

GRANT OPPORTUNITIES

Newsletter of the Office of Grants and Program Review

October 2004

UTC Professor Begins Research to Find PMP22's Function in Hearing

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Approximately twenty million Americans (8.6% of the United States population) are deaf or hard of hearing. People may lose their hearing at any point in their lives; however, people most commonly experience hearing loss either before age 3 or age 19 (occurring in 1/1000 and 2/1000 people respectively). Hearing loss is often hereditary; genetic factors are responsible for 30-50% of the total incidents of deafness. Hearing loss and deafness are serious issues that can negatively impact the quality of life, safety, and financial well-being of individuals who experience them. Because of these factors, scientists have long been concerned with identifying and addressing the causes of hearing loss and deafness.

Recognizing the promise that genetic research holds for the scientific and medical communities' understanding of the relation between certain genetic indicators and deafness, Dr. Margaret J. Kovach, associate professor in the Department of Biological and Environmental Sciences, has initiated research on a particular genetic marker known as PMP22 and its importance in the role of hearing. To support her research, Dr. Kovach secured a grant from the National Institutes of Health (NIH) totaling \$189,609. The NIH is one of the foremost medical research centers and is the federal hub of health research. Dr. Kovach's meritorious research plan and potential to substantially contribute to scientific knowledge gained her this highly competitive grant. Her project, entitled "Molecular Pathology of Deafness Due to Mutation in PMP22," draws

from a previous study that suggested a link between the PMP22 gene and hearing.

Previously (prior to coming to UTC), Dr. Kovach and her colleague Dr. Virginia Kimonis studied a four-generation, 84 member, family from central Illinois, a family in which an unusually high number of members—34 people—are afflicted with a rare genetic disorder, Charcot-Marie-Tooth (CMT) with deafness. This is consistent with traits that are inherited in an autosomal dominant fashion; meaning there is a 50% chance that children from an affected individual will inherit the disease. CMT is a progressive disorder that affects peripheral nerves—nerves connecting the brain and spinal cord to muscles as well as sensory cells such as touch, pain, heat and sound. The effects of CMT include muscle weakness, loss of sensation, and deformation of the hands and feet, debilitating 15 out of every 10,000 individuals. CMT is a genetic disease that is, at times, associated with profound and progressive deafness. Through their research of the Illinois family, Drs. Kovach and Kimonis found that those affected with both CMT and deafness had a certain mutation in the code of a gene called peripheral myelin 22 (PMP22). Although the exact function of PMP22 remains unclear, it belongs to a family of developmental proteins known to regulate gene expression, programmed cell death and cell division. Consistent with the neurological phenotype of CMT, PMP22 has been implicated in peripheral nerve myelination. To explain the deafness component of this disorder, Dr. Kovach hypothesizes that in the cochlear structure of the ear, PMP22 functions also in regulating cell growth and development.

Prompted by the research connecting

PMP22 to hearing, Dr. Kovach's study proposes to investigate the role of this gene in normal hearing. Dr. Kovach and her team will examine the expression and localization of the PMP22 gene and protein in the inner ear of both normal mice and mice with a mutant PMP22 and neuropathic phenotype (Trembler-J Mice). The gene expression will also be examined to identify genes whose transcription is influenced by PMP22 to provide insight to potential protein interactions that involve PMP22. Dr. Kovach's overall goal is to define the role of PMP22 in normal hearing as well as explain how the expression of the mutant form leads to deafness. Dr. Kovach's study has the potential to lead to the development of new treatments for deafness and also CMT.

Dr. Kovach's commendable research agenda is complemented by her commitment to undergraduate education, and she will enlist two to four undergraduate students each year to help with the project. Her project will provide excellent applied research and training experiences for UTC students. Dr. Kovach will also employ a Research Associate for the duration of the project.

This NIH award is highly prestigious and highly competitive, with NIH only awarding grants to approximately 35% of applicants each year. Dr. Kovach is the first to conduct NIH-funded research at UTC. Dr. Kovach's research addresses a gap in the existing understanding of deafness that may lead to new treatments and will provide a solid foundation for further research and experimentation.

FUNDED GRANTS AND RESEARCH

October 2004

COLLEGE OF ARTS AND SCIENCES

Music

DR. JONATHAN MCNAIR

Allied Arts of Chattanooga	Music, Art and Environment Contemporary Music Symposium	\$1,500
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Sociology, Anthropology & Geography

DR. BARBARA MEDLEY

Community Research Council	Race Relations Survey 2004-05	\$3,950
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BUSINESS ADMINISTRATION

Management

DR. LAWRENCE ETTKIN

Chattanooga State Technical Community College	Mentoring and Course Development Assistance for New Economy Institute	\$14,000
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COLLEGE OF HEALTH, EDUCATION & PROFESSIONAL STUDIES

Teacher Preparation Academy

DR. LUCIEN ELLINGTON

Freeman Foundation	NCTA Asian Geography Weekend Workshop	\$8,000
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ADMINISTRATIVE

WUTC-FM

DR. JOHN MCCORMACK

Corporation for Public Broadcasting	Radio Community Service Grant 2004-06	\$119,435
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