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News and information for BC/BE Neonatologists and Perinatologists

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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.

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IMMUNE AND NON-IMMUNE HYDROPS FETALIS

By Michael E. Speer, MD

Introduction – Ballantyne first described Hydrops fetalis or edema of the fetus in 65 human fetuses or newborn infants in 1892. Potter, in 1943, subdivided hydrops fetalis into immune and non-immune categories based upon the presence or absence of Rhesus isoimmunization.

Definitions – Hydrops fetalis is usually defined as the presence of subcutaneous tissue edema and the collection of fluid in one or more body cavities. (e.g., placenta, peritoneal space, pericardial sac). Immune hydrops occurs in the presence of fetomaternal isoimmunization, the most common of which is Rhesus isoimmunization; non-immune hydrops results from non-immune pathophysiology.

Incidence – In 1970, Macaffe et al reported that 82% of fetal hydrops were a result of isoimmune disease [1]. Since the implementation of antenatal Rh(D) immune globulin prophylaxis in the 1960's, the incidence of maternal Rh alloimmunization has fallen significantly. Recent reviews indicate that greater than 90% of fetal hydrops are now due to non-immune causes [2]. Although the rate of hydrops in the general population approximates 1 in 4000 pregnancies, the incidence in selected pregnancies referred for ultrasonography to a perinatal center is as high as 1 in 160 to 1 in 540 pregnancies [3]. The incidence of immune hydrops in the same population is lower and is estimated to occur between 1 in 1256 and 1 in 3473 [3].

"Hydrops fetalis has been reported in association with many conditions. Ultrasound and pathological studies performed early in gestation have found a predominance of chromosomal abnormalities, particularly aneuploidy, associated with non-immune hydrops fetalis"

Pathogenesis – Previously the pathophysiology of both non-immune and immune hydrops fetalis was attributed to a variety of conditions including hypoproteinemia, cardiac failure, increased capillary permeability, portal venous obstruction or malformation of the lymphatic system. When the various proposed causes of hy-

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drops are examined carefully, it becomes apparent that the "causes" listed in many reports are cursory in nature and do not address the underlying pathophysiology of the condition or do not define hydrops fetalis as described above.

Lymphatic function – In virtually all cases, hydrops fetalis results from an interference with lymphatic function either because of a structural anomaly of lymphatic development (e.g., cervical hygroma, pulmonary lymphangiectasia) adversely impacting lymphatic drainage [4,5] or elevated central venous pressure preventing normal lymph flow. The latter may be due to cardiac compression resulting in elevated central venous pressure due to mass effect (e.g., congenital cystic adenomatoid malformation, congenital high airway obstruction syndrome) or low or high output heart failure (e.g., cardiac arrhythmia, congenital heart disease, hemangioma, anemia, twin-twin transfusion syndrome). Many chromosomal and storage diseases either have myocardial dysfunction, structural heart disease, particularly narrowing of the aortic arch, severe anemia, or other causes of elevated central venous pressure associated with the primary disease. Anemia alone does not appear to cause hydrops fetalis; only when central venous pressure rises does hydrops occur [6]. Likewise congenital or induced hypoproteinemia does not seem to cause in utero hydrops [7].

Hypoxia – Recent work by Lumbers et al, have shown that a severe in utero asphyxial insult in the premature fetal sheep causes hydrops. There is sustained activation of the renin-angiotensin system and elevated renal renin levels without elevated central venous pressure or evidence of renal failure [8]. In this instance, hydrops may be a result of a hypoxic endothelial injury that interferes with both nitric oxide and cyclic guanosine monophosphate production.

Associations – Hydrops fetalis has been reported in association with many conditions [Table]. Ultrasound and pathological studies performed early in gestation have found a predominance of chromosomal abnormalities, particularly aneuploidy, associated with non-immune hydrops fetalis. The exception is in Asia, where a majority of cases are associated with alpha thalassemia. Studies carried out later in pregnancy have found that other congenital anomalies predominate, particularly cardiac, either functional or structural. The incidence of "idiopathic" hydrops fetalis ranges between 3.9&% and 35% and is becoming less frequent a diagnosis. It also should be remembered that any condition that causes fetal death may have hydrops fetalis either as a terminal event reflecting ongoing myocardial failure or severe anoxic injury as described by Lumber and coworkers [8].

