

# Respiratory Therapy™

The Journal of Pulmonary Technique

## Respiratory Therapy News

### READY

A recent survey of 525 nurses from America's leading hospitals revealed that 93% were confident that hospitals were far better prepared to handle a potential pandemic than they were before the H1N1 outbreak. Additionally, 91% said their hospitals had fully incorporated flu outbreaks into their emergency preparedness systems. The H1N1 outbreak played a part in enhanced planning and awareness, as 82% said that the pandemic was "a humbling lesson from which we learned a lot." The survey was jointly conducted by Kimberly-Clark Health Care and Baylor Health Care System in cooperation with the American Nurses Credentialing Center (ANCC). Another part of the survey revealed that just 40% said the public is well informed about healthcare-associated infections.

### HOME SWEET? HOME

Placebo Journal reported the announcement that Joint Commission is now going to accredit medical homes. The Journal responded: "How lovely. A third-party organization which everyone thinks works for the government is going to snoop around medical offices to see if they are pretending to make this medical home thing real. One happy horse organization watching over another... With more government involvement comes more regulations to follow which makes the Joint Commission feel even more self-important." See [placebojournal.com](http://placebojournal.com).

### BLOOD GAS E-BOOK

Respiratory Therapy has published its second full-length e-book, RESPIRATORY THERAPY BLOOD GAS. Our Blood Gas book is the second in a series of comprehensive knowledge resource books that will be

published regularly. It is now available from Amazon for download onto Kindle, iPad, PCs and other compatible e-readers. BLOOD GAS includes dozens of up-to-date papers about blood gas from renowned clinicians, researchers and scientists. The articles in this electronic textbook have been carefully selected and culled by Respiratory Therapy's editors for relevance to the readers of this journal. BLOOD GAS 2011 is the premier edition in an ongoing series, and will be updated each year. Our other book also currently available is Respiratory Therapy Ventilation. The cost of this valuable educational and informational resource book is only \$9.98. To order, go to Amazon.com and type "Respiratory Therapy Blood Gas 2011" (ASIN: B004KKZ3MG).

### HOW IT'S DONE

The journal Pediatric and Developmental Pathology reports that researchers examined postmortem brain stem tissue from 17 fetuses and infants to locate the human retrotrapezoid nucleus (RTN), which serves as the critical central chemoreceptor. Mutations in the protein expression pattern of PHOX2B can lead to congenital central hypoventilation syndrome. This condition is responsible for loss of air hunger and complete sleep apnea. By applying immunohistochemical studies similar to those performed in rodent models, scientists sought to identify the RTN in the human brain. Reviews of autopsy records and stained slides from brain stem sections were conducted between 2001 and 2008. Selected cases were evaluated for PHOX2B immunoreactivity in parts of the caudal pons and medulla brain sections of these samples. In essence, researchers followed the PHOX2B pattern to locate

the RTN. The predictions made from rodent models held true for human tissue. The authors report that the putative human RTN is located ventral to the facial nucleus and lateral to the superior olivary nucleus, where the two brain sections studied meet the pontomedullary junction. The authors describe this as a "valuable first step toward defining what is likely to be a key site of respiratory regulation."

### FALLOUT

Patients suffering from COPD who are on long-term oxygen therapy face an increased risk of death from cardiovascular disease and other non-respiratory ailments. A study at Blekinge Hospital, Karlskrona, Sweden, suggests that physicians need to carefully monitor for these conditions and treat them to help decrease the risk of mortality. In Sweden, the mean age of patients starting LTOT increased from approximately 66 to 73 years between 1987 and 2000. The researchers wanted to find out if these changes had resulted in a shift in the causes of death for COPD patients with long-term oxygen therapy. They enrolled 7,628 adult patients who started LTOT for COPD between January 1987 and December 2004. Patients remained in the study until LTOT was suspended or until death. Study participants were followed for a median of 1.7 years. The researchers found that while the risk of death decreased annually for both respiratory disease (2.7%) and lung cancer (3.4%), there were annual increased risks of circulatory disease (2.8%) and digestive organ disease (7.8%). The overall risk of death also increased by 1.6% per year during the study period. In total, the risk of death for cardiovascular disease increased by 61.5%. The researchers noted that this supports the importance

# RESPIRATORY THERAPY

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of optimized diagnostics and treatment of coexisting diseases and conditions to improve survival in severe COPD. The mechanism that underlies the increases in both overall mortality and mortality due to non-respiratory causes is that the patients have a progressively higher burden of coexisting diseases and conditions, and become more vulnerable with increasing age.

