National Institute of Diabetes and Digestive and Kidney Diseases
Diabetes Mellitus Interagency Coordinating Committee

A Joint Meeting of the DMICC and the NIH American Indian/Alaska Native Health Communications Work Group: American Indians, Alaska Natives, and Federal Programs

Building 31, Conference Room 6C6
National Institutes of Health Campus
Bethesda, Maryland
12:30–4:00 p.m.
June 29, 2007

SUMMARY MINUTES

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WELCOME, INTRODUCTIONS, BACKGROUND, AND GOALS OF THE MEETING

Judith E. Fradkin, M.D., Director, Division of Diabetes, Endocrinology, and Metabolic Diseases, National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), National Institutes of Health (NIH), Bethesda, MD

Dr. Fradkin welcomed participants and noted the significance of the meeting and the fact that it is occurring on the last day before the retirement of Dr. Kelly Moore, who has spent a distinguished career in the Indian Health Service (IHS). Dr. Moore began her IHS career working with the Pima Indians of the Gila River Indian Community (GRIC) of southern Arizona, where she focused on the impact of type 2 diabetes (T2D) and obesity in children. Dr. Fradkin asked that this meeting be dedicated to Dr. Moore many years of service.

Dr. Fradkin noted that this was a joint meeting between the Diabetes Mellitus Interagency Coordinating Committee (DMICC) and the NIH American Indian/Alaska Native (AI/AN) Health Communications Work Group. The day's program covered a broad array of ongoing activities, including clinical research and public health efforts. It was anticipated that the presentations to the DMICC and other participants would identify opportunities and areas for additional collaboration.

Griffin P. Rodgers, M.D., M.A.C.P., Director, NIDDK, NIH, Bethesda, MD

Dr. Rodgers thanked participants for coming to this important meeting on diabetes and AI/AN. The AI/AN population is approximately 2.5 times more likely to have diabetes than the non-Hispanic Caucasian population. This is an ongoing problem that NIDDK has adopted as part of its core mission: knowledge acquisition at the level of basic research and applied research, and knowledge validation by clinical investigations and clinical trials. The mission does not stop there. NIDDK also is involved in dissemination and education programs. Dr. Rodgers said that the National Diabetes Education Program (NDEP) is bringing knowledge learned through clinical trials to actions for informing the public and diabetes professionals.

NOTE: If the slide presentation for individual speakers is posted on the DMICC website, references have been made within their section of the Summary Minutes that refer to individual slides.

Betsy Singer, M.S., Director, Office of Communications and Public Liaison, NIDDK, NIH, Bethesda, MD

Ms. Singer thanked participants for attending the meeting and described the background and role of the AI/AN Health Communications Work Group. The Workgroup was initiated by Janet Austin and the NIH National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) in the summer of 2005. Three other NIH Institutes—The National Institute of Dental and Craniofacial Research, National Institute of Child Health and Human Development, and National Institute on Aging—joined NIAMS in establishing the Workgroup to focus on the gap in programs for AI/AN. A November 2005 workshop brought together NIH agencies with programs focused on this population. NIDDK participated in the initial workshop to present information on AI/AN initiatives within NDEP and existing programs such as the Diabetes Education in Tribal Schools (DETS) program and the GRIC program, each of which was on the agenda for this meeting.

Subsequent expansion of the AI/AN Health Communications Work Group has included NIDDK, The National Heart, Lung, and Blood Institute (NHLBI), National Library of Medicine, National Eye Institute, National Cancer Institute, National Institute of Mental Health, and National Institute on Drug Abuse. In 2006, another workshop was held on cultural competency strategies for indigenous health. This current meeting was the next in efforts to focus Federal agencies on health issues in AI/AN populations.

TYPE 2 DIABETES RESEARCH IN THE GILA RIVER INDIAN COMMUNITY (GRIC): POINTING THE WAY TO PREVENTION

William C. Knowler, M.D., Dr.P.H., Chief, Diabetes Epidemiology and Clinical Research Section, NIDDK, NIH, Phoenix, AZ

Dr. Knowler discussed the results of longitudinal population studies in the GRIC and implications for diabetes prevention (slide 1). Compared with other U.S. populations, Navajo and Pima Indians have a very high prevalence of T2D (slide 2). Dr. Knowler hypothesized that among Pima Indians and probably other full-heritage AIs, all diabetes is T2D, regardless of age of onset. Much of what we know about diabetes in AIs comes from the GRIC in Arizona (slide 3). Dr. Knowler acknowledged the contributions of Dr. Moore, who worked in the community as a clinician, Dr. Peter Savage, other researchers, and the community itself.

In 1965, NIDDK began a long-term study of arthritis and diabetes in the GRIC (slide 4); the study now emphasizes diabetes and related conditions and is the foundation for all research conducted on diabetes in the GRIC. This study offers biennial health examinations to all residents at least 5 years old (slide 5); this provides an opportunity to collect data on parameters such as the oral glucose tolerance test, HbA1C, blood pressure, and pregnancy and child health.

