MONELL CHEMICAL SENSES CENTER
Advancing Discovery in Taste and Smell

Media contact: Leslie Stein, 267.519.4707 or stein@monell.org

OLEOCANTHAL MAY HELP PREVENT, TREAT ALZHEIMER'S

Natural compound in extra-virgin olive oil targets toxic beta-amyloid proteins

PHILADELPHIA (September 29, 2009) -- Oleocanthal, a naturally-occurring compound found in extra-virgin olive oil, alters the structure of neurotoxic proteins believed to contribute to the debilitating effects of Alzheimer's disease. This structural change impedes the proteins' ability to damage brain nerve cells.

"The findings may help identify effective preventative measures and lead to improved therapeutics in the fight against Alzheimer's disease," said study co-leader Paul A.S. Breslin, PhD, a sensory psychobiologist at the Monell Center.

Known as ADDLs, these highly toxic proteins bind within the neural synapses of the brains of Alzheimer's patients and are believed to directly disrupt nerve cell function, eventually leading to memory loss, cell death, and global disruption of brain function. Synapses are specialized junctions that allow one nerve cell to send information another.

"Binding of ADDLs to nerve cell synapses is thought to be a crucial first step in the initiation of Alzheimer's disease. Oleocanthal alters ADDL structure in a way that deters their binding to synapses," said William L. Klein, PhD, who co-led the research with Breslin. "Translational studies are needed to link these laboratory findings to clinical interventions."

Klein is Professor of Neurobiology & Physiology, and a member of the Cognitive Neurology and Alzheimer's Disease Center, at Northwestern University. He and his colleagues identified ADDLs in 1998, leading to a major shift in thinking about the causes, progression and treatment of Alzheimer's disease. Also known as beta-amyloid oligomers, ADDLs are structurally different from the amyloid plaques that accumulate in brains of Alzheimer's patients.

Reporting on a series of *in vitro* studies, the team of Monell and Northwestern researchers found that incubation with oleocanthal changed the structure of ADDLs by increasing the protein's size.

Knowing that oleocanthal changed ADDL size, the researchers next examined whether oleocanthal affected the ability of ADDLs to bind to synapses of cultured hippocampal neurons. The hippocampus, a part of the brain intimately involved in learning and memory, is one of the first areas affected by Alzheimer's disease.

--more--

Measuring ADDL binding with and without oleocanthal, they discovered that small amounts of oleocanthal effectively reduced binding of ADDLs to hippocampal synapses. Additional studies revealed that oleocanthal can protect synapses from structural damage caused by ADDLs.

An unexpected finding was that oleocanthal makes ADDLs into stronger targets for antibodies. This action establishes an opportunity for creating more effective immunotherapy treatments, which use antibodies to bind to and attack ADDLs.

Breslin commented on the implications of the findings. “If antibody treatment of Alzheimer’s is enhanced by oleocanthal, the collective anti-toxic and immunological effects of this compound may lead to a successful treatment for an incurable disease. Only clinical trials will tell for sure.”

In earlier work at Monell, Breslin and co-workers used the sensory properties of extra virgin olive oil to identify oleocanthal based on a similar oral irritation quality to ibuprofen.

Oleocanthal and ibuprofen also have similar anti-inflammatory properties, and ibuprofen – like extra virgin olive oils presumably rich in oleocanthal – is associated with a decreased risk of Alzheimer’s when used regularly.

Future studies to identify more precisely how oleocanthal changes ADDL structure may increase understanding of the pharmacological actions of oleocanthal, ibuprofen, and structurally related plant compounds. Such pharmacological insights could provide discovery pathways related to disease prevention and treatment.

The findings are reported in the October 15 issue of *Toxicology and Applied Pharmacology.*

First author Jason Pitt, a graduate student in Klein’s lab, conducted the studies. Also contributing to the work were chemist Amos B. Smith, III, of Monell and the University of Pennsylvania, who supplied the oleocanthal; William Roth, Pascale Lacor and Pauline Velasco from Northwestern; Matthew Blankenship from Western Illinois University; and Fernanda De Felice from the Universidade Federal do Rio de Janeiro. In addition to his faculty appointment at Monell, Breslin is Professor of Nutritional Sciences in the School of Environmental and Biological Sciences at Rutgers University.

The National Institute on Aging funded the research; Dr. Breslin is funded by the National Institute on Deafness and Other Communication Disorders.

The Monell Chemical Senses Center is an independent nonprofit basic research institute based in Philadelphia, Pennsylvania. Monell advances scientific understanding of the mechanisms and functions of taste and smell to benefit human health and well-being. Using an interdisciplinary approach, scientists collaborate in the programmatic areas of sensation and perception; neuroscience and molecular biology; environmental and occupational health; nutrition and appetite; health and well-being; development, aging and regeneration; and chemical ecology and communication. For more information about Monell, visit www.monell.org.

# # #