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IN THIS ISSUE

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Neonatology Today (NT) is a monthly newsletter for BC/BE neonatologists and perinatologists that provides timely news and information regarding the care of newborns and the diagnosis and treatment of premature and/or sick infants.

Upcoming Meetings

Contemporary Management of Neonatal Pulmonary Disorders Conference
Nov. 4-5, 2010; Tempe, AZ USA
www.nalweb.com/cmnpdconference

Hot Topics in Neonatology
Dec. 5-7, 2010; Washington DC USA
www.hottopics.org

Continuous Quality Improvement Pre-Conference to NEO
Feb. 23, 2011; Orlando FL USA
www.neoconference.com

NEO: The Conference for Neonatology
Feb. 24-27, 2011; Orlando FL USA
www.neoconference.com

Recruitment Ads - pages: 2 and 11

NAVA Ventilation Allows For Patient Determination Of Peak Pressures, Facilitating Weaning In Response to Improving Lung Compliance During Respiratory Distress Syndrome: A Case Report

By Howard Stein, MD

NAVA (Neurally Adjusted Ventilatory Assist) is a new mode of assisted mechanical ventilation in which the ventilator is triggered by changes in the electrical activity of the diaphragm (Edi). The Edi peak represents the neural inspiratory effort and is proportional to workload. This is the amount of electrical activity sent to generate the tidal volume and varies breath by breath. The Edi minimum (min) reflects the tonic activity of the diaphragm at rest. This activity is responsible for maintaining the functional residual capacity of the lung and correlates with Positive End Expiratory Pressure (PEEP) as the physiologic reflection of derecruitment.[1]

> ***"NAVA (Neurally Adjusted Ventilatory Assist) is a new mode of assisted mechanical ventilation in which the ventilator is triggered by changes in the electrical activity of the diaphragm (Edi)."***

Current ventilators use the change in airway flow as the trigger to initiate a mechanical breath (see Figure 1 – flow trigger). These mechanical breaths have a set tidal volume or peak inspiratory pressure, inspiratory and expiratory time that may or may not be in synchrony with the patient. False triggering and missed triggering are common problems with this type of trigger.[2,3] Alternatively, NAVA detects the electrical excitation in the diaphragm and synchronizes the mechanical breath with this electrical activity (see Figure 1 – neural trigger). A special nasogastric catheter, with electrodes placed at the level of the diaphragm, measures the amplitude, duration and frequency of the electrical activity of the diaphragm and transmits this information to the ventilator. The electrical signal is then converted into a pressure proportional to the change in Edi.[1] The patients therefore determine their own peak inspiratory pressure (PIP), respiratory rate, inspiratory and expiratory times in synchrony with the ventilator. Table 1 summarizes properties of NAVA compared with conventional ventilation. This paper describes a brief case report of a prema-

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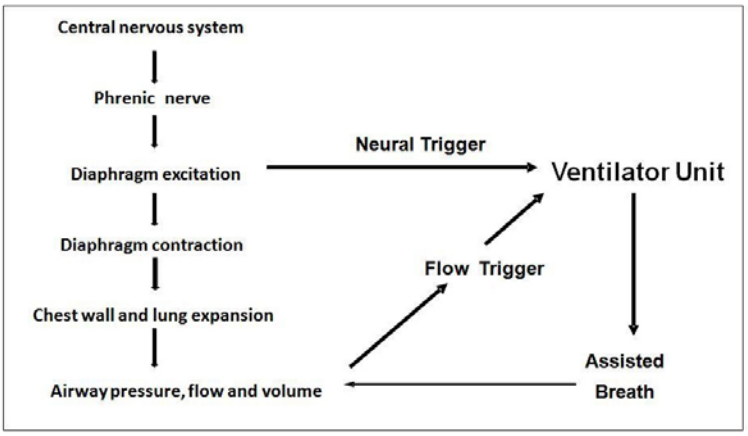

Figure 1: Neuro-ventilatory Coupling[1]

Table 1 – Comparison of Conventional to NAVA Ventilation[6]

Conventional Ventilation	NAVA Ventilation
Patient Controls using Flow Trigger:	**Patient Controls using Neutral Trigger:**
Initiation of Breath Rate (in some modes)	Initiation of Breath Inspiratory Time Rate Peak Pressure Termination of Breath
Ventilator Controls:	**Ventilator Controls:**
Peak Pressure or Tidal Volume Inspiratory Time Termination of Breath PEEP Minimum Rate FiO_2	FiO_2 PEEP
Synchrony:	**Synchrony:**
Only for Initiation of Breath Asynchronous for Many Breaths False Triggering	Initiation of Breath Size of Breath Termination of Breath

ture infant with Respiratory Distress Syndrome (RDS) who was effectively ventilated with NAVA before and after surfactant administration.

