New & Exciting Diabetes Research Sponsored by

Presented by Noel Carlson, Ph.D. & Hayley Miller, M.D.

Outline
1) Mission of the ADA
2) Research Objectives
3) ADA and its role in diabetes research
4) Utah and its role in ADA research

Diabetes Facts
Data from the 2011 National Diabetes Fact Sheet (released Jan. 26, 2011)
Total prevalence of diabetes
Total: 25.8 million children and adults in the United States—8.3% of the population—have diabetes.
Diagnosed: 18.8 million people
Undiagnosed: 7.0 million people
Prediabetes: 79 million people*
New Cases: 1.9 million new cases of diabetes are diagnosed in people aged 20 years and older in 2010.

Cost of Diabetes
$174 billion: Total costs of diagnosed diabetes in the United States in 2007
$116 billion for direct medical costs
$58 billion for indirect costs (disability, work loss, premature mortality)
After adjusting for population age and sex differences, average medical expenditures among people with diagnosed diabetes were 2.3 times higher than what expenditures would be in the absence of diabetes.

American Diabetes Association Mission:
TO PREVENT AND CURE DIABETES AND TO IMPROVE THE LIVES OF ALL PEOPLE AFFECTED BY DIABETES
ADA Scientific and Medical Supports Mission Activities

**Research Programs**
- ADA research funding
- Research collaborations
- Diabetes Care – Control – Cure

**Medical Information**
- Standards of diabetes care
- Diabetes screening and prevention
- Preventive health and wellness

**Advocacy**
- Diabetes care delivery
- Legal advocacy and support
- Legislative action

**Communities**
- Community programs & information
- Scientific & consumer publications
- Medical Information – DiabetesPro

Research Program Objectives

- Support the highest quality science across the broad spectrum of diabetes research
  - Independent peer-review process ensures support of highest quality research
  - Investigator-initiated submissions in highest interest areas of clinical, basic and translational research
- Encourage new investigators to dedicate their careers to diabetes research
  - 25% of annual budget dedicated to support of investigators early in their careers
- Support innovative research with high potential to have a significant impact
  - Specific grant opportunities for high-risk/high-impact diabetes research
  - Targeted Research in high-needs areas
  - Encouraging translational science to move basic discoveries into the clinic

Current Research Activities and Initiatives

**JDRF/ADA Genetics of Nephropathy**
- Support complimentary research to identify factors involved in susceptibility or resistance to development of kidney disease in type 1 and type 2 diabetes

**Bariatric Surgery and Diabetes**
- Covidien and Ethicon Endosurgery corporate partners
- Basic and clinic research on the effects of bariatric surgery in patients with diabetes

**Diabetes Care Delivery**
- Research support provided by Sanofi-Aventis
- Innovative studies to examine the effects of clinical care delivery programs in patients with diabetes

**Technology in Diabetes**
- Research support provided by Medtronic
- Analyze insulin pump/glucose meter data to understand the impact of these technologies on outcomes and care

How Are We Doing? Supporting High Quality Diabetes Research

**High Quality Science**
- Publication of study results in peer-reviewed journals
- Adding to the scientific knowledge base—average of 4 publications/award
- Majority of ADA investigators are subsequently funded through NIH or other federal funding agencies

**Dedication to Diabetes Research**
- 97% of supported investigators remain in diabetes research
- Researchers are active ADA professional members, participate in Scientific Sessions and other ADA activities, and become an even more active member of the diabetes community

Research Spending in US: American Diabetes Association

History of US Diabetes Therapeutic Advances
Other sources of Diabetes Research Dollars

<table>
<thead>
<tr>
<th>Amount</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>$35M</td>
<td>ADA</td>
</tr>
<tr>
<td>$100M</td>
<td>JDRF (2008)</td>
</tr>
<tr>
<td>$625M</td>
<td>$1.9 B from NIH-NIDDK</td>
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<tr>
<td>$150M</td>
<td>Type I Diabetes Research Fund NIDDK</td>
</tr>
<tr>
<td></td>
<td>Other NIH (NINDS, NIA, NEI), CDC</td>
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ADA's Continuing Commitment to Research

- Nearly 4,000 research projects funded since program inception
- Over the life of the program, more than $600 million invested in diabetes research (since 1952)
- Funding for research more than doubled between 2001 and 2007; $34.1 million awarded in calendar year 2010
- More than 400 active ADA sponsored research projects at 140 institutions nationwide in calendar year 2010

ADA Funded Grants in Utah (March 2012)

**University of Utah**
- The effect of bariatric surgery on peripheral nerve and axonal regeneration
  A. Gordon Smith, MD
- Metabolic syndrome and peripheral neuropathy: a lifestyle intervention study.
  A Smith, MD
- Transcriptional control of skeletal muscle insulin resistance
  Donald Ayer, PhD

**Utah State University**
- Dietary fats regulate amygdala insulin sensitivity - American ...
  Stephane Boghossian, PhD (Jr Faculty Grant)

ADA has funded $0.67M for 2012 & $1.8M for the last 3 years for Diabetes Research in Utah.

