



Diabetes

# Dateline

National Diabetes Information Clearinghouse

Fall 2008

## NIH Hosts Artificial Pancreas Workshop

Leaders in the effort to make an artificial pancreas a reality for the millions of people who take insulin for their diabetes convened at the National Institutes of Health (NIH) in July to discuss how much closer they have come to achieving that goal and the major obstacles that stand in the way.

The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), in collaboration with the U.S. Food and Drug Administration (FDA) and the Juvenile Diabetes Research Foundation International (JDRF), has been instrumental in speeding progress toward an artificial pancreas.

As conceived by researchers, a “closed-loop” artificial pancreas is a system of devices that would be able to monitor blood glucose, also called blood sugar, and administer the correct amount of insulin, and possibly glucagon, to maintain safe and healthy blood glucose levels—all without intervention from the person using it.

Since December 2005—the last time the NIH sponsored a meeting about developing an artificial pancreas—the NIDDK has continued to support cutting-edge research for the development of minimally invasive glucose monitors, long-term implantable glucose monitors, new glucose-regulated insulin delivery technologies, technologies to increase the biocompatibility of the devices, and the development of the algorithms that mimic the physiologic homeostasis,” said NIDDK Director Griffin P. Rodgers, M.D., M.A.C.P. “All these were eventually to be components of a future artificial pancreas.”



In 2006, the JDRF launched the Artificial Pancreas Project, making perfection of a closed-loop system one of its six therapeutic goals. “We believe we have the core technologies that are necessary to build a safe artificial pancreas,” said Larry A. Soler, the JDRF’s vice president of government relations. “It’s going to take all of us working together to put these things together and make a difference for people with diabetes.”

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### NIDDK

NATIONAL INSTITUTE OF  
DIABETES AND DIGESTIVE  
AND KIDNEY DISEASES

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The FDA continues to include the artificial pancreas as part of its Critical Path Initiative—a program to bridge the gap between basic scientific research and medical product development. “This initiative was not meant to be just an FDA project,” said Janet Woodcock, M.D., acting director at the FDA’s Center for Drug Evaluation and Research. “This [initiative] was meant to call upon the scientific community to band together to find new ways of advancing the movement of innovative science on the critical path to becoming actual products.”

“It has been very satisfying to see how the NIH, the FDA, the JDRF, academia, and industry have collectively catalyzed very intensive and productive activity in the development of an artificial pancreas,” said Rodgers.

### Lessons Learned

Workshop participants summarized lessons learned from studies of continuous glucose monitors, closed-loop systems, and open-loop systems, which require some intervention from the user.

Controlling post-meal glucose spikes has been a major challenge for closed-loop systems, which suffer from inherent delays between when a change in glucose is detected and when insulin infused through a pump takes effect. Unlike the pancreas, which delivers insulin directly into the bloodstream, most pumps deliver insulin just beneath the skin.

To keep glucose in check, the closed-loop system must somehow recognize when a meal is occurring and increase insulin infusion. Too much insulin, however, can cause low blood glucose, a condition called hypoglycemia. Turning up the insulin pump 30 minutes before mealtime helps control glucose spikes but requires action from the user.

Another big issue for closed-loop systems is adjusting for exercise, said Nelly Mauras, M.D., chief of endocrinology at the Nemours Children’s Clinic in Jacksonville, FL, and a principal investigator for the Diabetes Research in Children Network (DirecNet). DirecNet is an NIH-sponsored, multicenter study group evaluating continuous glucose monitoring devices in children. Physical activity can cause rapid drops in blood glucose and has residual effects on blood glucose levels for up to 16 hours afterward. Based on DirecNet studies, glucose levels measured at the start of exercise are the best predictor of hypoglycemia occurring during physical activity and at night following physical activity, according to Mauras.

Counter-regulatory responses to repeated drops in blood glucose are severely blunted—epinephrine and growth hormone do not prevent hypoglycemia, and glucagon and cortisol do not rise during hypoglycemia. Mauras said closed-loop systems should be equipped with alarms to alert users of severe hypoglycemia and should ultimately be able to predict and avert post-physical activity drops in blood glucose.

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“This initiative was not meant to be just an FDA project.”

Janet Woodcock, M.D.

Acting Director, Center for Drug Evaluation and Research, FDA

## Diabetes Dateline



*Diabetes Dateline*, an email newsletter, is sent to subscribers by the National Diabetes Information Clearinghouse (NDIC). The newsletter features news about diabetes, special events, patient and professional meetings, and new publications available from the NDIC and other organizations.