One of strongest risk factors for T2D is overweight or obesity. Dr. Knowler and colleagues found that, among adult Pima Indians, the incidence of diabetes is strongly associated with body mass index (BMI), such that the number of new cases of diabetes per year increases with the increasing BMI of nondiabetics (slide 6). The question now is whether helping an individual to

lose weight—or preventing a young person from becoming overweight to begin with—will prevent the development of diabetes. Researchers also found that the plasma glucose level of nondiabetics is highly predictive of future T2D in Pima Indians (slides 7–9). Other important risk factors include parental diabetes, the intrauterine environment, serum insulin, physical inactivity, and serum adiponectin (slide 10).

Dr. Knowler noted that, although the risk of diabetes is highly age-related, it also is related to parental diabetes (slide 11). The highest risk for children and young adults occurs when both parents have diabetes at early onset, arbitrarily designated as onset prior to age 45. If only one parent has early onset diabetes, the risk is almost as high. The prevalence of T2D in children and young adults is lower when either parent develops diabetes later in life and is lowest when both parents are nondiabetic. Importantly, when only one parent has diabetes, the risk to the child is greater if the diabetic parent is the mother. By their 20s, children whose mothers were diabetic during pregnancy have a 40-to-60 percent likelihood of developing diabetes. Children of prediabetic mothers have essentially the same risk as children of nondiabetic mothers (slides 12–15). In a study that compared siblings born before and after their mother became diabetic, the sibling who was *in utero* after the mother developed diabetes was at higher risk. In a long-term followup study, the mother's 2-hour glucose tolerance test during the third trimester showed a graded relationship with diabetes incidence in the offspring (to the age of 40; slide 16). This indicates that there is some effect of nondiabetic hyperglycemia during pregnancy but a much greater effect of diabetes during pregnancy. The researchers hypothesized that a "vicious cycle" of diabetes in pregnancy would lead to an increase in the incidence of diabetes in young Pima Indians (slide 17). Unfortunately, this prediction has been supported: almost 6 percent of GRIC children have T2D (slide 18). Further, people with youth-onset diabetes (onset before age 20) have the same risk of end stage renal disease (ESRD) at age 45 as those with later onset T2D at age 55 to 60 (slide 19). Incidence rates of T2D in the 5- to 14-year-old age range has increased dramatically (slide 20); as a result, more people are likely to experience long-term complications as they reach adulthood.

Care has improved for people with diabetes in the GRIC, as evidenced by an increase in the number of people treated with a hypoglycemic drug and concurrent declines in fasting plasma glucose levels (slides 21–23). Other improvements include increased use of antihypertensive drugs, coinciding with lower average blood pressures; increased use of drugs for dyslipidemia, coinciding with improved lipids; and a decline in the incidence rate of ESRD as a function of diabetes duration (slide 24).

The goal of this research is to prevent diabetes, or at least to prevent its complications (slide 25). Some of the major risk factors for T2D are modifiable: obesity and overweight, physical inactivity, and elevated blood glucose (slides 26 and 27). The Diabetes Prevention Program (DPP), a multiethnic, randomized clinical trial, was conducted to determine whether diabetes could be prevented or delayed by treating modifiable risk factors (slides 28–29). People at high risk for diabetes received one of three interventions: weight loss by diet and physical activity (intensive lifestyle intervention [ILS]), metformin, or placebo (slide 30). Weight loss was greatest in the ILS group in the first year (slide 31). The diabetes incidence rate was reduced by 31 percent in the metformin group compared with the placebo group (11% vs. 7.8%), but was reduced 58 percent in the ILS group (to 4.8%; slide 32). Incidence rates and response to

treatment among people who met the high-risk criteria for inclusion in this study did not depend on ethnicity (slide 33). Research on the long-term effects of DPP interventions are ongoing (slide 34).

Prevention requires application of these findings by clinics and the community. These examples illustrate such applications: (1) NIH-supported efforts include support for comprehensive clinical care, efforts to encourage breast feeding (a protective factor), and the addition of physical education in school curricula; (2) an IHS-supported program is implementing DPP-style interventions in adults; (3) community schools are attempting to reduce the fat content in school lunches and to remove soft drinks that contain sugar from school vending machines; and (4) community organizations are developing obesity-prevention programs that target children (slide 35).

Discussion

Dr. Gilman Grave asked whether reducing BMI decreases the risk of diabetes. Dr. Knowler responded that this does occur, at least in the short term. He referred to the DPP, in which body weight and the risk of diabetes declined. It is not yet known whether risk will be reduced over a lifetime.

Dr. Grave noted that these results are not limited to AIs. Larry Dolan's study in Cincinnati found that the rate of T2D in adolescents has increased by a factor of 10 in the past 15 years. This may show the fetal origins of adult disease: as we continue to treat mothers who have type 1 diabetes (T1D) and T2D, the prevalence of diabetes in the population will increase. Dr. Knowler agreed that much of what has been found in the GRIC probably will apply universally, though some of these findings are better documented in GRIC than elsewhere. T2D may be increasing in children in other populations; the question is the extent to which this is an increase in disease versus an increased recognition of the disease (i.e., that it is not T1D). It is not clear what the prevalence of T2D in Caucasian children is, but T2D certainly is a problem in other ethnic groups.

