhood or adolescence, although it can develop at any age.

- The number of newly diagnosed cases of type 1 diabetes is increasing among youth in the U.S. and worldwide, and the rate of increase is highest among very young children at 5.4% per year.

- White non-Hispanic youth in the U.S. have the highest rate of new cases of type 1 diabetes in the world at 23.6 per 100,000.

- The European research shows that the overall increase in incidence of type 1 diabetes is 3.9% per year.

- The increase was greatest among children under the age 5, who saw increases of 5.4% per year compared to an annual increase of 4.3% among children between the ages of 5 and 9 and 2.9% among children between the ages of 10 and 14.

- The rate of new cases among youth was 19.0 per 100,000 each year for type 1 diabetes in the U.S. from 2002 to 2005.

- Nationwide, about one in every 400 to 600 children and adolescents has type 1 diabetes.

- Annually, 15,000 youth in the U.S. are diagnosed with type 1 diabetes.

- Management of type 1 diabetes, which involves frequent testing of blood sugar levels and injections of insulin, is often very difficult for both children and parents.

- Though being overweight or obese is the main risk factor for developing type 2 diabetes, new research shows that obesity is also linked to increases in type 1 diabetes, especially in younger children.

- People with type 1 diabetes are at high risk for serious complications such as heart disease, kidney disease, eye disease, nerve damage and foot problems. However, they can prevent or slow these problems by keeping their blood glucose levels closer to normal.
Table 1. Estimated incidence of type 1 diabetes among non-Hispanic white children and youth in the U.S., 2002-2005

<table>
<thead>
<tr>
<th>Age group</th>
<th>Incidence of type 1 diabetes</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td>19 per 100,000</td>
</tr>
<tr>
<td>5-9</td>
<td>28 per 100,000</td>
</tr>
<tr>
<td>10-14</td>
<td>33 per 100,000</td>
</tr>
<tr>
<td>15-19</td>
<td>15 per 100,000</td>
</tr>
</tbody>
</table>

Source: The SEARCH for Diabetes in Youth Study, Centers for Disease Control (CDC)

Disparities

- Type 1 diabetes occurs in most racial and ethnic groups, but the risk is highest among white populations.
- The overall prevalence of type 1 diabetes among non-Hispanic white youth under 20 years of age is 2.0 out of every 1,000.
- The prevalence of type 1 among children gradually increases with age. By 19 years, the prevalence of type 1 diabetes was 3.33 per 1,000 for males compared to 3.69 per 1,000 for females in 2001.
- Sixty percent of youth with type 1 diabetes are from families with $50,000 or more annual income.
- More than 78% of youth with type 1 have private health insurance.
- More than 40% of these youth have elevated low-density lipoprotein (LDL) (bad) cholesterol.
- About 30% of youth with type 1 diabetes are overweight or obese, according to the SEARCH study.

- An estimated 35% people with type 1 diabetes die of coronary artery disease, compared with 8% of nondiabetic men and 4% of nondiabetic women.
- African American adolescents are impacted substantially by both type 1 and type 2 diabetes.
- African American youth experience a serious type 1 diabetes burden: 0.57 cases in 1,000 children aged 0-9 years, and 2.04 cases in 1,000 among those aged 10-19 years.
- Hispanic youth, aged 10 to 19 years, experience a substantial health burden due to type 1 and type 2 diabetes.
- Among Hispanic American youth, type 1 diabetes is more prevalent than type 2 diabetes. The prevalence of overweight and obesity was 44% among this group in 2001.
Costs

- Diabetes (type 1 and type 2) is the single most expensive chronic disease.
- Diabetes accounted for $174 billion in health care costs in 2007 in the U.S.
- Diabetes accounts for 32% of all Medicare expenditures.
  - The U.S. spent $11,744 on each person with diabetes, compared to $2,935 on those who do not have diabetes in 2007.
  - People with diabetes incur medical expenses that are approximately 2.3 times higher than people without diabetes in the U.S.
  - The costs for diabetes-related hospital stays totaled $58.3 billion in 2007.
- People with diabetes incurred an estimated 22% of hospital inpatient days in the U.S. in 2007.

Type 1 diabetes increases risk for serious complications.

- Patients with type 1 diabetes are 10 times more at risk for heart disease compared to people without diabetes. Heart attacks account for 60% of deaths in patients with diabetes (type 1 and type 2), while strokes account for 25% of such deaths.
- An estimated 35% of people with type 1 diabetes by age 55 years die of coronary artery disease compared with 8% of men and 4% of women without diabetes.
- Although some type 1 diabetes complications (mortality, renal failure, and neuropathy) are declining, others (coronary artery disease, overt nephropathy, and proliferative retinopathy) are not showing significant decline.

- People with diabetes diagnosed before the age of 20 years have a life expectancy that is 15–27 years shorter than people without diabetes.
- Many youth with diabetes have multiple cardiovascular disease (CVD) risk factors. About 14% of youth with type 1 diabetes have at least two CVD risk factors. In older youth (10 years or older) with type 1 diabetes, the prevalence of abnormal lipids was 19%.
- Youth with diabetes need to follow a healthy lifestyle to manage weight, lipid, and blood pressure to prevent or delay the development of CVD.
- About 9% of adolescents with diabetes have moderate or severely depressed mood symptoms, with more girls than boys. Depressed mood is associated with poor blood sugar control and complications, and a higher likelihood of emergency room visits.
- Compared with people without diabetes, adults with type 1 diabetes report more symptoms of depression and more antidepressant medication usage.