Case Summary

The patient was a 1440 gram, 30 week gestation AA male born to a 25 year old gravid 2, para 1 mother. The pregnancy was complicated by preterm labor and the mother received corticosteroids, Procardia and Penicillin in labor. Following artificial rupture of membranes of less than 12 hours, the baby was born by NSVD and had Apgars of 7 and 8. Cord arterial pH was 7.29 and cord venous pH was 7.37. He was intubated within 10 minutes in the delivery room for respiratory distress and his initial CXR was consistent with a diagnosis of RDS. He was brought to the NICU with hand bagging, and following placement of a nasogastric catheter, was placed on NAVA ventilation (Servo-I, Maquet® Wayne NJ). He subsequently was treated with surfactant within 30 minutes of life. His peak pressure, dynamic compliance, Edi and min measurements for the first 3 hours of life are shown in Figures 2-4. His first capillary blood gas (CBG) on NAVA was 7.36/44/-1 at 2

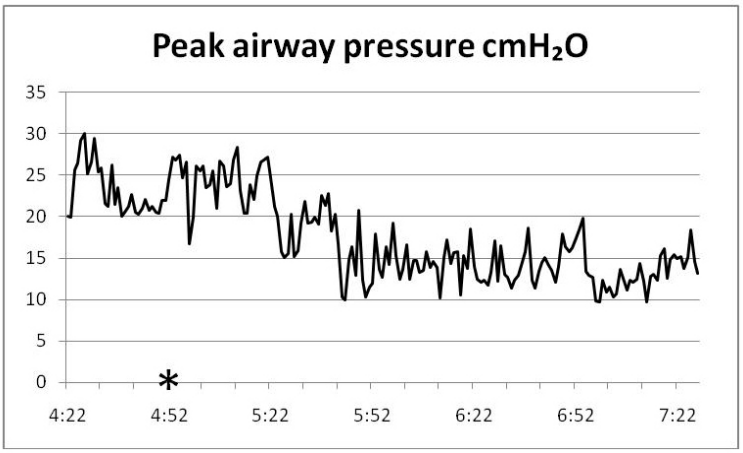

Figure 2: Peak Inspiratory Pressure (surfactant administered)*

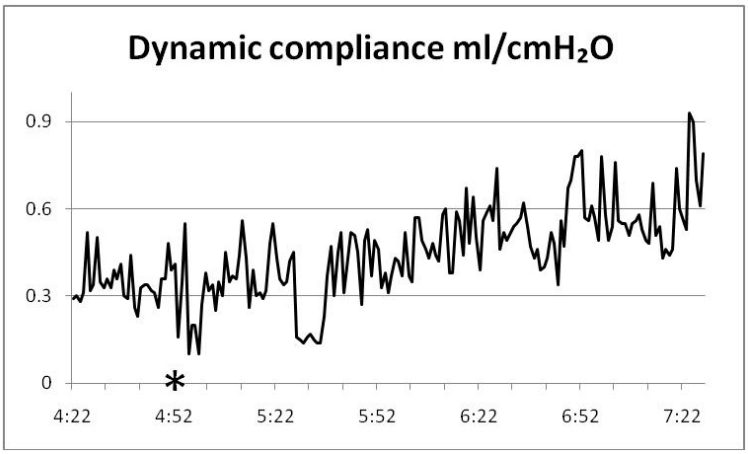

Figure 3: Compliance (surfactant administered)*

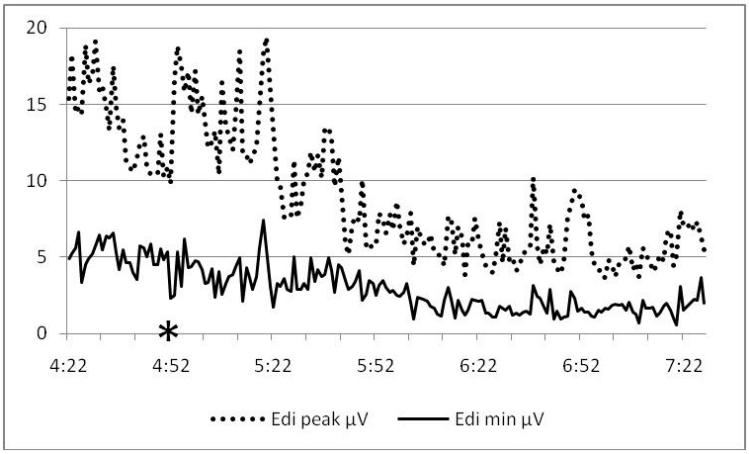

Figure 4: Edi Peak and Min (surfactant administered)*

hours of life and a follow-up CBG, prior to extubation 6 hours later, was 7.42/37/-1. Shortly after extubation, the patient successfully weaned off all respiratory support to room air. Table 2 compares the average value of data collected for 30 minutes prior to 30 minutes after surfactant administration, in addition to average values over the first 3 hours of life (collected at 1 minute intervals). Only Edi min fell during the first 30

Table 2 – Average data for the 30 minutes pre-surfactant, the first 30 minutes post-surfactant, and the next 2 hours post-surfactant.			
	0-30 min pre-surfactant	**0-30 min post-surfactant**	**0.5-2.5 hours post-surfactant**
Peak Airway Pressure (cm H_20)	23.1±3	24.5±2.7	14.7±3 #
Respiratory Rate (breaths/min)	77.8±5.4	75±6.5	78.2±6.6
Dynamic Compliance (ml/cm H_20)	0.35+0.07	0.34+0.12	0.5+0.16 #
Edi Peak (microvolt)	13.7±2.8	14.4±2.6	6.6±2.2 #
Edi Min (microvolt)	5.1+1	4+1.2 *	2.2+1 #
** – p < 0.05 compared to pre surfactant* *# - p < 0.05 compared to pre and post surfactant (Unpaired t-test)*			

minutes after surfactant administration. Edi peak, ventilator peak inspiratory pressure (PIP), respiratory rate and dynamic compliance all remained unchanged. Of note, several hours after surfactant administration there was a significant decrease in PIP, Edi peak and min coupled with an increase in dynamic compliance. Respiratory rate was unchanged before and after surfactant administration.