Dr. Grave mentioned Dorothy Becker's contention that there is a "type 1½ diabetes" or "diabesity," meaning that children predisposed to T1D gain additional weight that influences the beta cell and insulin resistance; therefore, they develop glycosuria long before they would have without the additional weight. Dr. Knowler responded that most people who develop T2D in childhood do not have evidence of autoimmune beta cell destruction and that, therefore, it is different from T1D. In many cases, however, the distinction between T1D and T2D is not clear.

Dr. Fradkin noted that the SEARCH Study is looking into this and will provide definitive information regarding the percentage of T2D in children who have glutamic acid decarboxylase (GAD) antibodies. Dr. Knowler replied that this has been the subject of a long debate. Some people with clinical T2D have GAD antibodies, but some nondiabetic people also have GAD antibodies. These people would not be diagnosed with T1D. Antibody status, therefore, is helpful but does not allow for absolute classification.

Dr. Grave said that the Hyperglycemia and Adverse Pregnancy Outcome study was reported at the American Diabetes Association (ADA) meeting in Chicago. Many of the findings were similar to those reported by Dr. Knowler and demonstrated that starting at a fasting plasma glucose level of 75, the birth weight of children began increasing, approaching macrosomia at a level of 105. Rates of caesarian section increased, as did rates of hypoglycemic incidence in the offspring. These findings occurred short of the diagnosis of gestational diabetes mellitus (GDM) but on a monotonic slope with fasting plasma glucose. Dr. Knowler acknowledged the replication of findings.

Dr. Peter Savage asked whether an individual who is exposed to diabetes *in utero* simply has an accelerated onset of diabetes, compared with a sibling who is *in utero* before the mother is diabetic, or whether a diabetic intrauterine environment actually adds to the long-term (10–20 years) difference in glucose levels between the siblings. Dr. Knowler responded that people who are exposed to diabetes *in utero* develop diabetes at a young age and their siblings do not, but it is not clear whether the unexposed sibling will develop diabetes later. Nevertheless, the early development of diabetes is important from a clinical standpoint because it is the duration of diabetes that leads to its complications. Dr. Savage wondered whether the potential toxicity of a hyperglycemic environment might add something to the genetic risk. Dr. Knowler indicated that he believes this to be the case. He added that the mechanism by which diabetes *in utero* causes increased risk is not yet understood. It is interesting that a few nondiabetic adults who are offspring of diabetic pregnancies tend to have an impairment of insulin secretion, not of insulin resistance; this points to a beta cell toxicity.

Dr. Rosemarie Filart asked whether data exist on mortality and morbidity with respect to ESRD for this population and the use of dialysis services in this or other AI communities. Dr. Knowler said he believes that survival rates in the GRIC, once dialysis begins, are better than national averages. In terms of morbidity, dialysis clearly is a major impediment to lifestyle, but specific data on the types of morbidity are not available except that people on dialysis tend to die of heart disease. Before dialysis was available, these people died of uremia and kidney failure. Now, kidney failure almost never is considered the cause of death for people on dialysis.

Dr. Fradkin asked whether any researchers have reported increased T2D in the offspring of people with T1D, which might suggest that the diabetic intrauterine milieu in T1D would increase the risk of T2D in offspring. Dr. Knowler responded that Dr. Boyd Metzger has presented data on this from his studies at Northwestern University in Chicago. Though the findings are limited by the lack of a control group, his data support the notion that there is an increased risk of T2D in the offspring of mothers with T1D.

DIABETES-BASED SCIENCE EDUCATION IN TRIBAL SCHOOLS (DETS)

Carolee Dodge Francis, Ed.D., Executive Director, American Indian Research and Education Center, University of Nevada Las Vegas School of Public Health, Las Vegas, NV, and Janet Belcourt, M.P.H., Chair of the DETS Steering Committee, Stone Child College, Box Elder, MT

Dr. Dodge Francis discussed diabetes in AI and the epidemic increase in T2D. She described the wisdom and optimism that developed when the Tribal Leaders Diabetes Committee (TLDC), in partnership with IHS, challenged NIH to address the epidemic of T2D in AI/AN communities by developing a diabetes-based science curriculum for AI/AN children. The resulting program, the Diabetes-Based Science Education in Tribal Schools (DETS), brought together three funding partners—NIDDK, the Centers for Disease Control and Prevention (CDC), IHS, and eight tribal colleges. The overall purpose of DETS is to effect change in the younger population and reduce the incidence of T2D (slides 1–5). The national partners cover an array of agencies, organizations, and tribal communities, and significant cooperation and collaboration between participants was required (slides 6–7). To develop common beliefs and goals for the DETS program, participants essentially had to learn to "dance together"—to accept, trust, and communicate openly with respect to this unique program (slides 8–11).