If you would like to subscribe, go to <http://catalog.niddk.nih.gov/newsletter.cfm>. You can read or download a PDF version of the newsletter at [www.diabetes.niddk.nih.gov/about/newsletter.htm](http://www.diabetes.niddk.nih.gov/about/newsletter.htm).

### Executive Editor: Judith Fradkin, M.D.

Dr. Fradkin is the director of the Division of Diabetes, Endocrinology, and Metabolic Diseases for the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), part of the National Institutes of Health in Bethesda, MD. Dr. Fradkin earned her M.D. from the University of California at San Francisco and completed an internship and residency at Harvard’s Beth Israel Hospital in Boston. Dr. Fradkin came to the NIDDK as a clinical associate in 1979 after an endocrinology fellowship at Yale University. She has overseen NIDDK-supported research in various roles, directing the Institute’s research programs in diabetes, cystic fibrosis, endocrinology, and metabolic diseases. A practicing endocrinologist, Dr. Fradkin continues to treat patients at the National Naval Medical Center in Bethesda, where she worked as a staff endocrinologist in the early 1980s.



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Infusing glucagon, a hormone that counters insulin by freeing glucose stores in the body, is a strategy that would help avoid sudden, severe hypoglycemia, said Edward Damiano, Ph.D., a biomedical engineer at Boston University. Damiano presented data from a diabetic pig model showing infused glucagon's ability to avoid hypoglycemia without the ingestion of rescue carbohydrates.

Although some at the meeting believe glucagon adds an unnecessary layer of complexity—requiring a dual chamber pump that infuses insulin and glucagon—Damiano said that simply stopping insulin infusion is not enough to avoid dramatic drops in blood glucose. “I think it’s difficult to imagine a system that could be effective without some counter-regulatory effect,” he said. “Glucagon is very fast.”

The performance of a fully implantable closed-loop device was reviewed by Howard Zisser, M.D., director of clinical research at the Sansum Diabetes Research Institute in Santa Barbara, CA. The device, about the size of a hockey puck, is implanted under the skin on the abdomen. Similar to a heart pacemaker, leads are tunneled under the collarbone and a glucose sensor is inserted in the vena cava.

Zisser said intravascular sensors require only once-a-month calibration, whereas subcutaneous sensors must be calibrated once every few days due to protein buildup. Although internal systems require surgeries with significant recovery times to insert and remove the pump and are subject to many of the same issues as external systems, “with these devices patients report they forget they have diabetes...once patients had them in, none wanted to take them out,” said Zisser. Research on fully implantable systems is currently on hold due to a halt in manufacturing the device.

### Perfecting Algorithms

Perfecting algorithms may be the biggest hurdle to a fully closed-loop artificial pancreas. Algorithms are the brains of the artificial pancreas that translate glucose monitoring data into appropriate insulin dosing. Performing an

infinitely complex task, algorithms must account for factors that result in steep climbs or drops in glucose levels, such as eating, physical activity, and sleep.

A quick lesson in Algorithms 101 was presented by Francis J. Doyle III, Ph.D., an engineer at the University of California, Santa Barbara. Akin to the way the chess computer Deep Blue predicts an opponent’s strategy based on past moves, a suitable algorithm would facilitate insulin dosing based on past responses, according to Doyle.

A perfect system would recognize when a meal is taking place and then, based on the algorithm, deliver the appropriate amount of insulin to maintain glucose control. But knowing which parameters to include in the algorithm, such as the rate of change in glucose levels, is complex and is the focus of computer-based “*in silico*” testing—a process whereby mathematical models based on real patient data are used to test algorithms.

### Patient Considerations

Tim Wysocki, Ph.D., a psychologist at the Nemours Children’s Clinic in Jacksonville, FL, outlined possible behavioral impediments to patient acceptance of an artificial pancreas, such as aversion to being “controlled” by a device or, in the case of a child, parents’ unwillingness to entrust a device with their child’s safety. Wysocki envisioned possible negative repercussions of the artificial pancreas, such as unwanted weight gain.

“For people who have lived with diabetes for a decade or more with continuous constraints on what and how much they can eat, a device that responds automatically and instantly with an appropriate insulin dose in response to whatever is eaten might create a significant source of temptation for many patients,” he said.

