As a member of the Penn State faculty for over forty years, I have been fortunate to have had first-hand experience in the excitement, joys, and challenges of making discoveries in the laboratory.

I believe that, if you want to create effective interventions for persons with diabetes and obesity, you need to have an accurate understanding of "the basics." The work in my laboratory focuses on how insulin works and how it affects muscles and other organs at the molecular level.

In addition to furthering our understanding of how insulin works, my lab has been able to train a host of undergraduate and graduate students, as well as fellows. Many of these individuals are today striving to increase our understanding of how the body changes due to diabetes and obesity.

Our work is supported by grants we've received from organizations and agencies such as the National Institutes of Health, the American Diabetes Association, and Juvenile Diabetes Research Foundation International.

In this issue of the newsletter, you will notice a few changes. First is the name, the Dialog. As any researcher will attest, study results are worthless unless others know about them and can use them. Moreover, clinicians will agree that it is important to talk about diabetes and weight management in order to stay informed and have the best chances of success. Hence, we thought the new name for the newsletter emphasized both of these points.

Second, features of both the patient e-newsletter, produced by the patient advocacy committee (Hershey area), and the research volunteer newsletter have been merged. As a result, the newsletter contains information for patients with diabetes and obesity, as well as information about ongoing research involving diabetes and obesity.

Third, the online version of the newsletter contains a table of contents with hyperlinks that allows you to more quickly reach the articles you are interested in.

I would also like to announce that the Penn State Institute for Diabetes and Obesity has a new look to its Web site. Over the past few months, information from our previous Web site has been migrated over to the new format. While we are still working on the site's design, we are happy to announce that we now have specific sections for patients, clinicians, and researchers. Information about community events in which PSIDO participates is also listed.

The new Web site may be found at www.pennstatehershey.org/web/diabetesandobesity.

Please send any comments about the Web site to reinventcare@hhdev.psu.edu.
Penn State Education Spotlight: Student-Created Devices Help Patients Overcome Everyday Hurdles

Two teams of Penn State Bioengineering students were recently recognized for their innovative designs that improve quality of life for people with diabetes.

In 2008, students working under the guidance of PSIDO member Nadine Smith, Ph.D., won first place in the Rehabilitation Engineering Society of North America's (RESNA) Student Design Competition in Washington, D.C. The students designed an assistive device for persons with one functional arm to deliver insulin (see photo).

In 2009, a team of Bioengineering students won second place in the RESNA competition. The students created a computer program that provides real-time recommendations for improving their blood glucose levels.

The teams created their products as part of a project that challenged students to design, build, and test engineering solutions to problems presented by patients and medical professionals. Five of the eight groups in the 2008 class and several groups in the 2009 class focused on designs to meet the challenges associated with diabetes management.

To create their solutions, students used the Learning Factory, a state-of-the-art machining facility at University Park that was created as part of a Penn State–industry partnership. At the end of the semester, all teams demonstrated their working project in a formal design presentation, which was open to the public.

This work is supported by a grant from the National Science Foundation called “Team MEDS: Multidisciplinary Engineering Design Students, Projects to Aid Persons with Disabilities.”

For more information on the design projects, as well as information about the Penn State Bioengineering program, go to www.bioe.psu.edu/students/design.html.

For more information about the 2009 projects, visit www.acuri.net/psudesignshowcaseapril292009.pdf.

Modified Cells Produce Insulin in Diabetic Mice*

Diabetes researchers from Harvard University’s Howard Hughes Medical Institute successfully transformed pancreatic exocrine cells in mice into insulin-producing beta cells.

Exocrine cells normally produce digestive enzymes and account for 95 percent of pancreatic cells. Scientists were able to “turn off” the digestive function of the exocrine cells and activate the necessary genes to produce insulin in about 20 percent of the cells. For the diabetic mice, this alteration returned their blood glucose to almost normal levels. It turns out that just three genes were required to enable the non-insulin-producing cells to create insulin.

