

her risk for having a miscarriage by improving her control. In fact, a diabetic mother in excellent control has no greater risk for having a miscarriage than a woman with no medical problems.

More work remains to be done on diabetes. Although we know that some aspect of maternal diabetic control causes malformations, diabetes is not just high blood glucose. It is more complicated than that. In addition to raising blood glucose, diabetes can cause numerous other metabolic changes. Scientists are now trying to determine which of the many biochemical abnormalities caused by diabetes is responsible for birth defects—as a way of identifying more precisely those at highest risk, and to improve our understanding of the mechanisms by which these defects occur.

Diabetes illustrates another fascinating riddle about birth defects. We know that those diabetic women in very poor control are at highest risk for having a malformed infant, 20 percent or more of their offspring will have major birth defects (that's about ten times the rate in the general population). Why is it that the other 80 percent are not affected? We know that women who take medications that are known to cause birth defects during the critical period when the embryo's organs are developing still do not have a 100 percent chance of having affected offspring. What we do not know is why some embryos escape unscathed.

We do have some ideas, however. One of the reasons we think not every exposed embryo gets malformations brings me to the next topic; that is, how factors from outside the developing embryo—in the embryo's environment—and genetic factors interact to cause birth defects. Now let me explain just what I mean by factors outside the developing embryo. The embryo's environment means whatever is in the mother's blood—drugs she takes for acne, high blood glucose, or low vitamin levels. By genetic factors, I mean anything hereditary that make the embryo directly susceptible to birth defects.

In order to illustrate how the embryo's environment and genetic factors together produce birth defects, I want to tell you a story about neural tube defects and folic acid. Neural tube defects are a malformation of the nervous system. They are among the most devastating defects. Anencephaly is a uniformly fatal defect in which most of the brain is missing. Spina bifida is a disruption of the spinal cord that is often fatal. In survivors, it causes paralysis, bladder and bowel problems and severe disability.

Many years ago scientists observed that neural tube defects were much more common in poor families. Some suspected that dietary deficiency was an important factor. When women who had delivered an affected child were tested, they were found to have significantly lower levels of several vitamins—notably folate—in their blood. This prompted scientists to give women vitamins before they became pregnant to try to prevent neural tube defects. When investigators gave women vitamin tablets containing folic acid before they became pregnant, they were able to decrease the risk for neural tube defects, thus proving that folic acid was an important factor in the causation of NTDs. In fact, the United States Public Health Service now recommends that all women who could possibly get pregnant take folic acid to prevent these defects. So, investigators had found the environmental piece of the puzzle—folate. But remember, I said this was a story about an environmental-genetic interaction. What about the genetic piece that completed the puzzle?

We know something else about the causes of neural tube defects; certain ethnic groups are known to be at high risk. In the Celtic

population, in particular in Scotland and Ireland, the risk is up to five times higher than the risk in the U.S. They call neural tube defects the curse of the Celts. So there is clearly a high risk genetic group.

We saw this as a golden opportunity to look for an environmental, that is vitamin-related, genetic, that is Celtic, interaction. We at NIH and our collaborators at the Health Research Board of Ireland and Trinity College, Dublin explored what it was about these high risk Irish mothers that put them at risk for having a child with a neural tube defect.

We had several clues. First, we knew that folate was important. This made it very likely that these women or their embryos had a problem absorbing folate from their diet, or using folate normally in their metabolic reactions. Unfortunately, humans use folate in over a dozen different reactions, making it very difficult to determine where the problem was. But we were lucky.

We had a second clue—low vitamin B12 levels also seemed to increase the risk for neural tube defects, and of all the dozen plus reactions that involved folate, only one involved B12 as well. In this reaction, B12 and folate are used to eliminate a chemical known as homocysteine. Homocysteine is converted into methionine, an essential ingredient in the production of proteins, DNA and other critical items for the embryo.