Diabetes advocate Kelly L. Close, founder of the health care information firm Close Concerns, Inc., and editor of the patient newsletter *diaTribe*, put a human face on the disease. Close, who has had type 1 diabetes the majority of her life, said the goal of the artificial pancreas should

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**Tim Wysocki, Ph.D.**  
Psychologist, Nemours  
Children’s Clinic

## Artificial Pancreas Expected to Improve Quality of Life for People on Insulin

An artificial pancreas is a system of mechanical devices that mimics, as closely as possible, the way a healthy pancreas detects changes in levels of blood glucose, also called blood sugar, and responds automatically to infuse appropriate amounts of insulin. Though not a cure, an artificial pancreas is expected to enable better blood glucose control, thereby improving the quality of life for people on insulin.



Achieving adequate blood glucose control remains a significant challenge for most diabetes patients on insulin.

People with type 1 diabetes—especially children and adolescents—are particularly likely to benefit from an artificial pancreas. People with type 1 diabetes must receive insulin therapy because their pancreas produces little or no insulin, the result of an autoimmune attack on the insulin-producing beta cells within the pancreatic islets. Many people with type 2 diabetes also eventually need to take insulin to manage the disease.

Achieving adequate blood glucose control remains a significant challenge for most diabetes patients on insulin. A common and serious side effect of insulin treatment is hypoglycemia, or low blood glucose. Severe hypoglycemia often occurs at night during sleep and can be life threatening.

Fear of hypoglycemia is a barrier to tight blood glucose control, which has been shown to reduce the risk of complications of diabetes in major studies such as the Diabetes Control and Complications Trial. An artificial pancreas has the

potential to allow tighter blood glucose control while reducing or eliminating these dangerous episodes of hypoglycemia.

An artificial pancreas will consist of a continuous blood glucose sensor, an insulin delivery system, and a way to link them together in a closed-loop system. A closed-loop system will function automatically and generally not require the user to make calculations, enter additional information, or adjust insulin doses manually.

Much progress has been made in the development of continuous glucose monitoring (CGM) devices and insulin pumps. Several CGM devices and a number of insulin pumps from various manufacturers are available, and other devices are in development. One system from Medtronic integrates a CGM device with an external insulin pump, representing the first step in joining glucose monitoring and insulin delivery systems using available technology. ■

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be to reduce but not necessarily eliminate severe hypoglycemia—often the biggest fear for people with type 1 diabetes and their families. Close said setting unrealistically high expectations for the artificial pancreas may unintentionally deprive people of a lesser device that could save lives: “If we aim to get rid of [hypoglycemia] completely, we’re in danger of moving too slowly or of research coming to a complete standstill.”

### Curing Diabetes

Workshop attendees seemed unanimous in the view that in some shape or form the artificial pancreas is technologically feasible and must remain aggressively pursued. However, it remains only part of the bigger picture.

As Aaron J. Kowalksi, Ph.D., director of metabolic control research at the JDRF, put it, “the ultimate goal is to walk away from devices and cure diabetes.” For more information about diabetes, visit [www.diabetes.niddk.nih.gov](http://www.diabetes.niddk.nih.gov). ■



## Hearing Loss Common in People with Diabetes

**H**earing loss is about twice as common in adults with diabetes, according to a study funded by the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) at the National Institutes of Health (NIH).



**"As diabetes becomes more common, the disease may become a more significant contributor to hearing loss."**

**Catherine Cowie, Ph.D.**  
Director, Diabetes  
Epidemiology Program, NIDDK

Researchers discovered the higher rate of hearing loss among those with diabetes after analyzing the results of hearing tests given to a nationally representative sample of U.S. adults. The tests measured participants' ability to hear low-, middle-, and high-frequency sounds in both ears.

Mild or greater hearing impairment of low- or mid-frequency sounds in the worse ear was about 21 percent in 399 adults with diabetes compared with about 9 percent in 4,741 adults without diabetes. For high-frequency sounds, mild or greater hearing impairment in the worse ear was 54 percent in those with diabetes compared with 32 percent in those without the disease.

Adults with pre-diabetes whose blood glucose, also called blood sugar, is higher than normal but not high enough for a diabetes diagnosis had a 30 percent higher rate of hearing loss of high-frequency sounds compared with those who had a normal blood glucose test after an overnight fast.