Ms. Belcourt indicated that the DETS goals, which served as guidelines for curriculum development, were to: (1) increase the understanding of health, diabetes, and maintaining life in balance among AI/AN students; (2) increase students' understanding and application of scientific and community knowledge about health, diabetes, and life in balance; and (3) increase interest in science and health professions among AI/AN youth to encourage them to serve as health professionals or community advocates (slide 11). Conceptually, the program is meant to promote understanding among children that diabetes is preventable and that balance is the key to healthful living (slide 12). To meet the goals, DETS subcommittees were formed for developing elementary, middle school, and high school curricula (slide 13), and DETS participants followed the 5E Instructional Model.. They incorporated inquiry-based learning, as well as measures by which to meet national standards and address cultural orientation (slide 14).

Dr. Dodge Francis suggested that there is a disconnect among AI/AN students between their awareness of T2D and their understanding of T2D. A curriculum goal was to ensure that students understand T2D both as a scientific concept and in terms of its relevance to their communities. The DETS curriculum addresses lifestyles in Native communities and integrates Native and Western science (slide 15).

Ms. Belcourt described the conceptual framework for the DETS curriculum: "Health is life in balance." Learning objectives for each grade level promote understanding of this concept. Elementary school learning objectives include the concept of health and the prevention of diabetes through healthy food choices and physical activity (slide 16). Middle-school learning objectives include an understanding of the slow development of diabetes over time and an identification of environmental changes that can be made to improve or maintain personal health and the health of families (slides 17–18). High-school learning objectives include an understanding of the science of diabetes, an identification of the risks for T2D, and the understanding of the roles of various professions in the treatment and prevention of T2D (slides 19–20).

Dr. Dodge Francis described the rigorous evaluation process for the curriculum, which includes a Scientific Review Committee—made up of individuals from NIDDK, CDC, IHS, and other institutions—and an External Advisory Committee appointed by the NIDDK. The curriculum has undergone pilot testing, followed by revision and further review by the Scientific Review

Committee. The project currently is in the implementation-testing phase and will use teacher feedback and student behavioral and attitudinal surveys to create a curriculum ready for wide dissemination. Following an update DETS presentation to the TLDC, it was determined that the inclusion of other Tribal Communities would greatly benefit the cohesiveness and testing of the curriculum. This critique and suggestion led to the development of the DETS "sister sites," Tribal Communities which had had no previous contact with the eight tribal colleges (slide 22) and significantly expands the diversity of sites for curriculum testing..

The curriculum already has been a catalyst for change. The Keweenaw Bay Indian Community, for example, removed soda machines from the school system, and school staff with the Seminole Tribe of Florida have begun discussing changes to school lunches. Teacher feedback indicates that the curriculum is relevant, reflecting who the students are as Native People, and that it is adaptable to other tribal communities (slide 24).

Discussion

Dr. Fradkin asked when the curriculum will be implemented in schools. Dr. Dodge Francis responded that the curriculum will be finalized in fall 2008. In spring 2008, presentations and marketing will continue to raise awareness about the curriculum among school personnel, parents, and tribal leaders. Ms. Belcourt added that a professional development component of the curriculum is being developed to train teachers to use the DETS curriculum.

In answering to a question about the response from non-Native students to this curriculum, Dr. Dodge Francis and Ms. Belcourt said that the curriculum is adaptable and that T2D is relevant to all populations. In the sister sites, for example, non-Native students have enjoyed the curriculum because T2D also is relevant to them. Further, in many tribal schools, non-Native teachers teach Native students; the DETS curriculum provides resources for those teachers to learn about the tribal community.

Dr. Kelly Acton commented that NIDDK should be proud of the DETS program. She suggested a major launch of the finished curriculum. Dr. Fradkin agreed and suggested broadening the program with the involvement of other, more diverse teacher associations. The DETS program could impact the broader population at risk for diabetes; in addition, it might be a good venue for teaching and learning about AI cultures and beliefs.

Dr. Filart asked how this program is funded by the three agencies. Dr. Garfield responded that each of the tribal colleges was funded using the U01 mechanism. Dr. Filart asked whether the Science Education Partnership Awards (SEPAs) have been used; these smaller awards could complement other funding for the DETS program. Dr. Garfield indicated that SEPAs have not been used for this program. Dr. Fradkin asked whether SEPAs would support dissemination, followup testing, and validation of the curriculum in practice (i.e., a next-phase evaluation). Dr. Filart responded that she will investigate this and report back to Dr. Fradkin.

INDIAN HEALTH SERVICE (IHS) PROGRAMS
Kelly Acton, M.D., M.P.H., Director, National Diabetes Program, IHS, Albuquerque, NM

Dr. Acton provided an overview of the IHS health care system, the National Diabetes Program, and the Special Diabetes Program for Indians (SDPI). IHS is the principal Federal health advocate and health-care provider for Indian people, employing a blend of clinical and public-health approaches. IHS has a unique government-to-government relationship with the Tribes; this relationship is a partnership in which tribal consultation plays a key role (slides 1–3). Dr. Acton discussed the history, goals, and structure of the IHS National Diabetes Program and emphasized that much of IHS's work is based on research, including the DPP discussed by Dr. Knowler (slides 4–5).