ADA-funded programs in UTAH are researching:
- How skeletal muscle in diabetic people may not take up as much glucose as muscle from unaffected individuals by regulating gene expression.
- How diet may influence neuropathy associated with diabetes.
- How dietary fats can affect the insulin signaling in a part of the brain that contributes to learning, motivation and control of feeding behavior.
- How a component in fat called ceramide could contribute to high blood pressure and blood vessel defects.
- The role of glucose in diabetes-associated cardiac muscle damage and how this may relate to increased risk of developing heart failure associated with diabetes.

ADA Funding for Diabetes Research in Utah

http://www.diabetes.org/news-research/research/
Thank You!

JDRF Research FY2012
Urgency – Excitement – Progress
Top JDRF Research Advances

Hayley Miller, MD
JDRF Utah
November 14, 2012

JDRF Research Mission
- JDRF is built around a core mission tied to research
- JDRF's research mission is to discover, develop & deliver drugs and devices that cure, better treat and prevent T1D
- Goal of transforming lives:
  - Improving outcomes
  - Reducing daily burdens
  - Accelerating progress towards curing T1D

JDRF Global Leadership in T1D Research
- Largest T1D non-profit: $1.6B in research funded over past 40 years
- In FY11 JDRF funded:
  - $116 million direct support
  - In 18 countries
  - Including over 50 clinical trials
- More than 80% of JDRF expenditures directly support research and research-related education
- Forbes magazine called JDRF "...a tightly run organization that puts almost every dollar spent to work curing disease...."

FY12 JDRF T1D Research Priorities

Cure
- Type 1 diabetes by replacing or engineering beta cells, and法庭ing the autoimmune process
- Beta Cell Regeneration, Health and Survival
- Encapsulation of Isolated Islets
- Artificial Pancreas Systems
- Immunomodulation of Alternative Beta Cell Sources
- Antigen specific Immunotherapies
- Biomarkers: Slugging, Prognostic, and Predictive

Treat
- Type 1 diabetes with new devices and therapies that optimize blood glucose control and treat prevent diabetic complications
- Treatment: Glucose Modulating Agents
- Diabetic Eye Disease
- Complications Prevention

Prevent
- Type 1 diabetes with vaccines and other therapies
- Prevention and Secondary Prevention

Research Agenda of Hope for all T1D Patients

Curing T1D
- #1 priority for JDRF
- Recent explosion of new information about immune system & beta cells
- Creating exciting new paths to a cure
- Leveraging efforts to both curing & preventing T1D

CURING T1D to remove it from the lives of our loved ones
**Advanced A Targeted Immune Therapy**

**Novel Immune Rebalancing Therapy in Clinical Study**

- A JDRF-supported study at Univ. CA at San Francisco is testing a novel, targeted immune rebalancing therapy.
- **Importance:** This is the first human test of a more targeted cell-based immune rebalancing therapy in T1D.

**Source:** [www.diabetes.ucsf.edu/clinical-care-education/clinical-trials/type-1-diabetes](www.diabetes.ucsf.edu/clinical-care-education/clinical-trials/type-1-diabetes)

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**Discovered Beta Cell Regeneration Targets**

**An Explosion of Beta Cell Proliferation Pathways**

- JDRF-supported researchers in Pittsburgh, Stanford, Zurich and Jerusalem have identified four new and different pathways that control beta cell proliferation.
- **Importance:** One of these new pathways may result in a future T1D drug that stimulates beta cell proliferation to restore a person’s own insulin production.

**Source:** Multiple JDRF press releases

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**Invented Novel Encapsulation Biomaterial**

**Unique Material Produces Oxygen to Sustain Beta Cells**

- JDRF-supported researchers at Univ. of Miami invented a new material that produces oxygen to sustain implanted encapsulated beta cells.
- **Importance:** This novel biomaterial should accelerate beta cell encapsulation progress by overcoming a key technical hurdle.