We hypothesized that women whose fetuses had neural tube defects could not convert homocysteine to methionine normally. We were able to measure homocysteine levels in the blood of women who were pregnant, carrying fetuses with neural tube defects. The homocysteine levels were higher than normal, indicating that these women were not able to convert homocysteine normally.

We believe that this inability to convert homocysteine is the reason that these women have babies with neural tube defects—either because homocysteine is toxic to the embryo, or because the embryo does not receive a sufficient amount of the products of the reaction. Genetically, these women seem to have an abnormal enzyme (a chemical that moves the reaction forward). Adding more of the vitamin, folic acid, in essence pushes this chemical reaction forward and converts the homocysteine normally.

Here then was the missing piece of the puzzle. A combination of an environmental factor—insufficient folate—and a genetic factor—impaired ability to clear homocysteine—causes neural tube defects.

This leads me to the last major topic—how our understanding of these biochemical and genetic factors can lead to the prevention of birth defects. After all, it may be very satisfying to know how birth defects occur, but we are really in this business to save children from death and disability. In order to do this, we are constantly on the lookout for markers to identify women at risk, and for interventions to prevent birth defects.

We now know of several biochemical risk factors. The diabetes specialist can use clinical markers like blood glucose to identify women in poor metabolic control, women who should avoid getting pregnant until their medical problems can be corrected. We hope that we will soon have a practical test to identify women who do not convert homocysteine well and, thus, are at increased risk for having children with neural tube defects. These women could then be targeted to receive extra folic acid to prevent neural tube defects. In the meantime, we can still prevent many neural tube defects by ensuring that all women who might become pregnant take folic acid supplements.

What will the future bring? To use the illustration of neural tube defects again, we expect to find the specific biochemical reac-

tion that is working too slowly in converting homocysteine. Once this is done, we will look at the enzyme that is supposed to move that reaction ahead. Because each enzyme is manufactured by a specific gene, it will be possible to see if the women with the homocysteine abnormality have a defective gene for that enzyme. This is as simple as finding out whether the genetic code contains an error for that gene. When that is accomplished, women can be screened by gene testing as another method of identifying women at higher risk for having babies with neural tube defects—those who especially need additional folate before they become pregnant.

Looking even farther into the future, we may be preventing birth defects by gene therapy. When a couple has a gene abnormality that prevents them from having normal children, it may be possible to perform in vitro fertilization and insert the proper gene into the fertilized egg to correct the defect—and to do it even before the fertilized egg is put into the mother's uterus.

Of course, we face new challenges with these new scientific advances. Moral issues, such as when to perform genetic testing and gene therapy, will require very careful consideration. Fortunately, when the goal is to save the life of the child by preventing birth defects, the moral questions often have clear answers.

In conclusion, Mark Twain once said that everybody always talks about the weather but nobody ever does anything about it. Until recently it could have been said that we scientists always talked about birth defects but never did anything about them. Now we are in an exciting new era where we are not just talking about birth defects; now we are doing something about them. We are preventing them.

EUNA M. THOMPSON, EXCELLENT
TEACHER

HON. TONY P. HALL

OF OHIO

IN THE HOUSE OF REPRESENTATIVES

Thursday, September 7, 1995

Mr. HALL of Ohio. Mr. Speaker, I rise today to salute Euna M. Thompson, a teacher in my district, who embodies excellence in the field of education. Ms. Thompson is an outstanding example of the vital and significant impact that a teacher can make on students' lives.

Ms. Thompson is a recipient of the 1995 Excellence in Teaching Award of the National Council of Negro Women. The Excellence in Teaching Award honors teachers who uphold the legacy of Mary McLeod Bethune, eminent educator and founder of the National Council of Negro Women, by making significant contributions to the education of African American students.

Ms. Thompson strives to effect change in her students by strengthening their self-esteem, self-discipline, creativity, and critical thinking skills. She creates opportunities for her students to explore, create, perform and develop positive attitudes about themselves.