Evaluation – A thorough evaluation of the fetus with hydrops fetalis is warranted to determine possible therapeutic options, keeping in mind the potential hazards of fetal intervention to both fetus and mother. This is particularly true in early gestation given the high risk of fetal demise. The parents should be counseled that prenatal testing for viral, hematological, genetic, and biochemical causes will provide a more accurate evaluation of the pathogenesis than if one attempts to perform these studies on a stillborn infant [6]. Early identification of a disorder with a poor prognosis will allow the parents to terminate the pregnancy with the least risk to the mother, if they so wish.

Critical examination of available data suggests that the fetal risk of first trimester chorionic villus sampling (CVS) and midtrimester amniocentesis are equal and approximate 1% [9]. Polymerase chain reaction (PCR) testing has dramatically expanded the ability to test for both genetic mutations and intrauterine infection. One disadvantage of CVS compared with amniocentesis is the approximately 1% risk of placental mosaicism. Also, CVS does not allow for assessment of amniotic fluid alpha-fetoprotein or acetylcholinesterase. Both CVS and amniocentesis can result in maternal-fetal hemorrhage and isoimmunization and Rhogam is indicated for Rh-negative women. CVS should probably be avoided in patients who are already isoimmunized because amniocentesis is less likely to cause a further elevation in their antibody titer. Amniocentesis has been associated with maternal-fetal transmission of HIV as well as hepatitis B and C viruses although the exact risks are presently unknown. The mortality following fetal blood sampling is considerably higher, particularly in cases involving nonimmune fetal hydrops. Fetal hemorrhage, fetal bradycardia, cord hematoma, arterial vasospasm, and fetal death have been reported. Other risks include ruptured membranes, bleeding, and preterm labor.

Total body sonography as well as detailed fetal echocardiography is indicated to detail whether congenital somatic or cardiac anomalies with or without cardiac failure are present. If questions exist as to the presence of fetal anemia, Doppler measurement of peak velocity of systolic blood flow in the middle cerebral artery should be per-

formed. Depending upon the past medical history and racial background of the family, hemoglobin electrophoresis and DNA genotyping (i.e., alpha thalassemia) may be indicated. Maternal blood type testing and antibody screening for RBC antigens will assist in the diagnosis of immune mediated anemia. Kleihauer-Betke acid elution will determine the presence of fetal-maternal hemorrhage. Serologic testing for infectious agents have limited value although may lead to a diagnosis of recent infection (e.g., specific IgM titers, MHA-TP). The introduction of real time PCR testing will likely replace viral cultures and serologic evaluation as the evaluation of choice. Likewise, array-comparative genomic hybridization (array-CGH) has the potential to replace karyotype banding analysis. Array-CGH is a genome-wide screening strategy for detecting DNA copy number imbalances that can be rapid, less labor-intensive, and it is highly amenable to automation.

"Because of the high incidence of neurologic injury that may occur in utero, neurodevelopmental follow-up should occur in all cases"

Mortality & In Utero Therapy – Mortality totally depends upon the underlying cause. Generally, the mortality rate for hydrops identified in the first part of pregnancy is higher than the mortality of patients diagnosed with hydrops in the latter portion, due to the high incidence of lethal malformations and chromosomal defects in those fetuses [2,3,9]. Diagnosis of fetal hydrops prior to 24 weeks' of pregnancy with later delivery carries a mortality rate of 94% to 96%.