Discussion

The primary purpose of this case report is to describe how the Edi signal can be useful in monitoring patients with RDS and how NAVA ventilation may improve ventilation and facilitate weaning of mechanical support in neonates with improving compliance. RDS is a well known respiratory complication of prematurity caused by surfactant insufficiency resulting in atelectasis and poor compliance. The use of surfactant in the treatment of RDS has been well described. In the case presented, the patient follows the typical clinical course described in neonates after surfactant administration.[4] The anticipated changes in pulmonary mechanics are noted with initially high peak pressures that remain high for the first 30 minutes after surfactant administration and then fall as the surfactant is distributed and compliance improves.[5] Our case nicely demonstrates that in patients with RDS, the Edi signal may be applied as a monitoring tool to follow ventilatory function. This may be especially useful in conventional ventilation where the clinician is responsible for changes in ventilatory parameters.

The Edi signal is a reflection of the brain's signaling about respiratory drive. In our example case, initially both Edi peak and min were elevated. Elevated Edi peak suggests that the patient's respiratory drive is increased to compensate for the increased workload needed to effectively ventilate the lungs. Edi min was also increased and likely reflects the patient's desire to maintain functional residual capacity (FRC) in the face of atelectasis. For the first 30 minutes after surfactant administration, Edi peak remained unchanged suggesting a high workload was still needed to facilitate distribution of surfactant out of the large airways into the alveoli. Of interest, the decrease noted in Edi min within the first 30 minutes likely was due to some surfactant reaching some alveoli, thus reducing surface tension and decreasing the impulse needed to maintain FRC. Over the next 2 hours, both the Edi peak and min decreased further (likely secondary to improved surfactant distribution) supporting the notion that less neural inspiratory effort is needed to recruit alveoli and less tonic diaphragmatic activity to maintain FRC. This change in respiratory drive is consistent with hemodynamic changes previously described.[4,5] These findings suggest that Edi can be used as a monitoring tool allowing the clinician to see, in real time, improvement in ventilatory function and thus facilitating weaning of ventilatory support. The use of NAVA additionally allows for significantly less bedside intervention by the clinician, as patients are able to wean their own ventilatory support in response to improving respiratory compliance and drive in proportion to changes in the Edi signal. While on NAVA, patients control the amount of ventilatory assistance needed to ventilate effectively and use the appropriate PIP and respiratory rate to generate effective minute ventilation in response to improvement in compliance.

In conclusion, this case report highlights the potential usefulness of the Edi signal as a tool to help the clinician optimize ventilatory support at the bedside. In addition, placing patients on NAVA ventilation allows them to autoregulate their own ventilatory needs, thereby likely reducing the risk of acute barotrauma as well as the risk for chronic lung injury from mechanical positive pressure support.

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Global Neonatology Today: A Monthly Column

By Dharmapuri Vidyasagar, MD, FAAP, FCCM

United Nations Millennium Development Goal (MDG) #4

The goals of MDG are of particular significance and interest for pediatricians and neonatologists, since the objectives are aimed at reducing global child mortality.

The Problem

Globally, millions of children die every year. Many of these deaths are preventable. Most deaths occur in developing countries as opposed to developed countries. Neonatal mortality is a major contributor to under age five mortality. A child born in a developing country is over 13 times more likely to die within the first five years of life than a child born in an industrialized country. In Eastern Asia, Latin America and the Caribbean, child mortality rates are approximately four times higher than in developed regions. These are due to several disparities: higher in rural than in urban populations, greater number of poor families, whose mothers lack a basic education.

"Globally, ten million children die every year. Many of these deaths are preventable. Most deaths occur in developing countries as opposed to developed countries. Neonatal mortality is a major contributor to under age five mortality."

Millennium Development Goal Four (MDG #4) aims to reduce overall child deaths by two-thirds by 2015 compared with 1990 level. Recognizing the important contribution of measles to child mortality, routine measles vaccination coverage is used as an indicator of progress towards MDG 4.

The Targets are to:

- Reduce under-five mortality rate
- Reduce infant mortality rate
- Increase the proportion of 1 year-old children immunized against measles

Progress Made

According to World Health Organization (WHO), in 2007 global the under 5 years of age mortality dropped to 67/1000 as compared to 93/1000 in 1990. The number of children who died worldwide decreased from 9.6 million to 6 million; more than 3 million children were saved.

Reduction of the under five years of age mortality in Sub-Saharan Africa and Southern Asia remain overriding priorities. In sub-Saharan Africa in 2007, close to one in seven children died before their fifth birthday. Sub-Saharan countries account for half of all child deaths in the world.