The researchers were ultimately able to change the identity of adult cells without the use of stem cells or genetic reprogramming. This research has the potential for application in humans by performing the same work in cells of a donated pancreas, which can then be transplanted into humans with diabetes.

Further information on this study can be found at www.jdrf.org/files/General_Files/Research/FY_09/Top_Highlights_10_08.pdf.

PSIDO is focused on reinventing diabetes care. One of the ways we are reaching this goal is by listening to our patients. When patients asked for an easy way to keep track of their diabetes care, we created the Diabetes Playbook.

Not only does the book offer tips on how to manage diabetes from people who treat diabetes, but it also offers tips from people who live with diabetes every day. To order a copy, go to www.hmc.psu.edu/diabetes.

Sleepless Kids Become Obese Adults*

Research has shown that sleep deprivation puts adults at risk for becoming overweight and obese. Improper sleep leads to an imbalance of hormones associated with appetite, hunger, metabolism, and fat retention.

New research shows that the same is true for children. Children’s sleep patterns have long-term effects that can catch up with them later in life. Helping your child attain a healthier future is as simple as making sure they get the proper amount of sleep at night.

Kids between the ages of 5 and 12 should get between eleven and twelve hours of sleep each night. Teenagers require nine to ten hours of sleep every night. This sounds like a lot, and kids may argue that they can’t sleep that long.

Here are a few tips that can help your children learn life-long healthy habits:

- Set a media curfew in the house. Too many electronic devices, such as computers and cell phones, may keep children up at night.
- Urge your children to be more physically active, which will promote sleep. They should get at least thirty minutes of cardio daily.
- Help manage your children’s time throughout the day, so they are not forced to stay up late doing homework.

They might complain about the early bedtime now, but they will be thanking you in the long run.

The full article is available at blogs.webmd.com/sleep-disorders/2008/11/sleepless-kids-become-fat-adults.html.

Researchers Find Genetic Links to Type 1 Diabetes*

Scientists from the United Kingdom recently identified four new genetic regions that affect a person's risk of developing type 1 diabetes. This discovery could lead to a breakthrough in understanding and assessing risks for type 1 diabetes on a person-to-person basis. Ten separate chromosomal areas have now been linked to type 1 diabetes. There is hope that these findings may also lead to a better understanding of the pathway the disease takes as it progresses.

Further information on this study can be found at www.jdrf.org/files/General_Files/Research/FY_09/Top_Highlights_10_08.pdf.


The Fight against Diabetes in Children Expands*

Researchers have created a program that can help children successfully prevent diabetes. Developed by WakeMed, a health care provider in Wake County, North Carolina, the Energize! program targets children who are likely to develop type 2 diabetes and educates them on how to make healthy diet and exercise choices.

One year after the program finished, a survey indicated that 70 percent of the participants had neutralized their dangerous health conditions by lowering their blood sugar levels to normal, healthy ranges.

Children attend sessions three nights a week, where they are coached to drink water instead of sugary drinks and be active after school instead of sitting in front of the TV. The program also includes a family night once a week, which has encouraged healthier habits in entire families.

The Energize! program has essentially found a way to prevent and cure type 2 diabetes before it begins with simple common sense practices and ideas. As success of this program continues, we will see Energize! springing up all over the United States.

The Pennsylvania Advocates for Nutrition and Activity, in partnership with the Center for Nutrition and Activity Promotion at Penn State Hershey Children's Hospital, has created a similar diet and exercise intervention program called nrgBalance. For more information about this program, go to www.nrgbalance.org.

For more on the Energize! story, visit www.newsobserver.com/front/story/772006.html.


PSIDO Research Volunteer Database

If the studies listed in this newsletter do not interest you, consider enrolling in the PSIDO Research Volunteer Database. This database provides Penn State investigators with contact information for persons interested in participating in studies on diabetes and obesity. Signing up for the database will allow investigators to contact you directly with information about studies, but being in the database does not obligate you to participate. For more information, contact us at 1-800-393-0782 or luk10@psu.edu.