SDPI includes two sets of programs—community-directed programs and competitive demonstration projects. The community-directed programs emphasize community-based objectives (slides 6–7). Eighty-three percent of these programs focus on the primary prevention of diabetes, approximately two-thirds focus on secondary prevention, and about one-third focus on tertiary prevention (slide 8). In terms of outcomes, the national mean HbA1C from 1996 to 2006 has improved steadily and significantly, declining to 7.85 percent by 2006 (slide 9).

The competitive demonstration projects include the Primary Prevention of Diabetes project and the Cardiovascular Disease Risk Reduction project. The IHS Division of Diabetes Treatment and Prevention is responsible for general oversight, coordination, and leadership of the competitive demonstration projects; the IHS Grants Management Office oversees grant administration; and the University of Colorado Health Science Center is the coordinating center for the program (slides 10–12). IHS released a Request for Applications (RFA) in May 2004; of 128 applications received, 66 projects from across the country were funded—36 in Diabetes Primary Prevention and 30 in Cardiovascular Disease Risk Reduction (slides 13–14). Planning occurred in FY 2005, with demonstration project activities begun in FY 2006 and continuing through 2008. In FY 2009, IHS plans to conduct dissemination training to ensure that other tribes learn about the results from these projects (slide 15). The goal of the competitive demonstration projects is to translate research findings into real-world settings. In particular, for the Primary Prevention of Diabetes projects, the goal is to determine how the DPP curriculum can best be applied in Indian communities (slide 16). To achieve this, the IHS selected a diverse set of grassroots, community-based programs and ensured the development of common activities. Through these projects, IHS is building a network and infrastructure for the rapid translation of diabetes findings (slides 17–21).

The Primary Prevention of Diabetes projects recruit people with prediabetes, teach the DPP curriculum in group sessions, and employ community activities as well as individual coaching on physical activity and weight loss. The outcomes include weight loss, lifestyle changes, and, ultimately, diabetes prevention (slides 22 and 24). IHS is evaluating the competitive demonstration projects, both in terms of the process (i.e., whether programs successfully implemented the activities and derived lessons learned) and the outcomes (whether participants improved on short-term, intermediate, and long-term outcomes and the factors associated with successful participants and programs). Evaluation is important for the reauthorization of SDPI (slide 23). Overall, most projects are doing well and making progress, although the initiation of some projects was delayed (slides 25–26). One of the lessons learned from these projects is that,

although a number of participants have been recruited, even the best projects are not meeting recruitment goals; this may indicate that the recruitment goals were not realistic (slides 27–29).

Dr. Acton closed by displaying the logo, "Ho-Chunk Hope: A Diabetes-Free Future (slide 45)," which shows what the tribes hope to achieve through this program. She noted that only baseline data are available currently, but she looks forward to sharing results in coming years that show how these programs are translating the results of the DPP effectively.

Discussion

In response to a question from Dr. Grave, Dr. Acton acknowledged that funding for the SDPI programs expires at the end of FY 2008. Dr. Grave followed up by asking how this funding is linked to the special statutory funding program for T1D. Dr. Acton replied that the programs are linked legislatively, but beyond that they are not linked at all. The funding for T1D comes through NIH, and the funding for the SDPI projects goes directly to IHS through the U.S. Department of Health and Human Services (DHHS) and then is distributed primarily (81 percent) to tribes through a grant process.

Dr. Grave asked whether renewal of the IHS program necessarily implies that the T1D statutory program will be renewed. Dr. Fradkin responded that funding for these two programs has been in lockstep since 1998, both in terms of funding amounts and reporting requirements. Dr. Grave asked whether renewed funding for both programs is likely, and Dr. Rodgers suggested that there is reason for optimism. Dr. Acton commented that the linkage of these two programs is interesting considering that one purely is a research activity and the other truly is a programmatic activity. Dr. Fradkin suggested that, in light of Dr. Knowler's presentation regarding the duration of diabetes and its complications, there is a rationale for linking the two programs. T1D primarily occurs early in life, and AI develop T2D early in life; so there are parallels.

HOW THE *EAGLE BOOKS* GOT THEIR WINGS: CULTURALLY BASED MESSAGES FOR HEALTH PROMOTION AND DIABETES PREVENTION

Lemyra DeBruyn, Ph.D., Senior Scientist/Field Director, Native Diabetes Wellness Program, Division of Diabetes Translation, CDC, Albuquerque, NM, and L. Dawn Satterfield, Ph.D., M.S.N., C.D.E., Health Education Specialist, Division of Diabetes Translation, National Diabetes Wellness Program, CDC, Atlanta, GA

The Eagle Books project has allowed for the convergence of science and art. Both the Eagle Books project and the DETS program were conceived by the TLDC. Tribal consultation through formative research was one of the most important components of the Eagle Books project from 1999 to 2005. Through this formative research, tribal participants expressed a number of issues and questions regarding: (1) the development of culturally appropriate materials and programs; (2) the integration of traditional knowledge into prevention activities; (3) the incorporation of traditional nutrition and activity; (4) emphasis on the message that diabetes can be prevented; and (5) the development of effective educational programs. Participants recommended that diabetes prevention should: (1) integrate prevention efforts into school programs, as demonstrated by DETS; (2) promote understanding that traditional culture is a source of health;

(3) make the information continuously available; (4) use metaphors and clear pictures; and (5) develop stories. In particular, elders who have witnessed the forced changes for AIs over time in terms of land, culture, and lifestyle have suggested that the lack of stories has contributed to the increased incidence of diabetes.