Ms. Thompson uses her considerable musical talents to enhance her teaching methods. She views art and music as means to enrich oneself culturally and academically. By leading her students to a second place victory in a New York singing competition and spearheading a \$40,000 fund-raising campaign, Ms. Thompson created a once-in-a-lifetime opportunity for her students to sing for Pope John Paul II in Rome.

Ms. Thompson has worked in the public school system for more than 30 years and now serves the Dayton community as director of Choral Music and Humanities at the Patterson Career Center. She has received many awards and accolades including the Impact II Grant for two consecutive years, the Dayton-Montgomery County Public Education Fund's Excellence in Teaching Award and the Martin Luther King Award for promoting human rights through the arts.

Mr. Speaker, I applaud Ms. Thompson for her devotion to children. By making a real and positive difference in her students' lives, Ms. Thompson makes a real and positive difference in our future.

ON CONTINUED SUPPORT FOR THE
DEFENSE DEPARTMENTS CIVIL-
MILITARY COOPERATIVE PRO-
GRAMS

HON. TIM JOHNSON

OF SOUTH DAKOTA

IN THE HOUSE OF REPRESENTATIVES

Friday, September 8, 1995

Mr. JOHNSON of South Dakota. Mr. Speaker, I rise today to express my strong support for continued funding for the Civil-Military Cooperative Action Program [CMCAP] of the Office of Reserve Affairs at the Department of Defense, and to voice my strong opposition to the level of funding included for this important office in the House version of the fiscal year 1996 Department of Defense appropriations bill. Thankfully, the Senate chose to fund this Office at a level significantly higher than the funding included in the House bill and I plan to urge my colleagues in conference to accept the level of funding adopted by the Senate.

CMCAP, which provides training opportunities for our military personnel and allocates surplus materials to States and local communities, was initially authorized by Congress in 1993 as a means of enhancing military readiness for the Reserves, while helping to address important domestic needs at the same time. As we continue downsizing and reorganizing our national defense, I cannot emphasize strongly enough the importance of appropriate reallocation of surplus materials which result from base closures both at home and abroad.

The benefit of civil-military program cooperation can be readily seen in native American communities around the country and in my State of South Dakota. This year \$6 million in excess equipment was distributed to 136 native American communities in 26 States. In South Dakota, much needed medical and construction equipment was delivered to communities on and off Indian reservations, including Rapid City, Eagle Butte, Sisseton, McLaughlin, Ft. Thompson, Flandreau, Lower Brule, Pine Ridge, Pierre, and Rosebud.

Federal expenditures for social programs continue to exceed investments for economic growth in Indian country. I feel strongly that the role of the Federal Government must be to encourage tribal self-sufficiency at every opportunity. I believe the Federal Government must prioritize programs which develop infrastructure on reservations and enhance economic growth for tribal communities.

I have been contacted by tribal organizations in my State regarding a CMCAP project

currently being developed to repair and refurbish substandard housing on the Oglala and Rosebud Sioux Indian reservations. The project, Operation Walking Shield, would also provide recreational fields for youth risk prevention programs, transport excess medical equipment and supplies to Indian health centers, and employ local labor to work with military personnel in this important community development effort. Without continued funding for civil-military programs, Operation Walking Shield and other such projects critical to economic development in Indian communities will likely not proceed.

As I stated previously, I plan to contact the House conferees and urge their acceptance of the Senate funding for the CMCAP. As we downsize our military, I feel strongly that adequate funding for the cooperative programs maintained by this Office is critical to ensuring that excess equipment and materials are distributed to communities in need as efficiently as possible.

HONORING 50TH ANNIVERSARY OF
KAISER PERMANENTE MEDICAL
CARE PROGRAM

HON. JAY KIM

OF CALIFORNIA

IN THE HOUSE OF REPRESENTATIVES

Friday, September 8, 1995

Mr. KIM. Mr. Speaker, I rise today to pay tribute to the Kaiser Permanente Medical Care Program on their 50th Anniversary.

