

The Miami Valley's "National Treasure" turns 75

by Judi Engle

In 1929, Antioch College President Arthur Morgan posed the question, "What makes people different?" to his friend, Samuel Fels, a Philadelphia businessman and philanthropist. He also speculated that a longitudinal study from birth to adulthood would be required to attempt to answer the question. Although expert biologists and social scientists of the time were skeptical that such a longitudinal study had any real value, Samuel Fels gave Arthur Morgan the backing he needed to establish the Fels Research Institute in Yellow Springs, Ohio, and begin the study.

The Fels Longitudinal Study was one of many similar studies initiated between 1927 and 1932, all of which recorded serial data for the individuals enrolled. However, while most studies analyzed the data cross-sectionally, only one group of researchers harnessed the power of the longitudinal design. In the 75 years since its founding, the primary focus of the Fels Study has evolved from the growth and development of children to encompass the examination of body composition across the generations, risk factors for cardiovascular disease, the genetic epidemiology of many common diseases, and the aging process.

As the world's largest and longest-running study of human growth and development, the Fels Study has been characterized as a "national treasure" by a committee of experts at the National Institutes of Health. The "treasure" is managed by Wright State University School of Medicine's Lifespan Health Research Center (LHRC) located at Miami Valley Research Park. The center is a recognized hub of research excellence in the Department of Community Health.

"One of the most unique aspects of the Fels Longitudinal Study is being able to relate aspects of childhood development to adult outcomes using familial data from multiple generations, and it's the continued involvement of the participants in the study that makes that possible," says Roger Siervogel, Ph.D., Fels Professor and LHRC director.

The treasure trove of serial data was used in developing the first pediatric growth charts for infants (from birth to 36 months) produced by the National Center for Health Statistics in 1977. Used by physicians nationally and internationally as a baseline for normal development and as a screening tool for nutrition related health problems, these charts were essential clinical tools. In 2000, a group of scientists, including experts from the LHRC, updated and revised the charts to include Body Mass Index (BMI) measurements using national data.

Often enrolled before birth, the children, grandchildren, and great grandchildren of the original Fels participants form the core of this research study. More than 1,100 members of the "Fels Family" still come to Dayton from across the nation for regular testing. Children under 18 months visit every three months for measurements of their growth and development. Children aged 2 to 18 visit twice a year; adults, every two years.

The battery of tests used in the Fels Study has changed over the past 75 years as technology and medical knowledge have advanced, but the anthropometric data—the meticulous measurement of height, weight, body circumferences, skin fold thicknesses and bone breadth—have remained constant.

Building on the strong foundation and valuable resource of the Fels Study, LHRC has greatly expanded its research programs. In 2004, four new NIH grants were funded for nearly \$11 million. About half the research done at LHRC is directly based on the Fels data, and it remains a critical resource for studying risk factors for many common diseases and gaining new knowledge to improve the quality of life of people across their lifespan.

For example, a new study is using the measurements of skull size and shape from the vast collection of head radiographs to locate the regions of the genome involved in normal craniofacial development, significant in common congenital defects such as cleft lip and palate. Other research projects examine the genetics of infant growth rates; sexual maturity of U.S. children in relationship to their growth; the genetic determinants of bone mass accrual during childhood and how that might impact adult bone health and osteoporosis risk; and the genetics of skeletal maturation to determine why the skeletal age of a healthy child may vary by two to three years from the child's chronological age.

Fels data also has emerged as a critical resource for research on aging, including studies of gait analysis for individuals with osteoarthritis; the genetics of age-related muscle loss; genetic risk factors for osteoporosis; the links between body composition and joint health across the lifespan; and analysis of the amount of total body water in adults and children, which has been found to be particularly relevant for persons with end-stage renal disease or those undergoing dialysis. This research will dovetail nicely with the school's new Department of Geriatrics.

“With heavy emphasis on serial data analysis and genetic epidemiology, our research projects all dovetail nicely,” says Ellen Demerath, Ph.D., associate professor of community health and LHRC associate director. “There are ample opportunities for new studies that springboard off of or expand existing resources. And we are also creating new resources—we are growing family trees every way we can.”