The researchers analyzed data from hearing tests given to participants from 1999 to 2004 in the National Health and Nutrition Examination Survey (NHANES) conducted by the National Center for Health Statistics, part of the Centers for Disease Control and Prevention. Half of the 11,405 survey participants ages 20 to 69 were randomly assigned to have their hearing tested: nearly 90 percent of them completed the hearing exam and a diabetes questionnaire that included questions about hearing loss. In addition, 2,259 of the participants who received hearing tests were randomly assigned to have their blood glucose tested after an overnight fast.

The research was conducted by scientists from the NIDDK, the National Institute on Deafness and Other Communication Disorders (NIDCD), components of the NIH, and Social and Scientific Systems, Inc., which provides support on public health topics to Government agencies.

"Hearing loss may be an under-recognized complication of diabetes," said Catherine Cowie, Ph.D., senior study author and director of the NIDDK's diabetes epidemiology program. "As diabetes becomes more common, the disease may become a more significant contributor to hearing loss," said Cowie, who suggested that people with diabetes consider getting their hearing tested. "Our study found a strong and consistent link between hearing impairment and diabetes using a number of different outcomes."

### Weaker Link

Earlier U.S. studies that examined diabetes and hearing loss found a weaker association or no association, but these studies were based on smaller samples of older adults and they were not nationally representative, according to study co-author Howard Hoffman, epidemiology program director at the NIDCD.

"This is the first study of a nationally representative sample of working-age adults, 20 to 69 years old," said Hoffman, "and we found an association between diabetes and hearing impairment evident as early as ages 30 to 40."

Diabetes may lead to hearing loss by damaging the nerves and blood vessels of the inner ear, researchers suggest. Autopsies of people with diabetes have indicated such damage.

"The link between diabetes and hearing loss has been debated since the 1960s or before, and our results show that a relationship exists even when we account for the major factors known to affect hearing, such as age, race, ethnicity, income level, noise exposure, and the use of certain medications," said Kathleen Bainbridge, Ph.D., lead author of the study.

Study results were published online on June 17, 2008, in the *Annals of Internal Medicine*. For more information about the causes, prevention, and treatment of diabetes, visit [www.diabetes.niddk.nih.gov](http://www.diabetes.niddk.nih.gov). ■

## Older Treatment May Be Better at Preserving Sight for Some Patients with Diabetes

### New Drug Treatment Not as Successful, More Side Effects than Laser Treatment



A photo of an eye with diabetic macular edema. Photo courtesy of the National Eye Institute, National Institutes of Health.

A new drug therapy for treating abnormal swelling in the eye—a condition called diabetic macular edema—proved less effective than traditional laser treatment in a study funded by the National Eye Institute (NEI), part of the National Institutes of Health. The study, published online in July in the journal *Ophthalmology*, found that laser therapy is not only more effective than corticosteroids in the long-term treatment of diabetic macular edema, but it also had far fewer side effects.

Between 40 and 45 percent of the 18 million Americans diagnosed with diabetes have vision problems such as diabetic macular edema. This condition occurs when the center of the eye's retina, called the macula, swells, possibly leading to blindness.

Ophthalmologists traditionally use lasers to reduce swelling in these areas. About 5 years ago, early reports of success in treating diabetic macular edema with injections of a corticosteroid called triamcinolone led to the rise in popularity of this alternative treatment. This is the first study to compare the long-term benefits of both treatments and evaluate their potential side effects. While triamcinolone was used in this study, there currently is no scientific rationale that one corticosteroid preparation should be substantially different from another.

“Results of this study should confirm the use of laser treatment for diabetic macular edema and will have a significant impact on quality of life for tens of thousands of people being treated for diabetic macular edema in the United States each year,” said NEI Director Paul A. Sieving, M.D., Ph.D.

A total of 693 participants with diabetic macular edema participated in the study at 88 sites across the United States. Each participant was randomly assigned to corticosteroid or traditional laser treatment. Following treatment, investigators with the Diabetic Retinopathy Clinical

Research Network (DRCR.net) tested each participant to determine whether the procedure had prevented substantial vision loss. The DRCR.net is a collaborative network supported by the NEI and dedicated to multicenter clinical research of diabetic retinopathy, diabetic macular edema, and associated conditions. Investigators defined substantial vision loss as reading at least two less lines on a standard eye chart 2 years after entering the study.

In the corticosteroid-treated group, 28 percent experienced substantial vision loss, compared with 19 percent in the laser-treated group. In addition, about 33 percent of the eyes treated with laser therapy showed substantial improvement in vision. Laser treatment had previously been perceived to prevent further vision loss, but not to improve vision.

