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Toward A Better Understanding Of Taste And Smell Impairments: The Role Of Inflammation

PHILADELPHIA, PA – A team of researchers from the Monell Chemical Senses Center and Jefferson Medical College has been awarded a \$7.7 million, five-year grant by the National Institute on Deafness and Other Communication Disorders (NIDCD) to study how inflammation affects our senses of taste and smell.

The role inflammation plays in basic biological processes is of increasing importance to medical research. The new grant will enable a multidisciplinary team of basic scientists and clinicians from the Monell–Jefferson Chemosensory Clinical Research Center (CCRC) to investigate how inflammation contributes to clinical changes in smell and taste. Information gained from the studies will form the foundation of new approaches to avoid or overcome the sometimes debilitating effects of chemosensory dysfunction.

Approximately six million Americans suffer from sensory loss or alteration related to the senses of taste, smell, or both. Although changes in taste and smell perception can significantly impact human quality of life, nutrition, and safety, current treatment options remain limited.

“By investigating the role of inflammatory factors in chemosensory loss and recovery, we expect to gain insight into potential therapeutic interventions for these dysfunctions,” says Beverly Cowart, Ph.D., a sensory psychologist who oversees the Chemosensory Clinic that assesses taste and smell function of patients. Otolaryngologist Edmund Pribitkin, M.D., Associate Professor of Otolaryngology – Head & Neck Surgery at Jefferson Medical College of Thomas Jefferson University, is the project’s medical director.

Scientists at the Monell-Jefferson CCRC seek to characterize and understand the causes of taste and smell disorders and to develop treatment strategies. Continuously funded since 1986, the Monell-Jefferson CCRC represents the only chemosensory clinical research center currently supported by the NIDCD. Monell’s Director, Gary K. Beauchamp, Ph.D., who is Principal Investigator of the grant, remarks, “The Monell-Jefferson CCRC applies molecular, cellular, and sensory research to address important clinical problems. Funding of this grant further validates the scientific strength and productivity of this long-term collaborative effort.”

Three distinct lines of inquiry, each headed by Monell investigators, will pursue studies related to the impact of inflammation on clinical disruption of smell and taste function:

One project, headed by cellular biologist Nancy Rawson, Ph.D., will study chronic rhinosinusitis (CR), one of the most common chronic medical conditions in the United

States and one of the most significant causes of smell loss. Scientists currently have only a limited understanding of how CR impairs olfactory function, and of the cellular and molecular processes involved. This project will identify inflammatory processes underlying smell loss in patients with CR and evaluate the prognosis for recovery. Results will enable improved diagnosis and treatment targeting for patients with CR-induced smell loss.

A second effort, led by environmental psychologist Pamela Dalton, PhD, will evaluate the impact of occupational exposure to various inhaled substances on nasal chemosensory function of three groups: (1) medical and veterinary students exposed to formaldehyde in gross dissection labs; (2) dental students and technicians exposed to methyl methacrylate vapors in prosthetic labs; and (3) firefighters who inhale the mixture of chemicals, particulates and fumes associated with fires. The results will provide an important resource for predicting and alleviating the effects of occupational chemical exposure on sensory function related to taste and smell.

The third component investigates taste loss in a population where this condition is common. Over 90 percent of all head and neck cancer patients who receive radiation therapy experience substantial taste loss and alterations of flavor perception. Yet relatively little is known about the impact of radiotherapy on taste perception. Under the direction of sensory psychologist Paul Breslin, PhD and cellular biophysicist Joseph Brand, PhD, this project will document the magnitude, quality, and time course for changes in taste perception following radiation treatment for oral cancer. Complementary studies will explore the physiological bases for these alterations and gauge the potential for prevention of sensory loss and for recovery.

In addition to having direct relevance to patients afflicted with chemosensory loss or dysfunction, the project will advance overall knowledge concerning the inflammatory process. Cowart comments, "Inflammatory processes are believed to play key roles in a variety of chronic diseases, including a number of forms of cancer, heart disease, and Alzheimer's disease. This research will contribute to the broader understanding of the impact of inflammatory mediators on cell function."

The studies represent a national partnership led by the Philadelphia researchers, in which 20 scientists and clinicians from the Monell Chemical Senses Center and Jefferson Medical College of Thomas Jefferson University will join collaborators at six other institutions, including: Philadelphia Veterans Affairs Medical Center, University of Pennsylvania, Georgetown University (Washington, DC), University of Alabama at Birmingham, The Sinus & Nasal Institute of Florida, and Johns Hopkins University (Baltimore, Md.).

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