Not So Harmless After All
Ignored bacteria found to be a factor in COPD

ubiquitous bacterial strain thought not to be involved in chronic obstructive pulmonary disease (COPD) is in fact responsible for two to four million flare-ups of the condition that occur annually in the United States, researchers from the University at Buffalo have shown.

A study published in the July 15, 2005, issue of the American Journal of Respiratory and Critical Care Medicine reports that M. catarrhalis is involved in exacerbations of COPD. Timothy F. Murphy, M.D., professor of medicine and microbiology in the UB School of Medicine and Biomedical Sciences, was lead author on the study.

"This paper is the first to study the involvement of M. catarrhalis in a prospective way in adults with COPD," says Murphy. "Using rigorous methods, our work has shown that acquiring M. catarrhalis is strongly associated with the onset of symptoms of an exacerbation. People with COPD, estimated to be about 20 million in the U.S., experience one to two exacerbations per year," says Murphy, chief of the Infectious Diseases Division in the School of Medicine and Biomedical Sciences and a pioneer in vaccine development for respiratory disease.

"If 10 percent of all exacerbations are caused by M. catarrhalis, that translates to two to four million exacerbations annually," COPD is the fourth leading cause of death in the U.S. and many of those deaths occur during exacerbations, he notes. "Exacerbations also cause enormous morbidity and health-care costs. They lead to physician visits, emergency room visits, hospital admissions and respiratory failure requiring mechanical ventilation."

In addition to showing that M. catarrhalis is involved in exacerbations of COPD, the researchers also found that patients make immune responses to the bacterium when they acquire it.

"Both of these observations provide lines of evidence that M. catarrhalis is a pathogen for these patients and provide a strong rationale for pursuing the development of vaccines to prevent M. catarrhalis infections in people with COPD," concludes Murphy.

The study involved 104 adults with COPD who were seen at the COPD Research Clinic at the Buffalo Veterans Affairs Medical Center over 81 months. During this period, patients made 3,099 clinic visits, 560 of which were during exacerbations. Sputum samples were collected at each clinical visit and molecular typing of organisms was conducted, as well as assays to measure immune response.

Researchers identified 120 episodes of M. catarrhalis infections in 50 patients, nearly half of which were associated with flare-ups of COPD. There was no evidence that exacerbations were associated with acquisition of a new strain of another pathogen.

"We know that M. catarrhalis causes ear infections in children," says Murphy. "With these new observations regarding the importance of the bacterium in adults with COPD, we have even more reason to forge ahead with developing a vaccine to prevent M. catarrhalis infections."

Additional researchers on the study were Aimel L. Brauer, research technician in the UB Department of Medicine; Brydon J. B. Grant, M.D, UB professor of medicine, physiology and biophysics and social and preventive medicine, and Sanjey Sethi, M.D., UB associate professor of medicine.

The study was supported by grants from the Department of Veterans Affairs and the National Institutes of Health.
Legal checking in hockey—hitting with the shoulder or trunk a player who has the puck or who has just passed the puck—is considered as integral to hockey as tackling is to football. The practice, however, has been much maligned as the cause for injuries among young players, a concern that led the American Academy of Pediatrics to recommend it be prohibited until players are at least 16 years old.

But just how harmful is body checking?

This question was recently addressed in a study conducted by UB researchers, the results of which were published in the October 31, 2005 issue of Medicine and Science in Sports and Exercise, the official journal of the American College of Sports Medicine. In the study, which followed 2,630 male players in four youth hockey leagues in Canada, the researchers documented the incidence of head injuries associated with body checking. The boys in this study were between the ages of 4 and 17, and were enrolled in a Burlington, Ontario, youth hockey program in 2002 through 2004.

In an earlier paper from Yan's group, the researchers showed that the neuromodulator serotonin, crucial to the treatment of Parkinson's disease, is involved in many neurological diseases. “Microtubules are hollow cylinders made up of polymers of the protein tubulin,” they continue. “Agents that break up, or depolymerize, microtubules disrupt the railway, stop the traffic and reduce the number of cargos that get delivered to the neuronal surface.”

In turn, fewer NM DA receptors are available on the surface of the neuron to interact with its neurotransmitter, which results in fewer signals being transmitted to critical areas of the brain,” explains Yuen. “Defects in neuronal transport are involved in many neurological diseases.”

In recent months, two groups of researchers studying mental disorders have published studies that identify these structures as possible targets for treatment of mental disorders and Parkinson's disease. The researchers studying mental disorders are led by Zhen Yan, PhD, associate professor in the Department of Physiology and Biophysics.

“Mental disorders, such as schizophrenia, depression, anxiety and bipolar, are the most prevalent neurological diseases,” says Yan. “Studies conducted by the World Health Organization reveal that mental illness ranks second in terms of cause of disability in the United States and that eight of the 10 of the leading causes of disability are mental illnesses.”

Yan's group has been focusing on discovering the convergent and unique molecular and cellular mechanisms that underlie the pathophysiology of mental disorders. In the August 19, 2005 issue of the Journal of Biological Chemistry, they published a paper describing how destabilization of microtubules interferes with the action of the NMDA receptor (NMDA), a target of the neurotransmitter glutamate, which plays a critical role in regulating cognition and memory.

“YOU can think of NMDA as the cargo moving along a railway consisting of the microtubules cytoskeleton,” says Eunice Yuen, a graduate student in Yan's laboratory and lead author of the study. “NMDA receptors are excitatory neurotransmitter receptors that are involved in many neurological diseases.”

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lonic stem cells may not be able to function because of scientific concerns that embryonic stem cells expressing genes without having to reactivate adult stem cells located on the floor of brain ventricles, germinal cells in retinoblastoma, an eye cancer caused by disease, trauma or stroke,” says Earl J. Bergery, PhD, coauthor and deputy director of biophotonics at the institute.

The group’s next step is to conduct similar studies in larger animals. The UB research was supported by the John R. Oishei Foundation, the National Foundation, the American Parkinson Disease Association, and UB’s New York State Center of Excellence in Bioinformatics and Life Sciences.

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