In March 2003, the TLDC issued a challenge to create stories akin to the Little Golden Books Series. Dr. DeBruyn and colleagues approached Georgia Perez, a community health representative in Nambe Pueblo and the author of *Through the Eyes of the Eagle*. This story was derived from a prayer and a vision about the eagle's view of the changes in Indian communities and the incredible toll taken by diabetes among AIs. The story had been integrated into the Strong in Body and Spirit curriculum developed by the Native American Diabetes Program at the University of New Mexico. With Ms. Perez and two illustrators—Patrick Rolo, Bad River Band of Ojibwe, and Lisa Fifield, Oneida Tribe of Wisconsin—Dr. DeBruyn and colleagues developed the other three books of what is now a four-book series. The Eagle Books are intended to highlight the joys of nutrition and physical activity and to encourage children to listen to their elders about traditional ways of health. The books incorporate science, including the epidemiology of diabetes prevalence in AI/AN communities from 1944 to 2004, the increasing rate of T2D diagnosis among young people, and the results of the DPP. The books also incorporate Native science with a focus on ecology, the environment, and traditional foods. Dr. DeBruyn described the process of character development, the creation of the artwork for the books, and the layout and graphics work.

The Eagle Books were unveiled in May 2005 at the Diabetes Translation Conference which included a book signing by the author and artists. Nearly 3 million copies of the Eagle Books have been printed, and almost 2 million books—as well as a teacher and community guide and puppets to be used as teaching tools—have been distributed to Indian Country communities, schools, libraries, clinics, Head Start programs, and Boys and Girls Clubs. IHS is assisting by distributing the books to the federally funded Special Diabetes Program for Indians (SDPI) grantees and other Indian organizations. The Eagle Books have been incorporated into the DETS K-to-4 lesson plans. The distribution of the books has not been limited to Native American communities or to the United States.

In summer and fall 2008, the original artwork from the Eagle Books will become the first display on health promotion at the Smithsonian Museum of the American Indian. In addition, the four original Eagle Books will be animated and made part of the DETS curriculum. Two upcoming Eagle Books that target older youth ages 10 to 14 will address other risk factors for diabetes, such as cardiovascular disease (CVD), depression, tobacco use, and other kinds of behavioral health issues that middle-school children may face. The Eagle Books are cross-cultural in their appeal and serve to teach about both diabetes and Native American culture. The new Eagle Books will capitalize on the positive cross-cultural responses to the original series.

Dr. DeBruyn noted that children, parents, and teachers have provided extraordinarily positive feedback regarding the four original Eagle Books and reiterated the importance of stories in the prevention of diabetes among AI youth.

Discussion

Dr. Fradkin inquired about the reading level of the books. Dr. DeBruyn responded that the Eagle Books were designed to be at the second to fourth grade reading level. In some cases, parents or teachers may be reading the books to children.

Dr. Fradkin asked whether the books are in public libraries. Dr. DeBruyn replied that they are in public libraries in some states, such as Nevada; this is something that Dr. DeBruyn and colleagues hope to address. The primary goal, however, is to distribute the books to school libraries in all schools in which Native children make up a substantial proportion of enrollment.

THE NATIONAL DIABETES EDUCATION PROGRAM: AMERICAN INDIAN/ALASKA NATIVE CAMPAIGNS

Joanne Gallivan, M.S., R.D., Director, NDEP, NIDDK, NIH, Bethesda, MD, and Kelly R. Moore, M.D., F.A.A.P., Clinical Consultant, Division of Diabetes Treatment and Prevention, IHS, Albuquerque, NM

Ms. Gallivan discussed the NDEP, a federally-sponsored initiative of the NIH and CDC with more than 200 public and private partners, including the Indian Health Service, ADA, the Juvenile Diabetes Research Foundation (JDRF), American Indian Talking Circles, and the American Indian Research and Education Center (slides 1–2). NDEP's target audience includes people with diabetes and their families, health-care professionals and providers, people at risk for diabetes, and health-care system policymakers (slide 3). The overall goal of NDEP is to reduce the morbidity and mortality associated with diabetes and its complications (slide 4). NDEP's first campaign focused on educating people regarding the control of their blood glucose levels. In later campaigns, the focus shifted to comprehensive control and the link between diabetes and CVD (slide 5). NDEP has developed educational materials on diabetes prevention and control for many different audiences, including a number of ethnic groups (slide 7). Each of 10 or 11 work groups within NDEP addresses a particular audience, such as a specific ethnic group, age group, or type of health-care provider (slide 8). Work groups also assist by delivering messages and ensuring that messages are culturally and linguistically appropriate (slide 9–10). Ms. Gallivan thanked Dr. Moore for her support and contributions to the NDEP on the AI/AN Work Group.