Intensified efforts include: improved new born care, emphasis on exclusive breast feeding, wider coverage of Perinatal HIV intervention programs, vitamin A supplementation. In addition, there has been wider coverage of critical HIV interventions in most sub-Saharan countries where HIV prevalence is high. This includes antiretroviral treatment for pregnant mothers who are HIV-positive, to prevent transmission of the virus to their babies.

Among children beyond the neonatal period, measles is a major cause of death, despite the availability of a safe, effective and inexpensive vaccine used for nearly 50 years.

Prevention of Measles

There are also serious efforts to increase measles vaccination among children 12-23 months of age. Global coverage with the first dose of measles-containing vaccine (MCV1) reached 82% in 2007, increasing from 72% in 2000. Between 2000 and 2007, global measles mortality declined by 74% from an estimated 750,000 deaths in 2000 to 197,000 in 2007. The sharp decline in measles deaths is the direct result of:

(a) Better access to routine childhood immunization;
(b) Providing supplementary measles immunization;
(c) Technical and financial support provided through the Measles Initiative, (a partnership formed in 2001 and spearheaded by WHO, UNICEF, the American Red Cross, and the Centers for Disease Control and Prevention);
(d) Implement effective laboratory-supported disease surveillance.

In the 47 measles-priority countries that accounted for 98% of the total estimated number of deaths globally in 2007, vaccination coverage increased from 58% in 2000 to 72% in 2007. The largest regional percent reduction in estimated measles mortality during this period occurred in the Eastern Mediterranean (90%) and African regions (89%), accounting for 16% and 63% of the global reduction in measles deaths, respectively.

However, these improvements remain far from the set targets of MDG #4. There is a need for serious efforts to improve newborn care for the rural poor around the globe, and to increase the Measles Vaccination to >90% eligible population.

The Clock is ticking!

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For more information on the United Nations Millennium Development Goals (MDGs), visit - www.un.org/millenniumgoals.

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Higher Oxygen Levels Improve Preterm Survival, Increase Risk for Eye Condition

Two findings from an NIH research network study provide new information on how much oxygen very preterm infants should receive starting on the first day of life and the most effective means to deliver it to them.

The first was that higher oxygen levels improve preterm infants' survival but increase the risk for a condition that can damage the retina.

The second was that a treatment typically used for adults with sleep apnea also is as effective as the traditional ventilator and surfactant therapy used to treat breathing difficulties in preterm infants — and may result in fewer complications. The treatment relies on a continuous positive airway pressure (CPAP) machine to blow air through a preterm infant's nostrils, to gently inflate the lungs.

These findings appear in two articles published online by *The New England Journal of Medicine*. The study results were presented on May 16 at the *American Thoracic Society 2010 International Conference* in New Orleans.

"Until the current study, CPAP had shown promise in treating respiratory distress in preterm infants, but had never been compared to ventilator therapy in this group of patients," said Alan E. Guttmacher, MD, Acting Director of the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD), one of the NIH Institutes that provided infrastructure and funding for the study. "The study results indicate that CPAP is an effective initial alternative to ventilator therapy for very preterm infants of 24-27 weeks gestational age."

The study was conducted by the 20 academic medical centers participating in the NICHD's Neonatal Research Network. The study also received funding from the NIH's National Heart, Lung, and Blood Institute.

The lead author of the article comparing oxygen saturation levels was Waldemar A. Carlo, MD, of the University of Alabama at Birmingham. The lead author of the article comparing CPAP therapy to ventilator and surfactant therapy was Neil N. Finer, MD, of the University of California at San Diego. The NICHD author of both papers was Rosemary D. Higgins, MD.

"Balancing the benefits of supplemental oxygen against the risks in these very premature babies has been a concern of doctors and parents for decades," said NHLBI Acting Director Susan B. Shurin, MD, a board-certified pediatrician. "The results of this large clinical trial of extremely low birthweight infants will help inform management decisions to improve chances of survival and reduce complications associated with breathing problems in these vulnerable patients."

The study enrolled 1,316 babies born between the 24th and 27th weeks of pregnancy. A full-term pregnancy is 40 weeks long. The very premature babies in the study had an average weight of less than two pounds.

The study was divided into two arms that provided the findings for the articles. Each arm proceeded at the same time, in the same group of infants. In the first arm, each infant had a 50% chance of receiving higher oxygen target saturation levels, and a 50% chance of receiving lower levels. In the second arm, each infant had a 50% chance of receiving oxygen by CPAP and a 50%chance of receiving intubation with surfactant, a viscous substance that helps keep the lungs' air sacs open. Although surfactant normally is produced by the lung, premature infants are not ready to make surfactant at first and suffer from severe breathing difficulties.

Researchers Compare Higher Oxygen Levels To Lower Levels

Higher oxygen levels have been linked to an increase in the risk of retinopathy of prematurity (ROP), a condition affecting the retina. The current study was undertaken to determine if slightly reduced oxygen levels would allow infants to remain healthy while reducing their risk for ROP. Information on ROP is available from the National Eye Institute (www.nei.nih.gov/health/rop/rop.asp).