Fifty years ago, as World War II came to an end and thousands of defense workers moved from the shipyards and steel mill operations of Henry J. Kaiser and found work in other areas, many asked that they be able to continue their membership in the pre-paid group practice health plan which had been established by Henry J. Kaiser and Dr. Sidney Garfield in California and Oregon.

As a result of community interest and need, the Kaiser Permanente Medical Care Program was opened to the public in 1945. In Southern California, the Kaiser Permanente Medical Care Program expanded from its initial site in Fontana, to the Los Angeles Harbor in 1950 and to metropolitan Los Angeles in 1951.

Once established in Southern California, the Kaiser Permanente Medical Care Program grew rapidly as more and more people were attracted to its integrated system, comprehensive benefits, high quality and affordability. In the mid-1960s the Kaiser Permanente Medical Center Program was brought to Orange County and now provides quality health care to 190,000 people and employees in the Orange County region.

Now, after 50 years, the Southern California region of the Kaiser Permanente Medical Care Program now provides care to more than 2.1 million Southern California residents at 10 major medical centers and more than 90 medical office buildings, and is offered by more than 10,000 businesses between Bakersfield and San Diego.

Since its inception, Kaiser Permanente has become an acknowledged and respected leader in the provision of quality, affordable health care, as well as an innovator in clinical research and the delivery of care to large numbers of patients.

Relying on its founding principles of prepayment, comprehensive benefits, preventive

care, group medical practice and integration of service and facilities, Kaiser Permanente has become a respected model for how affordable, high quality medical care can be provided.

After 50 years of providing care to the Southern California community, and having become the Nation's largest private health care provider with more than 6 million members in 16 States and the District of Columbia, it is indeed worthy to note the golden anniversary of the Kaiser Permanente Medical Care Program and its contributions to the health of our community and the Nation.

HONORING NINEL SEGAL

HON. GARY L. ACKERMAN

OF NEW YORK

IN THE HOUSE OF REPRESENTATIVES

Friday, September 8, 1995

Mr. ACKERMAN. Mr. Speaker, a very special lady celebrated a very special birthday on September 3. She is Ninel Segal, an unpaid volunteer in the office of my friend and colleague, Congressman MICHAEL R. MCNULTY.

In the true American tradition, Ninel has devoted her life to helping people—as an educator and an administrator dedicated to securing employment for economically disadvantaged individuals in New York State's capital region.

Ninel has selflessly given her time and service to numerous organizations. She never fails to lend a helping hand when needed. A most charming person with a sharp intellect and a compassionate heart, she has an unusual capacity for bringing people together.

Mr. Speaker, on this happy occasion, it is my pleasure to ask all my colleagues in the House of Representatives to join me now in wishing Ninel Segal the happiest of birthdays—and many, many more to come.

HONORING SISTER MARY
ANTIONETTE CAPPELLI

HON. ROSA L. DeLAURO

OF CONNECTICUT

IN THE HOUSE OF REPRESENTATIVES

Friday, September 8, 1995

Ms. DeLAURO. Mr. Speaker, on Sunday, September 10, St. Brendan's School in New Haven, CT will pay tribute to the many accomplishments of Sister Mary Antoinette Cappelli, O.L.G. After 19 years as principal of St. Brendan's, Sister Mary will be leaving this month to begin her responsibilities as a counselor for the Sisters of Our Lady of the Garden.

As principal, Sister Mary devoted herself to bringing the best out of every student. As a result of her commitment to meeting the academic, social, and spiritual needs of her students, St. Brendan's quickly became a model of educational excellence nationwide. In 1990, St. Brendan's was selected as a Blue Ribbon School by the U.S. Department of Education for its academic excellence and commitment to parent involvement. St. Brendan's has received much praise over the years for its ability to meet the needs of a economically and racially diverse student body. I have had the pleasure of visiting St. Brendan's on several occasions, and have always been impressed by the infectious enthusiasm displayed by the