

- **Detection of hundreds of known pathogens using DNA biochips** is now closer to reality through grants to an MSU research team from the National Institutes of Health, Michigan Economic Development Council, and the Department of Defense. A hand-held device will detect microbial contamination of health-related equipment and fluids in hospitals. In the near future this technology will incorporate nanoparticles and microfluidics to achieve automation, cost effectiveness, and enhanced sensitivity.
- Americans with advanced disease are using complementary therapy in record numbers yet little is known about these treatments. MSU researchers studying the use of these therapies in the context of conventional medical care for women undergoing chemotherapy for late-stage breast cancer are finding an improvement in quality of life. This research has potential for leading to enhanced care through **integration of conventional and scientifically based complementary therapies**.
- MSU engineering and life sciences researchers are developing **scaffolds for bone tissue engineering and drug delivery** and examining transport effects on cellular processes, metabolic profiling, and the effect of micropatterned surfaces on cell behavior. Such developments will be useful in creating new bone to eliminate the need to obtain bone from tissue banks with the attendant risk of disease. This biomolecular engineering work will also provide insight into the treatment of diabetes, Alzheimer's, and Parkinson's disease.
- Using data from 10-year trends of *Salmonella* outbreaks and sporadic infections, MSU researchers address the role of age, ethnicity, and location to map the epidemiology of salmonellosis in Michigan. Initial results suggest that **the Michigan pediatric population is at higher risk for salmonella infection than the national average**. Data will be used to develop a more effective health policy on salmonellosis in Michigan, identifying the foods related to contamination and evaluating risk factors to develop control and prevention measures.
- An MSU research team is determining if inflammation, infection, and hormonal levels during pregnancy and at birth are **factors in causing cerebral palsy**.
- **Secure wireless networks for collection, storage, and transmission of sensitive health information** will help provide quality health care to various locales across the state.

Spotlight on Success

Using methods they developed at MSU, a research team found a genetic process that may help explain how cancer originates. The researchers found that the human adult stem cell in which the gene, called oct-4, was expressed was the "target" cell for beginning the carcinogenic process. Cells in which oct-4 was not expressed could not go cancerous. If further research proves oct-4 to be a reliable screening marker for cells that turn malignant, learning how to turn off the expression of the gene will have major implications for both prevention and treatment of cancer.

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For more information contact:

Ann Beaujean, director, State Relations, beaujean@msu.edu, 355-5060, www.msu.edu/unit/vpga
Information compiled by Audrey Gift, associate dean, College of Nursing and Nigel Paneth, associate dean, College of Human Medicine.

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Outcomes for Michigan's Future

MSU: Ensuring That People Are Healthy

In Brief:

- Genetics, the environment, and inflammation are risk factors for life threatening conditions that include cancers, stroke, heart attack and other cardiovascular diseases, asthma, obesity, and autoimmunity. MSU researchers are exploring all of those areas and making **significant discoveries to understand and treat disease mechanisms**.
- Currently available drug delivery systems are not always effective or efficient. MSU researchers are exploring the use of **natural, biodegradable materials to carry medicines to the point where they're needed and dispense them when they're needed**. An MSU chemist has discovered a compound that shows promise for making cancer therapies more effective.
- Health care delivery systems are not always effective and efficient either, especially for poor and minority citizens. Some MSU researchers are exploring mechanisms to **improve care for those vulnerable citizens**. Others are applying technology to improve delivery of health care.

Situation:

Medicaid recipients comprise a large at-risk population. One in seven Michigan citizens is covered by Medicaid, including more than one-third of all babies born in the state and two-thirds of people in nursing homes. Medicaid is a nearly \$9 billion program statewide, accounting for 26 percent of the state's general fund expenditures in 2005.

People with chronic and advanced diseases and their families face special challenges and risks. Many do not have access to specialized services. Physical distance, cultural obstacles, and other circumstances often create communication problems between medical personnel and their patients. Many current treatments for chronic and acute diseases are inadequate, reflecting incomplete understanding of physical processes and disease trajectories. Ethnicity and socioeconomic status often influence the availability and quality of health care.

MSU Capacity:

- MSU assists the state Medicaid program in providing assistance to the most appropriate patients.
- A partnership between the MSU College of Nursing, the Institute for Healthcare Studies, the Michigan Department of Community Health, and the CAPE Health Plan in Detroit will help to **reduce care disparities** for African American adults diagnosed with diabetes.
- In collaboration with the Detroit Center on Oral Health Disparities, **MSU is reducing disparities in oral health care.**
- MSU's Obesity Council and the MSU College of Nursing are helping develop ways to **prevent obesity in youth and adults.**
- MSU College of Nursing researchers partner with the Special Supplemental Program for Women, Infants, and Children (WIC) in Michigan on ways to **prevent weight gain in young, low-income, overweight mothers with young children.**
- Various groups at MSU are developing ways to **prevent, detect, and treat breast cancer** in Michigan.