Keeping blood sugar under control reduces risk of complications

- Tight control of blood sugar benefits patients with type 1 diabetes by reducing complications in eye, kidney and nerve diseases. Intensive insulin therapy has long-term beneficial effects on the risk of CVD among people with type 1 diabetes.

In the landmark 10-year Diabetes Control and Complications Trial (DCCT), researchers found that people with type 1 diabetes who received the intensive treatment to achieve tight blood sugar control had much lower risk of complications:

- 76% reduced risk of eye disease
- 60% reduced risk of nerve disease
- 50% reduced risk of kidney disease
- 50% reduced risk of cardiovascular disease
Type 1 Diabetes in North Carolina

Prevalence

About 3,700 children and youth had type 1 diabetes in North Carolina during the period 2002-2005 (Table 2). The burden of type 1 diabetes was highest among white children and youth; 75% of North Carolina children with type 1 diabetes were white.

Table 2. Estimated cases of type 1 diabetes in youth in North Carolina, based on SEARCH prevalence 2001 and incidence 2002-2005

<table>
<thead>
<tr>
<th>Race</th>
<th>Prevalent Cases</th>
<th>Incidence Cases (per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whites</td>
<td>2,744</td>
<td>339</td>
</tr>
<tr>
<td>Blacks</td>
<td>754</td>
<td>92</td>
</tr>
<tr>
<td>Hispanics</td>
<td>161</td>
<td>25</td>
</tr>
<tr>
<td>All</td>
<td>3,659</td>
<td>456</td>
</tr>
</tbody>
</table>

Source: Beth Mayer-Davis, ejmayer-davis@unc.edu

Morbidity and mortality in North Carolina

- Diabetes (type 1 and type 2) is the seventh leading cause of death in North Carolina.
- Type 1 diabetes caused 144 deaths in North Carolina in 2007.
- Type 1 diabetes alone contributed to more than 3,800 hospitalizations in 2006 in North Carolina (Table 3).

Table 3. Type 1 Diabetes Hospitalizations in North Carolina 2006: Length of Stay, Total Charges and Discharges

<table>
<thead>
<tr>
<th>Type 1 diabetes Hospitalizations</th>
<th>Length of stay in days</th>
<th>Total Charges (in millions)</th>
<th>Number of Discharges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1 diabetes as any diagnosis</td>
<td>19,599</td>
<td>$72.1</td>
<td>3,833</td>
</tr>
<tr>
<td>Type 1 diabetes as the Principal Diagnosis</td>
<td>1,005</td>
<td>$2.1</td>
<td>372</td>
</tr>
<tr>
<td>Heart Attack</td>
<td>446</td>
<td>$3.1</td>
<td>79</td>
</tr>
<tr>
<td>Stroke</td>
<td>416</td>
<td>$1.7</td>
<td>98</td>
</tr>
<tr>
<td>Amputation Procedures</td>
<td>248</td>
<td>$1.0</td>
<td>27</td>
</tr>
<tr>
<td>Renal/Dialysis or Transplant Procedures</td>
<td>1,187</td>
<td>$4.7</td>
<td>149</td>
</tr>
</tbody>
</table>

Source: N.C. Hospital Discharge data, NC DHHS State Center for Health Statistics, 2009
Diabetes costs in North Carolina
The American Diabetes Association (ADA) estimated that the total cost of diabetes (type 1 and type 2) for people in North Carolina in 2006 was $5.3 billion. This estimate includes excess medical costs of $3.6 billion, and indirect costs due to lost productivity valued at $1.7 billion.

Diabetes in North Carolina schools
In the school year 2007-2008, 68% of the North Carolina schoolchildren with diabetes had type 1 diabetes. Public school nurses in the state reported that:
• 4,712 public school students had diabetes;
• 3,677 monitored blood glucose at school;
• 2,104 received insulin injections at school;
• 1,588 managed insulin pumps;
• 2,467 were known to self-carry their medication.

Table 4. The number of schoolchildren in North Carolina who had diabetes in 2007-2008 school year

<table>
<thead>
<tr>
<th>Condition</th>
<th>Elementary</th>
<th>Middle</th>
<th>High</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1 diabetes</td>
<td>981</td>
<td>904</td>
<td>1,320</td>
<td>3205</td>
</tr>
<tr>
<td>Type 2 diabetes</td>
<td>356</td>
<td>424</td>
<td>727</td>
<td>1507</td>
</tr>
</tbody>
</table>

Source: North Carolina Annual School Health Services Report 2007-2008, Women’s and Children’s Health Section, N.C. Division of Public Health

Data sources:
3 Juvenile Diabetes Research Foundation International (JDRF) Fact Sheet
4 The Many Faces of Diabetes in American Youth: Type 1 and Type 2 Diabetes in Five Race and Ethnic Populations. The SEARCH for Diabetes in Youth Study. Diabetes Care March 2009; Volume 32 Supplement 2.