For the arm of the study that compared oxygen levels, the infants were assigned at random to receive oxygen at one of two levels. The lower level consisted of 85 to 89% oxygen saturation in the babies' blood; the higher level 91 to 95%. The infants also were assigned at random to receive oxygen either through a ventilator or a CPAP machine.

The researchers evaluated the infants at the two oxygen saturation levels in a single combined measure, referred to as the combined outcome of their survival and their likelihood of experiencing ROP. No overall difference emerged between the groups in terms of this measure. However, there was a striking difference when survival and likelihood of experiencing ROP were considered separately.

More of the infants on the low oxygen level died than did infants on the higher level: 19.9% compared to 16.2%. But among those who survived, fewer on the lower level of oxygen developed ROP: 8.6 percent versus 17.9% in the higher-oxygen group.

"Many doctors believe that optimal oxygen saturation levels fall between 85 and 95%," Dr. Carlo said. "Our results offer much needed data on which to base treatment decisions."

CPAP Compared to Traditional Ventilator-Surfactant Therapy

A second arm of the study compared the standard ventilator treatment and surfactant for preterm respiratory distress to treatment with CPAP (www.nhlbi.nih.gov/health/dci/Diseases/cpap/cpap_what.html), which involves passing air through an infant's nose via prongs that rest in the nostrils. The standard ventilator (www.nhlbi.nih.gov/health/dci/Diseases/vent/vent_what.html) treatment involves placing a breathing tube in a newborn's windpipe to provide oxygen and surfactant. It is not possible to deliver surfactant with CPAP.

In this arm of the study, newborns who were randomly assigned to the ventilator-

surfactant treatment had a breathing tube placed in their windpipes within an hour of birth and received a dose of surfactant. Those who obtained CPAP treatment received oxygen through prongs placed in their nostrils, also within the first hour of life. Any infant receiving CPAP who subsequently did not achieve adequate oxygen levels in their blood was placed on a ventilator. Of the infants who received CPAP treatment initially, 83% required a ventilator tube in the windpipe and 67% received surfactant.

"Surfactant and intubation together have been shown to reduce the risk of serious complications and death in preterm infants," Dr. Finer said. "But the use of CPAP also grew during the last 10 or 15 years, without randomized studies to test it and compare it to surfactant."

The researchers looked at mortality and at a lung condition called bronchopulmonary dysplasia, which is characterized by a need for oxygen therapy when the baby is four weeks short of his or her original due date, or 36 weeks after the mother's last menstrual period. When researchers compared CPAP to surfactant on a combined measure of mortality and bronchopulmonary dysplasia, the two types of breathing therapy were practically identical.

"The study shows that CPAP is an effective alternative to surfactant in preterm infants," Dr. Higgins said. "Because it is less invasive than ventilator therapy, CPAP appears to be an appropriate first treatment for preterm newborns. If CPAP is unsuccessful, an infant can be placed on a ventilator and given surfactant."

By other measures, children initially placed on CPAP actually fared somewhat better than children who had received surfactant with the ventilator. They were more likely to have survived and to not require breathing therapy a week after being born. They were also less likely to need steroid treatment for their lungs; and they spent less time overall on ventilators.

Furthermore, the earliest preterm infants in the study, born at 24 to 25 weeks gestation, were less likely to die if they had received CPAP than if they had received surfactant as the initial treatment in the study.

The team will evaluate the children again when they are 18 to 22 months old, to learn whether any differences arise among the children who took part in the different treatments arms of the study.

9/11 Attacks Linked to Loss of Male Babies

The stress caused by psychological shock from the 9/11 terrorist attacks, felt even by people with no direct link to the event, may have led to an increased number of male children being miscarried in the US. Researchers writing in the open access journal *BMC Public Health* found that the fetal death rate for boys spiked in September 2001, and that significantly fewer boys than expected were born in December of that year.

Tim Bruckner from the University of California at Irvine worked with researchers from the University of California at Berkeley to carry out the study. He said, "The theory of 'communal bereavement' holds that societies may react adversely to unsettling national events, despite having no direct connection to persons involved in these events. Our results appear to demonstrate this; as the shocks of 9/11 may have threatened the lives of male fetuses across the US."

Bruckner and his colleagues used data from the National Vital Statistics System, which compiles fetal death data from all fifty states of the US, from January 1996 to December 2002 to calculate how many male fetal losses would be expected in a 'normal' September. They found that in September 2001, this figure was significantly exceeded. Speaking about the reasons for this, Bruckner said, "Across many species, stressful times reportedly reduce the male birth rate. This is commonly thought to reflect some mechanism conserved by natural selection to improve the mother's overall reproductive success."

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Prenatal Exposure to Endocrine-Disrupting Chemicals Linked to Breast Cancer

Newswise — A study in mice reveals that prenatal exposure to endocrine-disrupting chemicals, like bisphenol-A (BPA) and diethylstilbestrol (DES), may program a fetus for life. Therefore, adult women who were exposed prenatally to BPA or DES could be at increased risk of breast cancer, according to a new study accepted for publication in Hormones & Cancer, a journal of The Endocrine Society.

Endocrine-disrupting chemicals are substances in the environment that interfere with hormone biosynthesis, metabolism or action resulting in adverse developmental, reproductive, neurological and immune effects in both humans and wildlife. These chemicals are designed, produced and marketed largely for specific industrial purposes.