If the major disease states associated with fetal hydrops are each examined

Etiology	Fetal Condition
Low Output Cardiac Failure or Venous Obstruction	**Chromosome with or without Complex Congenital Heart Defect** * Sex Chromosome Aneuploidy (45,X; 45,X/46,XX; 45,X/46,XY) * Tetrasomy * Triploidy * Trisomy 18 * Trisomy 13 * Trisomy 21 **Cardiac Arrhythmia** * Atrial Flutter * Heart Block * Sinus Bradycardia * Supraventricular Tachycardia **Complex Congenital Heart Disease** * Pulmonary Valve Atresia or Incompetence * Tricuspid Valve Incompetence * Aortic Valve Stenosis or Atresia * Hypoplastic Left Heart Syndrome * Truncus Arteriosus **Endocardial Fibroelastosis** **Inborn Errors of Metabolism** * Carnitine Deficiency * Disseminated Lipogranulomatosis (Farber Disease) * Galactosialidosis * Gaucher Disease, Type 2 * GMI Gangliosidosis * Hypothyroid * ~Infantile Sialic Acid Storage Disease (ISSD) * Mucolipidosis II (I-cell Disease) * ~Mucopolysaccharidosis VII * Mucopolysaccharidosis IVA * Myopathies * Lethal Multiple Pterygium Syndrome * Mitochondrial Trifunctional Protein Deficiency * Myotonic Dystrophy * Nemaline Rod Myopathy * Niemann-Pick Disease Type C * Sialisis *~ hydrops is common* **Myocarditis** * Adenovirus * Coxackie Virus * Cytomegalovirus * Enterovirus * Parvovirus
	Mass Effect * Achondrogenesis * Chondrodysplasia * Congenital Diaphragmatic Hernia * Congenital High Airway Obstruction Syndrome * Cystic Adenomatoid Malformation * Cystic Hygroma Colli * Cytomegalovirus * Herpes Virus * Infantile Cortical Herperostosis * Leiomyosarcoma * Omphalocele * Pulmonary Sequestration * Syphilis * Teratoma * Toxoplasmosis * Rhabdomyoma * Midaortic Syndrome

Table: Conditions associated with Elevated Central Venous Pressure and Nonimmune Hydrops Fetalis.

Etiology	Fetal Condition
High Output Cardiac Failure	**Immune Anemia** * ABO Incompatibility * Anti C * Anti c * Anti D * Anti E * Anti e * Anti-Js(b) * Anti K * Anti Mur * Anti PP1Pk * Kell **Nonimmune Anemia** * Alloimmune Thrombocytopenia * Alpha Thalassemia * Erythroleukemia * Congenital Dyserythropoietic * Eythrocyte Pyruvate Kinase Deficiency * Fetomaternal Hemorrhage * G-6-PD Deficiency * Glucose Phosphate Isomerase Deficiency * Gunther's Disease * Hemochromatosis * Hemoglobin Taybe * Hereditary Stomatocytosis * Hereditary Spherocytosis * Intrauterine Hemorrhage, Fetal * Infection * Chagas' Disease * Cytomegalovirus * Parovirus * Syphilis * Toxoplasmosis **Arteriovenous Malformation:** * Chorioangiomata * Hemangioendothelioma * Intracranial Tumor * Sacrococcygeal teratoma * Twin-Twin Transfusion Syndrome * Vein of Galen **Fetal Methemoglobinemia** **Hyperthyroidism** **Renal Vascular Hypertension (Midaortic Syndrome)**

Table: Conditions associated with Elevated Central Venous Pressure and Nonimmune Hydrops Fetalis (Continued from previous page).

independently, mortality varies markedly from category to category and emphasizes the importance of prenatal studies to accurately identify the underlying diagnosis. For example, of all cardiac causes of hydrops, hydrops due to cardiac tachyarrhythmias carries the best prognosis as the fetus can be treated in utero, potentially reversing the hydropic state. Hydrops secondary to structural heart disease, chromosomal or syndromic conditions is almost always lethal [9]. Survival with fetal hydrops due to infection is also poor, with a mortality approaching 80% [9].

The prognosis of the fetus with anemia depends upon the etiology of the anemia. Mortality associated with alpha thalassemia is virtually 100%; the mortality associated with fetal parvovirus infection approximates 10%. The survival rate of nonhydropic fetuses with rhesus alloimmunization has been reported to be 92%, while survival in hydropic infants ranges between 70% and 78% [10].

Outcome –Those infants who survive the perinatal period usually will have a normal developmental outcome, but not always. In 34 cases of 78 fetuses with hydrops where intrauterine therapy was provided (11 with hydrothorax, 6 with supraventricular tachycardia, 6 with isoimmunization and 5 with anemia secondary to parvovirus infection), 24 of those infants survived the neonatal period. The highest survival rate was found in those patients receiving intravascular blood transfusions (i.e., isoimmunization and parvovirus anemia) [3]. Infants with twin-twin transfusion syndrome are frequently delivered prior to 30 weeks gestation and their prognosis is less sanguine. Of 12 hydropic infants reported by Matsuda and Kouno, two thirds died and, of the survivors, half had cerebral palsy [11].