### Increased Eye Pressure

The corticosteroid-treated group was also far more likely to experience side effects. In fact, 51 percent of the corticosteroid-treated group had cataract surgery compared with 13 percent of those in the laser-treated group. In addition, almost half of the corticosteroid-treated group had increased eye pressure, which could lead to glaucoma. One-third of this group needed eye drop medications to lower their eye pressure. The laser-treated group had significantly less of a

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**Paul A. Sieving, M.D., Ph.D.**

Director, NEI

## Organizations Test Collaborative Models for Diabetes Self-management

**M**anaging diabetes is a big job—one that falls primarily on those who have the disease. The more people with diabetes learn about how to manage their illness the better. Research shows self-management of diabetes saves money and improves care.

A unique program with the goal of promoting diabetes self-management is so far yielding positive results. The employer-based program builds on National Diabetes Education Program (NDEP) messages about diabetes and how people can be self-managers of their care, William Ellis, R.Ph., M.S., CEO of the American Pharmacists Association (APhA) Foundation, told attendees at the spring NDEP Steering Committee Meeting.

Through the Diabetes Ten City Challenge, employers create a voluntary health benefit for employees, dependents, and retirees with diabetes and waive copayments for diabetes medicines and supplies if they work with a pharmacist coach, along with their doctors and diabetes educators, to manage their condition.

Participating pharmacists, who are specially trained in diabetes care, meet with program participants regularly to track key diabetes indicators and discuss medications, diet, nutrition, and physical activity. Employers

pay pharmacists for the care they provide. Since the program's inception in October 2005, 31 employers in 10 cities have partnered with hundreds of pharmacists to help more than 1,000 people with diabetes manage their disease.

### Positive Outcomes

Initial data published in the March issue of the *Journal of the American Pharmacists Association* show improvements across all key clinical and patient satisfaction indicators, including

- decreases in laboratory measures for A1C, LDL cholesterol, and blood pressure during the first year of the program
- increases in the number of participants with current flu vaccinations and foot and eye examinations
- a 21 percent increase in the number of participants achieving the American Diabetes Association goal of A1C levels below 7

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problem with eye pressure—only 8 percent of the group needed eye drop medications.

Researchers found that, while not as effective as the laser treatment, corticosteroid treatment did provide some benefit. “Our findings raise the possibility that combining laser with corticosteroids might produce greater benefit,” said Neil Bressler, M.D., chair of the DRCR.net and professor of ophthalmology at Johns Hopkins

University in Baltimore. The DRCR.net is conducting a study comparing a combination of corticosteroids and laser with laser alone.

For more information about the DRCR.net, visit [www.drcr.net](http://www.drcr.net). For a fact sheet about diabetic eye disease, go to [www.nei.nih.gov/health/diabetic/retinopathy.asp](http://www.nei.nih.gov/health/diabetic/retinopathy.asp). For a booklet about keeping your eyes healthy when you have diabetes, visit [www.diabetes.niddk.nih.gov/dm/pubs/complications\\_eyes](http://www.diabetes.niddk.nih.gov/dm/pubs/complications_eyes). ■

### ORGANIZATIONS TEST COLLABORATIVE MODELS, from page 7

- an increase in the number of participants setting self-management goals to control their diabetes, including nutrition, weight, and physical activity goals
- an increase—from 39 percent to 87 percent—in the number of participants who said their overall diabetes care was “very good to excellent”

“The results to date prove that this collaborative practice model is effective for managing diabetes and replicable in diverse locations and employers,” Ellis said. “In years of experience with this model, we have seen that when you have positive clinical outcomes and increased patient satisfaction in the early stages, the economic benefits follow.”

Ellis also said HealthMapRx, an initiative announced by the APhA in 2007, offers the collaborative practice model to employers throughout the United States to help manage diabetes and other chronic illnesses such as depression, cardiovascular disease, and asthma.

### Collaborative Learning

Carole A. Brownson, M.S.P.H., deputy director of the Diabetes Initiative at the Robert Wood Johnson Foundation (RWJF), agreed that an organizational commitment to self-management is needed for successful diabetes control. The RWJF Diabetes Initiative successfully implemented programs in 14 primary care and community sites across the United States using a collaborative learning network model, Brownson told meeting participants. “Resources and supports for self-management are key to good diabetes care,” said Brownson.