## SLEEP BEFORE SLICE

Performing polysomnography prior to pediatric adenotonsillectomy may help identify children at a higher risk of developing postoperative respiratory complications, according to researchers at the George Washington University School of Medicine. Guidelines for adenotonsillectomy, established by the American Academy of Otolaryngology-Head and Neck Surgery, recommend that children should be healthy, have no evidence of obstructive sleep apnea-hypopnea syndrome, and be older than 3 years. To determine if polysomnography may potentially predict adverse outcomes following a pediatric adenotonsillectomy, the researchers examined the records of 1,131 children who underwent an adenotonsillectomy by two attending surgeons at an academic pediatric hospital. Preoperative polysomnography was performed on 151 patients, representing 13.4% of all those undergoing adenotonsillectomy. Of these, 23 (15.2%) experienced adverse respiratory events after surgery. Results of the polysomnography showed that patients who experienced respiratory complications had significantly higher apnea-hypopnea index, higher hypopnea index, and lower nadir oxygen saturation. Additionally, the 23 individuals who experienced complications had a higher body mass index (BMI) compared with those who did not have complications, with 47.8% defined as obese, vs 29.7% in the non-complication subgroup. Overall, the patients who experienced adverse respiratory events spent an additional 22 days in the hospital beyond routine overnight observation for persons with obstructive sleep apnea-hypopnea syndrome.

## BRUSH!

Maintaining periodontal health may contribute to a healthy respiratory

system, according to research published in the Journal of Periodontology. A new study suggests that periodontal disease may increase the risk for respiratory infections such as COPD and pneumonia. The study included 200 participants between the ages of 20 and 60 with at least 20 natural teeth. Half of the participants were hospitalized patients with a respiratory disease such as pneumonia, COPD, or acute bronchitis, and the other half were healthy control subjects with no history of respiratory disease. Each participant underwent a comprehensive oral evaluation to measure periodontal health status. Patients with respiratory diseases had worse periodontal health than the control group, suggesting a relationship between respiratory disease and periodontal disease. Researchers suspect that the presence of oral pathogens associated with periodontal disease may increase a patient's risk of developing or exacerbating respiratory disease. However, the study authors noted that additional studies are needed to more conclusively understand this link. A related study at Sahlgrenska Academy noted that children with asthma have more caries and suffer more from gingivitis than people without asthma. The first study revealed that 3-year-olds who suffer from asthma have more caries than 3-year-olds without asthma. Researchers also compared the oral health of adolescents aged 12-16 years who had long-term moderate or severe asthma with that of adolescents of the same age without asthma. Only 1 out of 20 in the asthma group was caries-free, while 13 out of 20 were caries-free in the control group. One factor that may have influenced the development of caries is a somewhat lower level of saliva secretion, which was probably caused by the medication taken by those with asthma. An examination of the oral health of young adults aged 18-24 years, with and without asthma, had results that were nearly identical with those in the group of 12-16-year-olds.

## RESTFUL NIGHTS

New research from the University of Toronto could provide some restful nights for sufferers from obstructive sleep apnea. In a recent study that appeared in the Journal of

Neuroscience, scientists from the University demonstrated that repeated obstruction of the airways requires release of the brain chemical noradrenaline. The release of this chemical helps the brain learn to breathe more effectively and purposefully. "What we showed is that repeated disruption of normal lung activity – what happens during sleep apnea – triggers a form of learning that helps you breathe better. This type of brain plasticity could be harnessed to help overcome the breathing insufficiency that typifies sleep apnea," said Dr John Peever, Associate Professor of Neuroscience and lead author of the study. In order to mimic the experience of severe sleep apnea, scientists induced short 15-second apneas in sedated rats by repeatedly restricting airflow into the lungs. They found repeated apneas caused the brain to progressively trigger more forceful contraction of the respiratory muscles, which caused an increase in breathing. This increase in breathing lasted for over an hour. Peever said it seems the brain uses the unwanted side-effects of sleep apnea to help it learn to prevent

future apneas by increasing the depth of breathing. This study also pinpointed the brain chemical that allows this type of plasticity to occur. They found that noradrenaline is required in the case of repeated apneas to cause brain plasticity and enhance breathing. These findings were deemed important because they suggest that artificial manipulation with common drugs that affect noradrenaline levels in the brain could also help improve breathing in patients suffering from sleep apnea. This work could serve as the potential basis for developing the long sought after pill for sleep apnea.