You can sign up for the database online by going to www.pennstatehershey.org/web/diabetesandobesity/patientcare/clinicaltrials.
How Children Can Take Control in their Own Diabetes Care*

Many children diagnosed with diabetes may begin showing signs of interest in the management and care of their disease at a very young age. It is important to teach your child how to perform self-checks and glucose tests as they begin to mature. Here are some simple guidelines for times when children may be ready to take an active role in their diabetes care.

Between the ages of 5 and 7, children may be interested in testing their own blood glucose levels. This is a task that can be passed on to your child with your supervision. Ensure that their testing method is correct, and help with interpreting the blood sugar readings. Also, be sure to remind children when to test their blood sugar.

Around the age of 8, children may ask about carbohydrate counting and should be encouraged to count their own carbs for a given meal or entire day. Simple carb counting involves counting every fifteen grams of carbohydrate as one carbohydrate choice. Your child should then be allotted a certain number of carbohydrate choices for the day, which they can track themselves.

Children between the ages of 8 and 12 should be able to administer their own insulin injections. Parents should make sure they calculate and draw up the correct dosage of insulin, although the more the child is able to do, the better.

As children grow up they need the skills to manage their diabetes without the help of a parent. By giving your child a head start on caring for their diabetes, they will gain the practice and confidence to manage the disease safely on their own. The more they are able to do by themselves, the more comfortable they will feel when forced to take charge in their diabetes care.

For more tips and ideas visit www.dlife.com/dLife/do/ShowContent/daily_living/kids.

Volunteers are needed for the following research studies. All studies listed have been approved by either the Penn State, University Park, or Penn State Milton S. Hershey Medical Center institutional review boards. Information about additional studies may be found at http://www.pennstatehershey.org/web/diabetesandobesity/patientcare/clinicaltrials.

**Baclofen Study**
Binge eating is a growing problem that affects both men and women. It threatens successful weight loss and is linked to weight regain and severe obesity. Adult men and women who binge eat three or more times a week and are currently under treatment for their binge eating are needed for a Penn State study. The purpose of the study is to test whether a new drug can help reduce food craving and binge eating. If you are interested in this study or other studies being done at Penn State on obesity and diabetes contact Kathy Peters, M.S., at 800-393-0782 or kfp1@psu.edu. IRB#29140; PI: R. Corwin.

**Integrating Diabetes into Everyday Life (IDIEL)**
Adults with diabetes who have been diagnosed for five or more years and who have hemoglobin A1C results of 8 percent or higher are needed to volunteer for a Penn State research project investigating how people cope with diabetes. Participants will fill out a one-time survey packet and give a small amount of blood by finger stick. For more information about the IDIEL study, contact Ronda Renosky at 814-863-7076 or reinventcare@hhdev.psu.edu.

**Effects of Pistachios on Cardiovascular Responses to Stress in Type 2 Diabetes: A Novel Intervention for a High-Risk Population.**
We are looking for men and postmenopausal women between the ages of 30 and 70 who have been diagnosed with type 2 diabetes for more than six months. Exclusion criteria include taking insulin or medications that lower lipid levels or blood pressure. The study is approximately twelve to fourteen weeks long and consists of a two-week run in diet followed by two four-week diet periods. Compensation is provided. For more information, contact dls5001@psu.edu or call 814-863-0856. IRB#24174; PI: D. Downs.

**BEAP (Beliefs about Exercise after Pregnancy)**
BEAP is a PSIDO-funded research study targeting postpartum women who had gestational diabetes in their most recent pregnancy. The study's objective is to better understand a woman's thoughts about exercise and other healthy behaviors in order to develop an intervention program. Compensation is provided. For more information, contact dsd11@psu.edu or 814-863-0456. IRB# 23986; PI: D. Downs.