The initiative’s goals included

- improving self-management supports through organizational and program improvements in primary care settings
- improving diabetes care and self-management through innovative community/clinic partnerships aimed at demonstrating the value of community support for diabetes care and coordinating clinic and community-based services

The initiative also worked with four sites on pilot projects aimed at making policy and environmental changes in communities and schools to prevent diabetes by reducing the risk of obesity among children ages 3 to 12.

The initiative has made materials for project implementation, training, education, and assessment available for others to use on its website at [www.diabetesinitiative.org](http://www.diabetesinitiative.org). To learn more about the Diabetes Ten City Challenge, visit [www.diabetestencitychallenge.com](http://www.diabetestencitychallenge.com). For more information about the NDEP, go to [www.ndep.nih.gov](http://www.ndep.nih.gov); type in “diabetes self-management” for NDEP information about this topic.

The National Diabetes Information Clearinghouse has an easy-to-read booklet called *Prevent diabetes problems: Keep your diabetes under control*. The booklet is part of a series of publications to help people prevent diabetes complications through self-management of their disease. These publications are available at [www.catalog.nidk.nih.gov/PubType.cfm?Type=167&CH=NDIC](http://www.catalog.nidk.nih.gov/PubType.cfm?Type=167&CH=NDIC). ■



“The results to date prove that this collaborative practice model is effective for managing diabetes and replicable in diverse locations and employers.”

William Ellis, R.Ph., M.S.  
CEO, American Pharmacists  
Association Foundation



## Number of Americans with Diabetes Hits 24 Million in 2007

The number of Americans with diabetes increased by more than 3 million people in 2 years, reaching nearly 24 million in 2007, according to the Centers for Disease Control and Prevention (CDC). The increase raised the total U.S. population with diabetes to almost 8 percent. The CDC also reported that an additional 57 million Americans had pre-diabetes, a condition in which individuals' levels of blood glucose, also called blood sugar, are higher than normal but not high enough to be classified as diabetes.

Among adults, diabetes increased in both men and women and in all age groups. However, the disease continues to disproportionately affect older adults: almost 25 percent of Americans ages 60 or older had diabetes in 2007.

### Health Disparities Continue

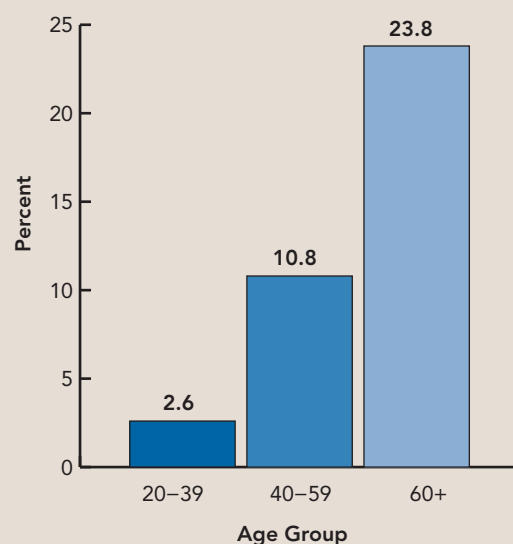
Similar to previous years, disparities still exist among ethnic groups and minority populations including American Indians, African Americans, and Hispanics/Latinos. After adjusting for population age differences among the groups, the rate of diagnosed diabetes was highest—at 16.5 percent—among American Indians and Alaska Natives. African Americans were next with a rate of 11.8 percent, followed by Hispanics/Latinos at 10.4 percent, which includes rates for Puerto Ricans at 12.6 percent, Mexican Americans at 11.9 percent, and Cubans at 8.2 percent. The diabetes rate for Asian Americans was 7.5 percent, followed by Caucasians at 6.6 percent.

The updated diabetes statistics and other information about diabetes are included in *National Diabetes Statistics, 2007*, which is available on the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) website at [www.diabetes.niddk.nih.gov/dm/pubs/statistics](http://www.diabetes.niddk.nih.gov/dm/pubs/statistics). The fact sheet includes prevalence rates for pre-diabetes by race and an updated section about treating diabetes for health care professionals and diabetes educators.

Together with the CDC, the NIDDK's National Diabetes Education Program (NDEP) provides

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Estimated prevalence of diagnosed and undiagnosed diabetes in people ages 20 years or older, by age group, United States, 2007



Source: 2004–2006 National Health Interview Survey estimates projected to year 2007.

diabetes education information to improve treatment and outcomes for people with diabetes, promote early diagnosis, and prevent or delay the onset of diabetes. NDEP resources are available at [www.ndep.nih.gov](http://www.ndep.nih.gov). ■

## Grants Available to Research Impact of Health Communication on Dietary Behavior

The National Institutes of Health (NIH), along with the Centers for Disease Control and Prevention and the U.S. Food and Drug Administration, has issued a funding opportunity announcement (FOA) for research projects focused on creating and executing communication strategies to change dietary behaviors to improve health.