### CONSEQUENCES

Severe asthma in early childhood may lead to premature loss of lung function during adolescence and more serious disease during adulthood, according to researchers at Emory University School of Medicine. The researchers studied how airflow limitation changes throughout childhood and how this affects disease severity later in life. Although there are similarities between children and adults with severe asthma, recent research has shown that the

limitation of airflow is not as significant in children as in adults. This raises questions about the course of severe asthma in childhood and the critical developmental time frame during which loss of lung function occurs. The authors used data from children with mild-to-moderate and severe asthma who were enrolled in a long-term National Heart, Lung, and Blood Institute Severe Asthma Research Program. The children were ages 8-11 years at the first evaluation and 11-14 years at the follow-up visit. Comparing measurements of symptoms, medication use and lung function, the researchers analyzed changes in the children's respiratory health over an average three-year period. The researchers found that children with severe asthma reported a higher frequency of daily symptoms and hospitalization during the previous year despite higher doses of ICS and controller medication, and that they had significantly lower lung function when compared to children with mild-to-moderate asthma. Additionally, they noted that daily asthma symptoms such as coughing and wheezing and

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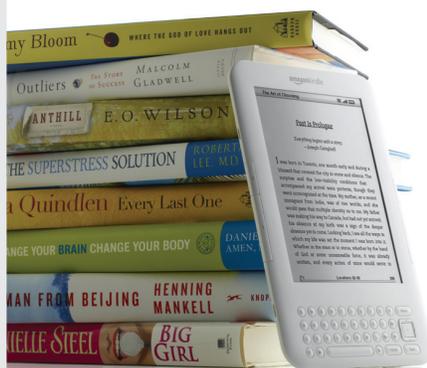
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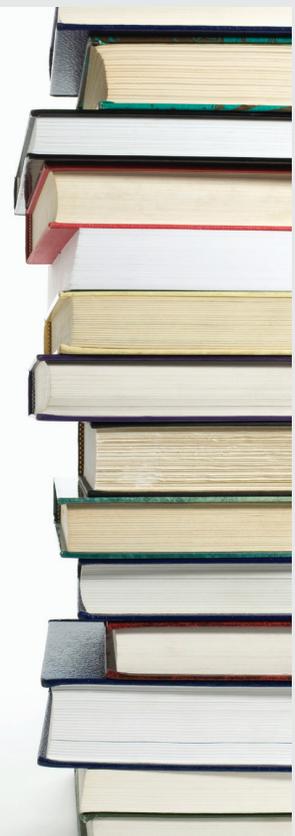
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sensitization to aeroallergens during the initial evaluation were strong predictors of declines in lung function of more than one percent per year. The authors concluded that children with severe asthma have a premature loss of lung function during the adolescent years that is associated with an increased frequency of wheezing and asthma symptoms and greater allergic sensitization during childhood.

### THE NOSE KNOWS

A collaborative project between researchers at the Trudeau Institute and their colleagues at St Jude Children's Research Hospital in Memphis, TN examined the migration of white blood cells to the mucosal tissues of the nose in response to a viral infection. Researchers found that cells arrive early during the infection and persist at the site for months afterward, providing a first line of defense against a second infection with the virus. These cells are soldiers that guard nasal passages and combat viruses at their site of entry. The researchers said that in the future, a single application of vaccine by nasal spray or drops may be all that is needed for long-term protection against some serious respiratory virus infections.