"BPA is a weak estrogen and DES is a strong estrogen, yet our study shows both have a profound effect on gene expression in the mammary gland (breast) throughout life," said Hugh Taylor, MD, of the Yale University School of Medicine in New Haven, Conn. and lead author of the study. "All estrogens, even 'weak' ones can alter the development of the breast and ultimately place adult women who were exposed to them prenatally at risk for breast cancer."

In this study, researchers treated pregnant mice with BPA or DES and then looked at the offspring as adults. When the offspring reached adulthood, their mammary glands still produced higher levels of EZH2, a protein that plays a role in the regulation of all genes. Higher EZH2 levels are associated with an increased risk of breast cancer in humans.

"We have demonstrated a novel mechanism by which endocrine-disrupting chemicals regulate developmental programming in the breast," said Taylor. "This study generates important safety concerns about exposures to environmental endocrine disruptors such as BPA and suggests a potential need to monitor women exposed to these

chemicals for the development of breast lesions as adults."

Other researchers working on the study include Leo Doherty, Jason Bromer, Yuping Zhou and Tamir Aldad of the Yale University School of Medicine in New Haven, Connecticut.

The article, "In Utero Exposure to Diethylstilbestrol (DES) or Bisphenol-A (BPA) Increases EZH2 Expression in the Mammary Gland: An Epigenetic Mechanism Linking Endocrine Disruptors to Breast Cancer," has been published online and can be found at: www.springerlink.com/content/547256j0g0207 3v5/?p=286f52b5d3c94d9f8dc4546af408af89 π=0.

For more information, visit: www.endo-society.org.

Study Sheds Light on Deadly Gastrointestinal Disease in Infants Born with Complex Congenital Heart Disease

Newswise — Infants born with complex congenital heart disease are not only at risk for serious heart-related complications, but also for developing a deadly bowel disease, regardless of the type of surgical intervention they receive for their heart. These are the findings from a study by Nationwide Children's Hospital, and appeared in *Pediatric Critical Care Medicine* published online May 6 ahead of print.

Necrotizing enterocolitis (NEC) is one of the most common and most life-threatening gastrointestinal diseases in newborn infants and involves inflammation that can destroy the intestine. While premature infants are at especially high risk for developing NEC, the bowel disease is also significantly more common in late preterm and term neonates with congenital heart disease.

"NEC and congenital heart disease are two distinct disease processes, but they appear to be inter-related, particularly in patients with the congenital heart condition known as Hypoplastic Left Heart Syndrome," said Wendy Luce, MD, the study's lead author and principal investigator in the Center for Perinatal Research at Nationwide Children's Hospital.

Research has shown that neonates undergoing the Norwood surgery for Hypoplastic Left Heart Syndrome (HLHS) have the highest risk for NEC of all congenital heart disease patients.

The Hybrid approach has been developed at Nationwide Children's as an alternative strategy to the Norwood procedure for the management of HLHS and other forms of complex congenital heart disease. The Hybrid approach shifts the risk of major open heart surgery and cardiopulmonary bypass to later in infancy. The incidence of NEC in patients undergoing the Hybrid procedure has not been evaluated.

"Since both the Norwood and Hybrid procedures have been shown to be effective in treating the immediate dangers associated with complex congenital heart diseases, it's important that we begin to compare the secondary outcomes and quality-of-life measures related to both surgical approaches," said Dr. Luce, also an assistant professor of Pediatrics at The Ohio State University College of Medicine.

In the study, Dr. Luce and colleagues from The Heart Center at Nationwide Children's Hospital evaluated charts of 73 patients who underwent Hybrid stage I procedure for the treatment of complex congenital heart disease at Nationwide Children's during a six-year period. Of these 73 patients, 11% developed moderate to severe NEC postoperatively, an average of eight days after surgery.

This percentage is similar in neonates undergoing the Norwood procedure. However, only two of the Nationwide Children's patients required abdominal surgery for NEC, compared to nearly 60% of patients documented in other reports.

"Our early and aggressive treatment of neonates with symptoms of NEC in this high risk population appears to be warranted and may contribute to the relatively low need for abdominal surgery in this patient population," said Dr. Luce.

To help identify risk factors associated with NEC and this patient population, the investigators examined pregnancy factors such as: mother's age and history of prenatal care; pre-surgical factors (such as ventilation at the time of the procedure and maximum dose of prostaglandin infusion – a medicine required to maintain blood flow to the body in patients with HLHS and other forms of complex congenital heart disease that result in decreased or no blood flow to the body); and factors related to the surgery including patient's age on the day of surgery and the mode in which the vascular stent was placed during the procedure. Of all of the factors they compared, only three were significantly associated with NEC: babies who were born fewer than 37 weeks gestational age, those who received a lower maximum dose of prostaglandin infusion, and those who had an unexpected readmission to the intensive care unit.

Dr. Luce says that although the study's findings can't be immediately generalized to other patients with congenital heart disease, the data reinforces the belief that clinicians should continue to be watchful for NEC in neonates undergoing surgery for congenital heart disease. Also, multidisciplinary approaches to feeding regimens in these high-risk patients are needed to improve outcomes and quality of life.