Michigan's children face significant health issues. Lead poisoning is one pernicious problem. Obesity has tripled in school-age children in the United States since the 1970s, and Michigan is among the states with the highest levels of obesity. Michigan is the third fattest state in the United States, and physical inactivity and obesity are the leading health indicators targeted for intervention by the Centers for Disease Control. Cerebral palsy occurs in approximately 250–300 Michigan births. Premature infants — although only 1 percent of births in Michigan — account for nearly 40 percent of infant mortality, and survivors make up a substantial fraction of children in Michigan with severe chronic disabilities, including chronic neurodevelopmental disabilities.

- In partnership with state agencies, **MSU is helping to improve Michigan's nursing home care.**
- Faculty at MSU are developing approaches to **detect chronic lung diseases, especially asthma, decrease their incidence, and treat these illnesses.**
- The START program at **MSU helps children with Autism Spectrum Disorder.**
- Hospitals in Lansing, Grand Rapids, and Royal Oak participate in an MSU-led consortium to **protect underdeveloped and low-gestational-age infants from brain damage.**
- The Pregnancy Outcome and Community Health (POUCH) project is helping **predict and thus prevent premature deliveries** and, with support from the Blue Cross-Blue Shield Foundation, MSU scientists are developing medical care for seriously ill newborns.
- Scientists at MSU are developing **approaches to treat cardiovascular disease**, including strokes.
- MSU Faculty are developing **anticancer therapies** and using adult stem cells to find ways to prevent the development of cancer.

- Approaches are being developed at MSU to work with adolescent women in Michigan to **reduce unintended pregnancies and sexually transmitted diseases**, subsequently reducing Medicaid costs.
- MSU faculty are developing ways to **improve access to health care services** to populations at risk.
- The National Food Safety and Toxicology Center at MSU is developing ways to **process food to make it safer, to detect and treat food allergies, to prevent**

- adverse effects from food toxins, and to prevent food-related diseases.**
- Scientists at MSU are focusing on the **detection and control of emerging infectious diseases** such as bovine tuberculosis.
- Several MSU faculty groups are developing approaches to **control and remediate toxic waste sites** in Michigan.

Successes:

- MSU researchers developed a program for **management and support of high risk pregnant women.**
- MSU faculty have developed **nutritionally improved foods** through genetic engineering.
- MSU faculty developed ways to improve the level and types of the **health care work force** in the state through the Michigan Direct Care Workforce Initiative.
- MSU developed and distributed instruments and interventions that are helping **address the obesity problem** in the state. These include several statewide surveys, a Webcast on *Obesity: a Personal or Public Health Issue*, and early interventions with mothers of infants on Medicaid to reduce the risk of early childhood obesity.
- MSU research resulted in “decision support tools” — booklets, Web sites, and audio tapes that explain

- treatment or screening options and the costs and benefits of each option — to give patients and the public the **information and skills to make informed medical decisions** and increase their involvement in medical decision-making.
- The Geriatric Education Center of Michigan, which is administratively located at MSU, helps Michigan's primary care providers deal with **dementia patients**, with a specific focus on medically underserved communities.
- The Cognitive Games Suite is an Internet-based technology designed by MSU to help **preserve memory and other cognitive mental functions** during the years from middle age through late life.
- The MSU Blood Lead Level group developed an inexpensive tool to **screen children for risk of lead poisoning** and determine when they need more expensive blood testing.

Outcomes for Michigan's Future:

- MSU is developing two Web sites for Medicaid beneficiaries. One will provide **diabetes information and educational materials** to beneficiaries who have or are at risk for diabetes, with material accessible to beneficiaries with literacy problems. The second site will provide low-literate parents of children enrolled in Medicaid with **information related to the care of childhood diseases at home.**
- An MSU project to disseminate **information on breast and cervical cancer screening** to Hispanic women on Medicaid will encourage them to seek

- appropriate screening and assist them in making and keeping appointments for screening.
- MSU training for paraprofessionals and professionals will increase their skills in **recognizing and communicating effectively with low-literacy clients.**
- MSU researchers collaborating with Early Head Start agencies in 20 Michigan counties will develop culturally sensitive measures and identify approaches to **prevent obesity in at-risk toddlers.**