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**Discovered New Test to Accelerate a Cure**

**Potential Blood Test to Detect Early Beta Cell Death**

- JDRF-supported researchers at Yale Univ. discovered a blood test to measure the release of beta cell DNA after they die.
- **Importance:** Tests of beta cell death will allow earlier detection and treatments of T1D and speed clinical studies of beta cell therapiess.

**Source:** Akirav E M et al. PNAS 2011;108:19018-19023

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**FDA Issued Artificial Pancreas Guidance**

**JDRF-Led Effort Gets Results in Washington, DC**

- JDRF-led grassroots advocacy including professional clinical associations helped drive FDA to produce draft guidance for artificial pancreas systems.
- **Importance:** This guidance will speed APP clinical studies and approvals by informing researchers and companies of FDA’s requirements.

**Source:** JDRF Press Release and [www.fda.gov/medicaldevices](www.fda.gov/medicaldevices)

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**Research Agenda of Hope for all T1D Patients**

**Better Treating T1D**

- Until we can cure & prevent T1D we are committed to improving lives of those with T1D.
- The past 40 years have seen significant improvements in care, translating into longer life expectancy.
- More can be done to improve the quality of life for everyone living with T1D.

**Source:** [www.diabetes.ucsf.edu/clinical-care-education/clinical-trials/type-1-diabetes](www.diabetes.ucsf.edu/clinical-care-education/clinical-trials/type-1-diabetes)
Launched First Outpatient APP Study

**Real World Testing of Control-To-Range AP System**

- JDRF supported the first real world studies of a handheld artificial pancreas device in France, Italy, California and Univ. VA
- **Importance:** Real world testing of AP systems moves them a big step closer to delivering them to patients

Source: JDRF Press Release

Challenged the World to Invent a GRI

**$100,000 for Novel Glucose Responsive Insulin (GRI) Ideas**

- JDRF launched a novel GRI Challenge Prize and will announce the winners in summer 2012
- **Importance:** JDRF is seeking creative solutions to develop novel GRI products that could transform T1D management

Source: JDRF Press Release dated Sept 8, 2011

Discovered Marker of T1D Kidney Disease

**Improves Diagnostics and Therapy Development**

- JDRF-supported researchers at the Joslin Diabetes Center, Boston discovered proteins in the blood strongly associated with T1D kidney disease risk
- **Importance:** Earlier identification of the risk for kidney disease will allow earlier treatment and better management of this serious T1D complication


Research Agenda of Hope for all T1D Patients

**Preventing T1D**

- Growth of T1D is accelerating; especially among young children
- Children born to a family with T1D have a 10 times greater risk of developing the disease
- Only prevention can alter this trend and protect future generations from T1D
- Research to prevent T1D will help accelerate finding a cure for T1D

Supported Novel T1D Prevention Vaccine

**Focuses Novel Technology on T1D Antigen-Specific Goal**

- JDRF partnered with Selecta (an MA-based company) to bring a unique nanoparticle based vaccine technology to T1D vaccine research
- **Importance:** Vaccine research is one of the most promising approaches to prevent or halt the beta cell-specific autoimmunity in T1D

Source: JDRF Press Release dated June 9, 2011 and Selecta BioSciences website

Strengthened T1D Link To Enteroviruses

**Providing Potential Novel Prevention Strategy**

- JDRF-supported researchers in Finland showed persistent enteroviral infection and related inflammation in the gut lining of people with T1D
- **Importance:** As a potential T1D causative factor, the development of a vaccine or anti-viral agents that target these enteroviruses may be a possible T1D prevention strategy

JDRF FY13 Research Priorities
Continuing Focused Momentum from FY12

Cure
- Regenerating new beta cells and halting the autoimmune process.
- Encapsulation of alternative beta cell sources.
- Immune therapies.
- Diagnostic, measurement and imaging tools.

Treat
- Artificial pancreas systems.
- Novel insulins and other blood sugar control drugs.

Prevent
- Preventing the autoimmune process from ever starting.
- Stopping and reversing the autoimmune process early to maintain insulin independence.
- Novel insulins and other blood sugar control drugs.

Artificial pancreas systems.
- Novel insulins and other blood sugar control drugs.

JDRF T1D Research Funding Trend
You Can Help Rebuild to JDRF’s Pre-Recession Funding

Make A Difference - Get Involved!
Thank You!

- Give generously to speed JDRF research to cure, better treat and prevent T1D.
- Join a JDRF walk, ride, gala or other fund-raising event.
- Volunteer at your local JDRF chapter.
- Participate in clinical research.

Learn more at: jdrf.org

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