Antidepressants in Pregnancy Increase Risk of Miscarriage

A new study in CMAJ (*Canadian Medical Association Journal*) found a 68% increase in the overall risk of miscarriage in pregnant women using antidepressants.

Antidepressants are widely used in pregnancy and up to 3.7% of women will use them at some point during the first trimester. Discontinuing treatment can result in a depressive relapse which can put mother and baby at risk.

Most previous studies on the use of antidepressants in pregnancy did not look at miscarriages as a main outcome, had small samples and several showed contradictory results. This large study sought to determine the association between antidepressant use in pregnancy, including: classes, types and doses, and the risk of miscarriage.

Researchers from the University of Montreal and the CHU Ste-Justine looked at data on 5,124 women in Quebec from a large population-based cohort of pregnant women who had clinically verified miscarriages up to 20 weeks of gestation and a large sample of women from the same Registry who did not have a miscarriage. Of those who miscarried, 284 (5.5%) had taken antidepressants during pregnancy.

Selective serotonin reuptake inhibitors (SSRIs), especially paroxetine and also ven-

lafaxine were associated with increased risk of miscarriage as were higher daily doses of either antidepressant. As well, a combination of different antidepressants doubled the risk of miscarriages.

"These results, which suggest an overall class effect of selective serotonin reuptake inhibitors, are highly robust given the large number of users studied," writes senior author Dr. Anick Bérard, from the University of Montreal and the Director of the Research Unit on Medications and Pregnancy at CHU Ste-Justine.

The researchers urge that physicians who have patients of child-bearing age taking antidepressants or have pregnant patients who require antidepressant therapy early in pregnancy discuss the risks and benefits with them.

In a related commentary, Ms. Adrienne Einarson, Assistant Director of the Motherisk Program at The Hospital for Sick Children (SickKids) writes that there is no "gold standard for studying the safety of drugs during pregnancy, because all methods have strengths and limitations," and results can vary from one study to the next. In this study, there were missing data on important potential confounding factors. However, the overall results on the use of antidepressants during pregnancy and the risk of miscarriage, despite the different methodology, were almost identical to a Motherisk study with 937 women published in 2009.

"Clearly, this study cannot make any definitive conclusions as to whether antidepressants increase the risk of spontaneous abortion," although the author points out it appears there is a small risk with less than double the number of miscarriages in the women exposed to antidepressants compared to those not exposed.

For more information visit:

Research
www.cmaj.ca/cgi/doi/10.1503/cmaj.091208

Commentary
www.cmaj.ca/cgi/doi/10.1503/cmaj.100507

High-Frequency Oscillatory Ventilation No Better or Worse Than Conventional Ventilation for Preterm Babies

A study of ventilation strategies in high-income countries has shown that high-frequency oscillatory ventilation (HFOV) for preterm babies gives outcomes that are no better or worse than conventional ventilation (CV). The findings are reported in an Article Online First and in an upcoming *Lancet*, written by Dr. Filip Cools, Neonatal Intensive Care Unit, Universitair Ziekenhuis Brussel, and Vrije Universiteit Brussel, Belgium, and colleagues from the PreVILIG collaboration.

With HFOV, the lungs are continuously inflated and "oscillate" at a very high rate (600 to 900 per minute) using very small volume changes. Conventional ventilation mimics spontaneous respiration with repeated inflation-deflation of the lungs at a physiological rate of 30 to 60 breaths per minute.

Differences in studied populations and study design has made meta-analyses of ventilation studies difficult, leading to uncertainty about effectiveness and safety of elective HFOV in preterm infants. In this study, authors of those trials gathered in the PreVILIG collaboration to re-assess the original data and make a new meta-analysis possible.

This new systematic review and meta-analysis looked at 3229 participants in ten randomised controlled trials, with the primary outcomes being death or bronchopulmonary dysplasia* at 36 weeks' postmenstrual age, death or severe adverse neurological event, or any of these outcomes. The authors found no difference in any of these outcomes between the two ventilation techniques, even when infants were categorised by gestational age, birthweight for gestation, initial lung disease severity, or exposure to antenatal corticosteroid treatment. Nor did the ventilator type or strategy have any effect on treatment outcome.

The authors say: "Our meta-analysis of individual patient data suggests that elective HFOV in preterm infants, compared with conventional ventilation, is equally effective in prevention of bronchopulmonary dysplasia without being associated with increased mortality or brain damage."

They add that subsequent trials should investigate issues such as the optimum timing of surfactant administration in infants on HFOV and other possible roles for HFOV in the treatment of respiratory distress syndrome—for example, in those infants who do not respond to initial non-invasive respiratory support.