### SITTING AROUND

Up to 79% of Canadians with COPD avoid everyday activities, according to a survey by the Canadian Lung Association. The survey found that 17% of Canadians at risk for the disease don't believe COPD is as serious as other chronic illnesses like heart disease and diabetes, but it is the fourth leading cause of death in Canada. Lung attacks or COPD flare-ups are also the main cause of hospitalization for chronic medical conditions in Canada. Half of at-risk Canadians polled have already experienced one or more of the common symptoms of COPD, such as persistent cough, fatigue, phlegm and shortness of breath. In current smokers, 74% have experienced one or more symptoms. The survey also revealed that 39% of smokers avoid seeking medical advice for some of their COPD symptoms because they fear they are the consequence of smoking. Fifty-three per cent do not speak with their doctor about their COPD symptoms because they don't think it's anything serious; 27% of diagnosed and at risk Canadians who

have not seen a doctor about their symptoms say they know their doctor is just going to tell them to stop smoking; and 17% of diagnosed and at risk Canadians who have not seen a doctor about their symptoms don't think there are serious consequences related to any of their COPD symptoms.

### DRIVE, THEY SAID

You are six times more likely to end up at the doctors with an acute respiratory infection if you have recently used a bus or tram, but those who use buses or trams daily might be protected compared with more occasional users, according to a study at The University of Nottingham (thus, the tram). Research showed that bus or tram use within five days of symptom onset was associated with an almost six-fold increased risk of going to the doctor for ARI. The case control study ran during a local flu outbreak. One hundred and thirty eight patients (72 cases of ARI and 66 control patients) from a Nottingham GP practice were asked to fill in a questionnaire on bus or tram usages in the five days preceding the onset of their illness or the five days before consultation. The researchers found a statistically significant association between ARI and bus or tram use in the five days before symptom onset. The risk appeared greatest among occasional bus or tram users.

### SURPRISING DEVELOPMENT

ALI and ARDS can develop in surprising ways that seem to have little relation to the lungs, from severe trauma and after severe burns, for instance. Researchers at the University of Colorado School of Medicine used animal models of ALI/ARDS to show that the aggressive inflammatory state of specific immune cells can be switched off to control such runaway inflammation. Studies of the neutrophils and macrophages that are responsible for ALI/ARDS have led to important ideas which offer hope for new concepts and options for treatment. For example, it is now known that the macrophage itself can exist in both an aggressive inflammatory state and in a more reparative state that can even help the lung to heal. The researchers said they'd like to see that if by switching the state of the macrophages to the more reparative state, the ongoing

inflammation will be stopped and the capacity of the lung to repair itself will improve.

### UNDER CONTROL

Scientists at Temple University have found a new therapeutic target for controlling dangerous inflammation in the lungs. Blocking the activation of the enzyme delta-protein kinase C (delta-PKC) could protect the lungs from neutrophil-mediated damage, which can result in out of control inflammation. In an animal model of acute respiratory distress syndrome (ARDS), inhibiting delta-PKC in the lungs showed dramatically reduced inflammation, thereby protecting the lungs from further damage. Researchers used a rat model of severe inflammation or sepsis that produces lung injury. The animals that received the delta-PKC inhibitor had markedly reduced evidence of lung injury and distress. These results suggest that delta-PKC is an important regulator of inflammation in the lung and that targeted inhibition of this enzyme may protect the lungs from the damage associated with severe infection.

### D-EFFICIENCY

Vitamin D deficiency can be linked to the development and severity of autoimmune lung diseases, according to researchers at the University of Cincinnati. The researchers wanted to see if lack of sufficient vitamin D would also be seen in patients who are diagnosed with an autoimmune interstitial lung disease (ILD) and whether this was associated with reduced lung function. They evaluated 118 patients, 67 with connective tissue disease-related ILD and 51 with other causes of lung fibrosis, for serum 25-hydroxyvitamin D levels, and then evaluated associations between these serum levels and the patients' conditions. Those with connective tissue disease related ILD were 52% vs 20% more likely to have vitamin D deficiency. Vitamin D insufficiency was pegged at 52% vs 20%. Reduced serum 25-hydroxyvitamin D levels were strongly associated with reduced lung function. The findings suggest a high prevalence of vitamin D deficiency in patients with ILD, particularly those with connective tissue disease. Information is from Medical News Today, copyright Medical News Today.