**Active MOMS**
Active Moms is a research study targeting pregnant women diagnosed with gestational diabetes. The study purpose is to examine physical activity, health beliefs, and behaviors during pregnancy in an effort to understand the impact on gestational diabetes for women and their babies. Women may be randomized to a standard of care, leisure physical activity, or structured exercise condition in pregnancy. Compensation is provided. Active MOMS is funded by the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). For more information, contact dsd11@psu.edu or 814-863-0456. IRB# 24174; PI: D. Downs.

**Mineral Supplementation for Women with Polycystic Ovary Syndrome**
Researchers at Penn State are conducting a study to see if taking daily magnesium (mineral) supplements can help treat insulin resistance and other health consequences associated with polycystic ovary syndrome (PCOS). Women with PCOS who are between the ages of 18 and 50 and have irregular periods (eight or less per year) are needed for this twelve-week study. For more information, contact Lauren at luk10@psu.edu or 1-800-393-0782. IRB#26582; PI: J.S. Ulbrecht.
Polycystic Ovary Syndrome and Pregnancy

Penn State Hershey Medical Center researchers need volunteers 18-40 years old with polycystic ovary syndrome (PCOS) who are trying to become pregnant. Participation includes physical exams, pelvic ultrasounds, DXA scans, exercise treadmill tests, hormonal blood work, oral glucose tolerance tests, and recording of daily exercise and dietary information. Study-related medications and a lifestyle intervention are included in the study. For more information contact Patsy at prawa@hmc.psu.edu or 717-531-3692 or 800-585-9585. IRB#27184; PI: R.S. Legro.

Endometrial Hyperplasia Study

Postmenopausal women between the ages of 45 and 75 who are overweight and have diabetes and/or high blood pressure may qualify for this research study. The purpose of this study is to determine the effectiveness of endometrial cancer screening tests in women with certain risk factors. This research involves one study visit. Compensation is provided. For more information, contact 717-531-1540 or seyer@psu.edu. IRB# 20175; PI: R.S. Legro.

Weight-Loss Study

Non-smoking, premenopausal women who want to lose weight and are willing to follow a reduced-calorie diet for eighteen weeks can get involved in a new study. The purpose of the study is to evaluate the differences in two diet intervention strategies on markers of inflammation, bone mineral density, cholesterol levels, and blood pressure in premenopausal women with a body mass index of at least twenty-five but less than forty-three. Nutrition education and snacks will be provided during the entirety of the study. All test sessions will take place in Chandlee Lab, on the University Park campus, under the supervision of Sharon Nickols-Richardson, Ph.D., R.D.

To qualify, women must be 25-45 years old; in good health; have a body mass index (BMI) between twenty-five and forty-three (for help calculating your BMI, please visit www.bmi-calculator.net); be available to attend an orientation session, four blood draw sessions, and weekly diet sessions; be willing to discontinue all current supplement regimens during the study and follow a reduced calorie diet; and women may not be pregnant or planning to become pregnant during the study. For more information, please call the Bone Laboratory at 814-865-5926 or contact Kathryn Piehowski, R.D., at kep158@psu.edu.

TrialNet

TrialNet is an international research study that screens relatives of people with type 1 diabetes to assess their risk for developing diabetes. Relatives (age 1-45) may be eligible to be screened with one blood test at no cost. This study is aimed at tracking the development of diabetes and in the future. The study will include experimental diabetes prevention treatments. For more information, contact 800-393-0782 or kfp1@psu.edu. IRB# 18620; PI: J.S. Ulbrecht.

Retinal Function Study

This observational research study is seeking both healthy volunteers and volunteers with a history of diabetes for at least seven years with and without diabetic retinopathy. The study will evaluate several vision tests designed to reveal whether decreased visual function may be used as an identifier in future studies aimed at early diabetic disease. Eligible volunteers will have two visits within three weeks, lasting two to three hours each, provide medical and eye history, and complete various visual function tests. Compensation is available. For more information, contact Laura Walter at 717-531-4696 or lwalter@psu.edu. IRB# 25461EP; PI: G. Jackson.