Dr. Moore described the NDEP AI/AN Work Group, established in 1998, and its mission: to advise and assist NDEP on the promotion, development, and dissemination of culturally appropriate messages, materials, and interventions for AI and AN communities (slides 1–3). Among the accomplishments of the AI/AN Work Group (slides 4–9), Dr. Moore focused on the Move It! Campaign, a diabetes prevention and awareness campaign that targets youth ages 12 to 18 and urges them to reduce their risk for developing T2D by increasing their physical activity (slide 10). The Move It! Campaign was developed in response to the increased rates of T2D in youth, with a goal of reducing risk factors for diabetes through physical activity (slide 11). The campaign was launched at the Association of American Indian Physicians (AAIP) annual conference in 2001 and targeted Bureau of Indian Affairs (BIA), Tribal, and Indian community schools, as well as Indian health programs, Indian youth organizations, and Indian media (slide 12).

In a 2003 evaluation of the Move It! Campaign, the Work Group found that approximately 16,000 posters had been disseminated in 40 states to more than 300 Indian health diabetes grant programs and 29 conferences and cultural events (slide 14). Of the 313 IHS SDPI grant programs that received the campaign materials, approximately 61 percent had heard of the campaign and 42 percent had used the materials (slide 16). Of the 181 BIA and Tribal schools that received the campaign materials and consented to an initial interview, approximately one-half (52.5 percent) recalled receiving the materials (slide 15). Approximately one-half of those schools that recalled receiving the campaign materials agreed to a more in-depth interview, from which the Work Group found that the posters and fact sheets were used most frequently, by 82.1 percent and 61.1 percent of the schools, respectively; print ads were less useful. More than one-half of the schools used the materials with existing activities within their schools, and nearly one-third used the materials from the campaign to develop new activities for the youth of their schools (slide 17). The schools also provided recommendations for improving of the materials (slide 18).

In response to the campaign's evaluation, the NDEP AI/AN Work Group revised the Move It! kit to include more striking fact sheets—one designed for use by teachers and one targeting the youth themselves (slide 19). The revised kit also included a "Getting Started" packet with tips for encouraging physical activity, a customizable poster, a newsletter from AAIP highlighting some of the model Move It! program activities, a template news release, the NDEP tip sheet for lowering risk for T2D, and a flier on ordering pedometers (slide 20). The refreshed campaign was launched at the National Indian Education Association annual conference in fall 2006 and highlighted the efforts of 17-year-old Miami Nation of Oklahoma member John Riley, spokesperson for the Davenport Indian Club's model Move It! program (slide 21).

To provide communities and schools with more resources for implementing activities related to the Move It! Campaign and to reduce risk factors through both physical activity and healthy eating, AAIP and the University of Arizona sought additional funding through the Office of Minority Health, DHHS. In the first 2 years of the Move It! grant program, 20 schools, representing Tribal Nations from across the country, received funding to implement a variety of activities. Promising outcomes resulting from these efforts include weight loss, increased knowledge about diabetes risk factors, increased participation in physical activity, and changes in school lunch program menus (slides 22–23). The model Move It! program at Davenport School in Oklahoma installed a running track with a grant of $7,500 and local donations of land and equipment (slide 24). In addition, students in the Davenport Indian Club produced and disseminated their own Move It! poster (slide 25). Davenport students run and train for marathons and serve as positive role models for others in their communities. The students now know what it takes to lead a healthier lifestyle and are pursuing it (slides 26–27).

Discussion

Dr. Fradkin remarked that the Davenport program was a true success story. Dr. Moore agreed that the Work Group is very excited about the success of the Davenport program and that John Riley is a positive role model and an inspiration.

MACROVASCULAR COMPLICATIONS OF DIABETES IN AMERICAN INDIANS AND ALASKAN NATIVES—NATIONAL HEART, LUNG, AND BLOOD INSTITUTE STUDIES

Peter J. Savage, M.D., Director, Division of Epidemiology and Clinical Applications, NHLBI, NIH, Bethesda, MD

Dr. Savage began by remarking on the impressive progress over the years regarding the medical community's understanding of the prevalence, prevention, and treatment of diabetes and its complications among AIs. He also acknowledged the substantial accomplishments described in previous presentations. Dr. Savage then summarized a number of NHLBI-funded studies in AI communities.