The FOA is designed to promote interdisciplinary research at multiple levels—individual, environmental, and policy—and across diverse populations. Research targeting populations at high risk for obesity, such as children, teenagers, and minority populations, is encouraged.

The funding will be awarded as R01 and R21 grants. The NIH R01 grant

- supports a discrete, specified, circumscribed research project
- is the NIH's most commonly used grant program
- is not limited to a specific dollar amount unless specified in the FOA
- requires advance permission for \$500,000 or more in direct costs in any year
- is generally awarded for 3 to 5 years

The NIH R21 grant

- encourages new, exploratory, and developmental research projects by supporting the early stages of project development
- is sometimes used for pilot and feasibility studies



- limits funding to 2 years
- usually limits the combined budget for direct costs for the 2-year project period to \$275,000
- generally requires no preliminary data

For complete information about applying for the R01 grant, go to [www.grants.nih.gov/grants/guide/pa-files/PA-08-239.html](http://www.grants.nih.gov/grants/guide/pa-files/PA-08-239.html). For more information about the R21 grant, go to [www.grants.nih.gov/grants/guide/pa-files/PA-08-240.html](http://www.grants.nih.gov/grants/guide/pa-files/PA-08-240.html). ■

## MedlinePlus Health Information Now Available in Multiple Languages

**M**edlinePlus, a consumer health portal from the National Library of Medicine (NLM), part of the National Institutes of Health, now features reliable health information in many languages. The collection of health resources contains more than 2,500 links to information in 44 languages covering nearly 250 health topics.

Users can navigate the new collection of health information either by language or topic. The page listing the 44 languages covered in the collection is located at [www.nlm.nih.gov/medlineplus/languages/languages.html](http://www.nlm.nih.gov/medlineplus/languages/languages.html). The most commonly spoken languages included on the site are Chinese, Korean, Russian, Spanish, and Vietnamese.

Links to foreign language information can also be found on individual topic pages, such as the diabetes topic page at [www.nlm.nih.gov/medlineplus/diabetes.html](http://www.nlm.nih.gov/medlineplus/diabetes.html). MedlinePlus has information about diabetes in all of the languages listed in the right-hand column on that page.

### Limited English Proficiency

According to a 2006 survey by the Health Research and Educational Trust of more than 850 hospitals, 80 percent of them treat patients with limited English proficiency. But despite nationwide demand, free, online consumer health information in multiple languages has not been readily available.

To be included on the MedlinePlus website, the multiple-language information must be produced by the Federal Government or a U.S.-based organization such as a hospital or medical association. The information also must be current, authoritative, and appropriate for a U.S. consumer audience.



“As the population of patients and consumers with limited English proficiency increases, more health care providers, patients, and family members will need information in languages from Hindi to Tagalog,” said Paula Kitendaugh, head of the health information products unit in the NLM’s public services division. “By creating a repository of authoritative, free, online information, we hope MedlinePlus will help meet that need.” ■

## NDEP News

### New and Revised Diabetes Prevention and Control Resources

The National Diabetes Education Program (NDEP) offers free educational resources for health care professionals to disseminate to patients from a variety of cultural backgrounds. Patient education materials include adaptations for high-risk audiences such as African Americans, Hispanics/Latinos, American Indians, Alaska Natives, Asian Americans, Pacific Islanders, older adults, and women with a history of gestational diabetes and their children.



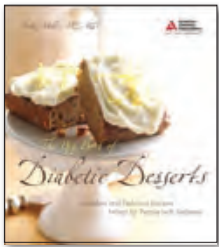
A centerpiece of the NDEP's "Control Your Diabetes. For Life." campaign is an easy-to-read patient education booklet titled *4 Steps to Control Your Diabetes. For Life.*, which helps health care professionals outline vital self-care principles. Presented in an easy-to-read format, the four steps help people with diabetes understand, monitor, and manage their diabetes and empower people with diabetes to be active partners in their care. In addition to English and Spanish, adaptations can be found in Cambodian, Chinese, Korean, Samoan, Tagalog, Thai, Tongan, and Vietnamese.