In a linked comment, Dr. Richard B. Parad, Department of Newborn Medicine, Harvard

NOVEMBER MEDICAL MEETING FOUCS

Contemporary Management of Neonatal Pulmonary Disorders Conference
Nov. 4-5, 2010; Tempe, AZ USA
www.nalweb.com/cmnpdconference

Faculty:

- Vineet Bhandari - *Yale University*
- Sherry Courtney - *Stoney Brook University*
- Carl T D'Angio - *University of Rochester*
- Martin Keszler - *Brown University*
- Jonathan Klein - *University of Iowa*
- Donald Null - *University of Utah*

Meeting Topics:

- Golden First Hour: Newborn Resuscitation - Martin Keszler, MD
- The Ethics of Neonatal Resuscitation in the "Gray Zone" of Neonatal Viability - Carl T. D'Angio, MD
- Nasal Ventilation in Neonates: Evidence-Based Guidelines - Vineet Bhandari, MD
- CPAP and BiPAP in Neonates: What We Know and What We Don't - Sherry Courtney, MD
- Pulmonary Biomarkers in BPD - Vineet Bhandari, MD
- Optimal Lung Volume - Donald Null, MD
- Genetics of RDS and BPD - Vineet Bhandari
- Panel Discussion: Ask The Faculty
- Strategies in High Frequency Ventilation: Practical Aspects of Using the SensorMedics and Bunnell Jet - Jonathan M. Klein, MD
- Respiratory Viral Illness in the Premature Infant: Risks and Prevention - Carl T. D'Angio, MD
- Historical Perspective and Clinical Update of Postnatal Diaphragmatic Hernia - Jonathan M. Klein, MD
- Volume-Targeted Ventilation: How to Avoid Physician-Induced Lung Injury - Martin Keszler, MD
- Why High Frequency is Not Working - Donald Null, MD
- Elective HFOV in Preterm Infants with RDS: An Individual Patient Data Meta-Analysis - Do We Know Everything Now ? - Sherry Courtney, MD
- Lung Ventilator Weaning: Strategies and Practice - Donald Null, MD
- Mechanical Ventilation: Old School vs. New School Approaches - Martin Keszler, MD

Do you or your colleagues have interesting research results, observations, human interest stories, reports of meetings, etc. that you would like to share with the neonatology community?

Submit a brief summary of your proposed article to: RichardK@Neonate.biz. The final manuscript may be between 400-4,000 words, and contain pictures, graphs, charts and tables.

Medical School, says the study shows that there is no clear benefit or harm of HFOV, based on this new method of statistical analysis (Individual Patient Data Meta-Analysis). He adds this allows clinicians to use HFOV at their discretion given that safety is better established, but that such use of HFOV cannot be said to offer a benefit based on this analysis.

For full article and comment, see: http://press.thelancet.com/hfov.pdf.

University of Tennessee Medical Center Chooses GE Perioperative

In late June, GE Healthcare, a leading provider of healthcare information technology, announced the successful implementation of its Centricity® Perioperative solution at the University of Tennessee (UT) Medical Center (Knoxville, Tenn.). The solution covers a total of 27 operating rooms and 10 ancillary rooms at the Level I Trauma Center and academic medical center. The implementation included Centricity Perioperative Suite for Nursing Documentation and Centricity Perioperative Anesthesia Information System.

"An anesthesia information management system is essential in order to improve anesthesia record keeping, expedite quality assurance and outcomes measurements, enhance business analysis, document compliance with national standards and to reduce medicolegal exposure," said Dr. J.L. Epps, Department of Anesthesiology Chair, UT Medical Center, Knoxville. "Most importantly, this can enhance the quality of care for our patients. As an anesthesiologist, that is my primary goal."

Gary Scott, UT Medical Center's VP of Perioperative Services added, "We were looking for a complete Perioperative solution that provided ease-of-use, full documentation including the latest patient safety features. GE is just the right fit."

Centricity Perioperative, a comprehensive clinical and business solution, provides a bridge to support patient centric workflow by creating a link to patient information shared by clinicians and anesthesiologists. Making synchronized nursing and anesthesia information available at all points of the care cycle, it enables clinicians to make key clinical decisions and document each step more accurately and efficiently. Interfacing with the hospital's clinical information system enhances enables the provider to enhance patient safety and improves patient data throughput, mitigating historical interoperability challenges between hospital solutions such as allergy and lab data.

"Throughout the past year, we've seen a surge in hospitals that are choosing Centricity products for their perioperative needs," observed Laurent Rotival, VP & General Manager of GE Healthcare IT. "The University of Tennessee Medical Center has made a wise choice, one that will pull all the perioperative data their clinicians want to one spot, when they need it and where they need it. We're thrilled to have UT Medical Center as our newest academic partner."

"The use of our EMR has resulted in charting that is much more complete and accurate, and the prompts even allow for "on the job" education and quality improvement," said Robert M. Craft, MD, Professor, Vice-Chair and Residency Program Director at the medical center's Department of Anesthesia. "Being able to access nearly everything pertaining to quality patient care in one location is quite a revelation." The Centricity solution supports communication, data and workflow beginning with pre-admission testing through post anesthesia, including comprehensive resource management. Centricity Tracker responds to the alerts and triggers inherent to the clinical documentation record. This replaces the infamous white board, commonly used to manage communication between anesthesia and operating room staff.

Efficiencies gained from the implementation of Centricity pre-admission testing clinic have enabled the medical center to increase the number of patients benefitting from pre-surgical evaluation. The surgical requirements and outcomes determined from diagnosis and procedure codes noted in clinical documentation assist with projecting the case mix index.

For more information about GE Healthcare, visit www.gehealthcare.com.

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