The Strong Heart Study (SHS) was initiated to reconcile conflicting data and anecdotal reports regarding the incidence of heart disease among AIs with diabetes. At the time, it was thought that heart disease was relatively rare, at least among the Pima. The objectives of this study were to: (1) measure rates of CVD and risk factors; (2) determine the effect of diabetes on the development of CVD; (3) determine whether differences exist among tribes; and (4) use followup studies to examine changes in risk factors over time. Approximately 4,500 AI men and women were recruited from Arizona, Oklahoma, and the Dakotas. Additional participants subsequently were recruited to allow for an investigation of risk factors in younger people and families and to examine potential associations with genetic factors. Heart disease rates in all three geographic regions were somewhat higher than those found for Caucasians and African-Americans in the Atherosclerosis Risk in Communities Study; the prevalence of diabetes in SHS was highest in the Arizona group but also was quite high in Oklahoma and the Dakotas. The contribution of diabetes to CVD—and the hazard ratio associated with having diabetes—was substantial, such that people with diabetes had a hazard ratio 2 or 3 times that of nondiabetics; the hazard ratio may have been a bit higher than in some of the other populations in the Framingham Heart Study. In addition, the hazard ratio was higher in women than in men. Because of the high incidence of diabetes, the attributable risk for heart disease associated with diabetes is much higher among AIs.

The Genetics of Coronary Artery Disease in Alaska Natives (GOCADAN) Study is conducted by the MedStar Research Institute in collaboration with the Southwest Foundation for Biomedical Research and the Norton Sound Health Corporation. About 1,200 people were recruited from multiple communities in the area around Nome, Alaska. The goal of GOCADAN was to examine risk factors as well as genetic factors associated with underlying risk factor distributions. Results from GOCADAN compared with those of SHS suggest that there are substantial differences among Native American groups. For example, among GOCADAN participants, normal glucose tolerance was quite common and diabetes was relatively rare; in SHS participants, by comparison, diabetes and impaired glucose tolerance were common. Smoking rates were higher in GOCADAN participants than in SHS or Framingham Heart Study participants. Rates of elevated high-density lipoprotein (HDL) cholesterol levels were higher in GOCADAN participants than in either the Framingham Heart Study or SHS; only a relatively small number of SHS participants had high HDL cholesterol levels. Rates of high blood pressure were lowest in GOCADAN, intermediate in SHS participants, and highest in Framingham Heart

Study participants. An investigation of CVD using carotid ultrasound demonstrated high rates of carotid artery disease in the GOCADAN participants compared with U.S. African-American and Caucasian adults. The incidence of carotid artery disease in GOCADAN participants is as high as it is in SHS participants; the higher smoking rates among Inuits in the Nome area may partially explain this finding. Comparing results from GOCADAN and SHS demonstrates the wide differences among Native American communities in CVD and diabetes.

Other NHLBI efforts include an RFA to encourage the development of behavioral interventions intended to promote the adoption of healthy lifestyles and to lower CVD risk. These interventions have been carefully designed to be culturally appropriate; in addition, they are meant to be suitable for incorporation into community health systems so that they will be sustainable after the research effort has concluded. In addition, NHLBI administers a group of grants for small, randomized clinical trials investigating a variety of interventions to reduce CVD risk factors. Finally, NHLBI funds a group of investigator-initiated research grants.

Dr. Savage briefly summarized two other NHLBI-funded studies. The Pathways Study was a school-based intervention for children intended to prevent the development of obesity. Successful outcomes included modification of the school lunch program, development of additional school activity programs, and improvement in children's knowledge about healthy eating. The program, however, resulted in only a very small difference in BMI between the control and intervention groups; this suggests that improvements made in the school environment did not extend to families and the home environment. An NHLBI study is underway to investigate the aggressive treatment of blood pressure and lipids in an AI community and to examine by carotid ultrasound the progression of atherosclerosis. This study is underway and should provide information regarding additional means of preventing some of the complications of diabetes.

Dr. Savage responded to Dr. Knowler's comment regarding the increase in heart disease that apparently has occurred in some AI communities. In one region in the Sacaton, Arizona, area, this largely is a result of the treatment of renal disease. It is not clear, however, whether this also is the case in the other SHS regions. CVD has increased and there are significant differences in CVD risk factors among participants in the three regions examined in the SHS.

Discussion

Dr. Grave referenced the higher hazard ratios in women compared with men and asked whether the cause of this difference is known and whether it also occurs in Caucasian populations. Dr. Savage agreed that the sex difference in hazard ratios is large but suggested that the difference might not be as great with a larger sample. Nevertheless, evidence suggests that hyperglycemia is a greater hazard in women than in men; this may be because of the differences between men and women in other risk factors.

Dr. Knowler noted that, in other studies, this sex difference basically results from differences in heart disease rates in nondiabetic people: nondiabetic men have higher rates of heart disease than nondiabetic women. Among people with diabetes, however, the sex difference tends to disappear. Dr. Savage argued that the extent to which the sex difference disappears is somewhat

debatable. The most recent evidence suggests that the sex difference in the risk of CVD diminishes but does not disappear.

DISCUSSION AND OTHER ISSUES
Dr. Fradkin

Dr. Fradkin thanked all participants. In particular, she acknowledged Dr. Garfield for organizing the meeting and for his contributions to many of the programs and projects discussed at the meeting that address the problems of diabetes in Indian Country.

She noted that the next DMICC meeting has not yet been scheduled and requested suggestions from the participants for topics to be discussed at a future DMICC meeting. NIDDK will pursue suggestions from the last DMICC meeting regarding opportunities for clinical trials.

The meeting adjourned at 4:08 p.m.