Proliferative Diabetic Retinopathy Study

Adults who have diabetes and have proliferative diabetic retinopathy are sought for a one-year study to determine if decreased vision due to proliferative diabetic retinopathy can be prevented. All eligible participants will receive laser treatments and some participants will also receive study medication in the eye. All participants must be available for approximately six study-related visits at the Penn State Hershey Medical Center. Compensation is available for travel expenses. For more information, contact schobanoff@psu.edu or 717-531-3790. IRB# 25235; PI: K. Neely.

Diabetic Retinopathy Eye Study

This proof-of-concept research study is seeking adults with severe non-proliferative or non-high-risk proliferative diabetic retinopathy to participate in a twenty-four-month study evaluating the effects of doxycycline on slowing the progression of diabetic retinopathy and/or improving retinal function. Participants must meet medical and ocular study criteria and be willing to come for study visits every three months for twenty-four months. Compensation is available. For more information, contact Mary Wilmarth, COMT, at 717-531-6779 or mwilmarth@hmc.psu.edu. IRB# 25234; PI: I.U. Scott.
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Clinical Questions and Answers:

A Focus on Insulin

Amy Leffard, RN, CDE, Mount Nittany Medical Center

Q: What is insulin and how does it work?
A: Insulin is a hormone made in the pancreas that helps the
body use glucose for energy. Much of the food we eat is
broken down into sugar (glucose) in the body. This glu-
cose gets released into the bloodstream. The pancreas
secretes insulin to allow the cells of the body to take up the
glucose and use it for energy. However, when there is not
enough insulin, the levels of glucose in the blood remain
higher than normal. This is called insulin deficiency.

Q: What is insulin resistance?
A: Most people with type 2 diabetes are considered insu-
lín resistant because their tissues and cells are unable
to properly use insulin. The glucose cannot get into the
cells to be used for energy. This causes glucose to build
up in the blood (hyperglycemia). Insulin resistance may
continue to worsen over time, especially if the person is
overweight. The body then will require more and more
insulin to remove glucose from the blood. Weight loss and
exercise both help decrease insulin resistance; after this
happens, the pancreas does not have to work so hard.

Q: Does taking insulin cause weight gain?
A: Many type 2 diabetics gain weight when taking insulin;
however, meal planning and regular physical activity can
help prevent the weight gain. You can work with your
health care provider to find an insulin plan that is least
likely to cause weight gain.

Q: Do people with type 2 diabetes have to take insulin
because they have failed in their diabetes self-
management?
A: By the time most people are diagnosed with type 2 dia-
betes, their bodies have already been working hard to lower
blood glucose by producing extra insulin. They may only
have about half of their insulin-producing cells left, and
the cells of the body may be resistant to the insulin being
made. Blood glucose levels may have been high for many
years. As type 2 diabetes progresses, the body naturally
loses the ability to produce insulin, and insulin injections
become necessary. This is not because the person has
done anything wrong; it just means diabetes pills are no
longer enough to control the disease and the body cannot
produce enough insulin to keep blood glucose levels at or
near normal levels.

Q: Isn't insulin only for people with type 1 diabetes?
A: In type 1 diabetes the pancreas stops producing insulin
altogether due to the immune system attacking insulin-
producing cells of the pancreas. It is unknown why this oc-
curs, but insulin is always required to treat type 1 diabetes.
Many people with type 2 diabetes can take pills instead
of insulin for a while, but it is a progressive disease. Many
people with type 2 diabetes will require insulin eventually
when they can no longer produce enough insulin. This
does not make them a type 1 diabetic.

For more information on managing type 2 diabetes, visit
development.rtcrm.com/NovoNordisk2.