The NDEP also provides tip sheets about preventing and managing diabetes, such as

- *Tips to Help You Stay Healthy.* This newly updated tip sheet provides a four-part action plan to encourage people with diabetes to know their A1C, blood pressure, and cholesterol numbers and manage their diabetes to reach their target numbers. The tip sheet is a companion piece to the *4 Steps to Control Your Diabetes. For Life.* booklet.
- *We Have the Power to Prevent Diabetes.* This revised resource offers tips to help empower American Indians and Alaska Natives to prevent type 2 diabetes by losing weight through making healthy food choices and getting at least 30 minutes of physical activity every day.
- *Get Real! You Don't Have to Knock Yourself Out to Prevent Diabetes.* This popular resource offers tips to help all Americans at risk for type 2 diabetes move more and eat less to lose weight and lower their risk for type 2 diabetes.

All NDEP materials are available for free, and they also are copyright-free. Many are available on printer-ready CDs, making it convenient for organizations to add their logo and print desired quantities. Visit the NDEP at [www.YourDiabetesInfo.org](http://www.YourDiabetesInfo.org) to download or order free materials, or call 1-888-693-NDEP (6337); TTY: 1-866-569-1162. ■





## Featured in the NIDDK Reference Collection

### Diabetic Desserts

*The Big Book of Diabetic Desserts: Decadent and Delicious Recipes Perfect for People with Diabetes* is designed to help people with diabetes enjoy sweets without exceeding the carbohydrate and calorie targets of their eating plans. The book's author, Jackie Mills, describes the recipes as compromises between often-disappointing sugar-free, fat-free desserts and sugar-laden, high-calorie sweets that should only be a rare treat. The introductory chapter reviews carbohydrate counting, the importance of nutrition, the chemistry of cooking with sugar and sugar alternatives, stocking one's pantry with high-quality ingredients, the use of fruit, suggestions for incorporating small amounts of chocolate and nuts, shopping and cooking hints, the use of spices, and kitchen tools for better baking. The cookbook presents recipes in eight categories: great cakes, quick breads, sweetie pies, smart tarts, fruity desserts, custards and puddings, cookies and bars, and pleasers from the freezer. Each recipe includes ingredients, preparation instructions, food exchange values, and nutrients—including total calories, calories from fat, total fat, saturated fat, cholesterol, sodium, total carbohydrate, dietary fiber, sugars, and protein. About 20 full-color photographs illustrate the center of the cookbook. A recipe index concludes the book. The 240-page book is available for \$18.95 from the American Diabetes Association, 1701 North Beauregard Street, Alexandria, VA 22311, 1-800-232-6733, [www.diabetes.org](http://www.diabetes.org).

The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) Reference Collection is a free, online database that helps health care professionals, health educators, patients, and the general public find educational materials not typically referenced in most databases. The NIDDK does not control or endorse the information contained in this collection; the information is provided as a convenience to our visitors. To find more diabetes resources, visit [www.catalog.niddk.nih.gov/resources](http://www.catalog.niddk.nih.gov/resources). ■

## Additional Resources

### New Spanish Publications

The National Diabetes Information Clearinghouse (NDIC) has translated two diabetes publications into Spanish:

- *Prevent diabetes problems: Keep your teeth and gums healthy (Cómo prevenir los problemas de la diabetes: Mantenga sanos los dientes y las encías)*
- *What I need to know about Diabetes Medicines (Lo que usted debe saber sobre las medicinas para la diabetes)*



### Updated Publications

The NDIC has updated the following fact sheets:

- *DCCT and EDIC: The Diabetes Control and Complications Trial and Follow-up Study*
- *National Diabetes Statistics, 2007*



## New Interactive Tools

New to the Interactive Health Education Tools section of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) website are

### Quizzes

- ¿Cuánto Sabe Sobre la Enfermedad Diabética del Ojo?: Tome este cuestionario (Diabetic Eye Disease: How Much Do You Know?)

### Podcasts

- Chronic Kidney Disease–Cardiovascular Disease Link
- We Can Be Stronger Than Diabetes (National Diabetes Education Program)

### Audio Reports

- Long-term Pesticide Exposure May Increase Risk of Diabetes

The NIDDK interactive tools section consolidates tools and resources about diabetes from the National Institutes of Health and the National Library of Medicine. To access these resources, visit [www.diabetes.niddk.nih.gov/resources/HealthTools](http://www.diabetes.niddk.nih.gov/resources/HealthTools). ■