Neonatal Management – In spite of significant advances in neonatal treatment, including steroids, surfactant, and advanced ventilator care, the mortality rate of live born infants with hy-

drops fetalis remains at approximately 50% in recently reported series [3]. In order to optimize outcome as much as possible, delivery of such fetuses should occur in tertiary centers with an equivalent level of neonatal care. Similar studies to those performed to evaluate fetal hydrops should be undertaken here to identify possible recurrent causes of hydrops and to provide counseling to the parents. Because of the high incidence of neurologic injury that may occur in utero, neurodevelopmental follow-up should occur in all cases.

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NEO-The Conference for Neonatology
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Evidence vs. Experience in Neonatal Practices
Jun. 22-23, 2007; Chicago, IL USA
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SUMMARY OF THE 3RD ANNUAL EVIDENCE VS. EXPERIENCE IN NEONATAL PRACTICES CONFERENCE: JUNE 16TH AND 17TH, 2006

By Istvan Seri, MD, PhD

The third annual Evidence vs. Experience in Neonatal Practices CME Conference was held at the Hyatt Harborside in Boston, MA on June 16th and 17th, 2006. The conference, initiated in 2004, was co-sponsored by the Keck School of Medicine of the University of Southern California and the Annenberg Center for Health Sciences at Eisenhower. Focusing on the clinical needs of neonatal practitioners to examine current and developing treatment options for the care of critically ill, preterm infants, this program reviewed the current level of evidence and practical experience linked with treatment protocols for these patients.

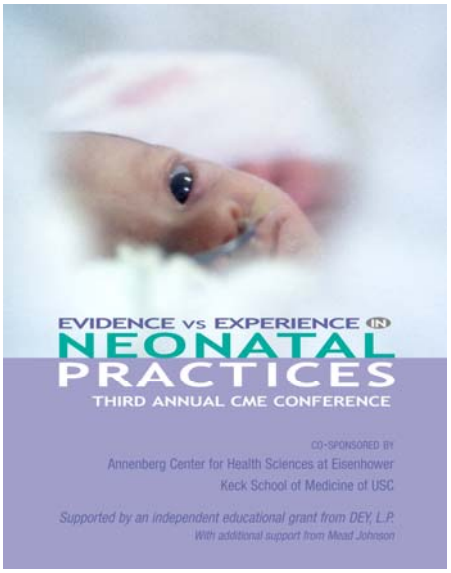
The program content and faculty was the task of the 2006 steering committee - Istvan Seri, MD, PhD, Jatinder Bhatia, MBBS, Rangasamy Ramanathan, MD and Kris Sekar, MD. The committee assembled a world-class faculty, who focused on bringing the "state of the art" in neonatal practice along with a practical orientation that the participants could consider utilizing in their practice after the conference.

DEY, L.P., the U.S. distributor of Curosurf®, has supported this program since its inception with unrestricted educational grant support. This year's event acquired additional support from Mead Johnson Nutritionals.

2006 Attendance Reflects Strong Interest

This year's conference had a turnout of 137 attendees, which included 29 fellows plus an additional 13 faculty. While registration fees are routinely waived for all fellows who attend the conference, 23 fellows received additional Neonatal Practices Fellow Scholarships from the Annenberg Center to attend the conference. This support was made available via an unrestricted grant by DEY, L.P.

These figures reflect a growth in attendance over the years. In 2004, there were 108 participants including 14 faculty at the inaugural meeting in Chicago. In 2005, there were 106 individuals, including 11 faculty and 30 fellows, who took part in the San Diego meeting. The growing popularity of this event is attributable to the nature of the content whereby the most important and clinically relevant questions in neonatology are presented, and the topics discussed are critically examined for the presence of evidence or if there is only experience. This "compare and contrast" format is made possible by the interaction of the audience with the internationally recognized faculty who bring tremendous practice insight and clinical and research expertise to the event.



Conference Highlights

The Evidence vs. Experience in Neonatal Practices conference was divided into four sessions, spread over two days. This year's keynote presentation "Permissive Hypercarbia and Hypoxemia in Newborns" was provided by Waldemar A. Carlo, MD from the University of Alabama. Dr. Carlo presented information from randomized control trials, as well as studies investigating the cellular and organ-system effects of hypercarbia and hypoxemia in the preterm neonate. The findings suggest a relationship between permissive hypercapnia and lung injury and abnormal cerebral blood flow regulation. As for the question of tissue oxy-

Evidence vs. Experience 2006 Steering Committee Colleagues, left to right: Kris Sekar, MD; Jatinder Bhatia, MBBS; and Rangasamy Ramanathan, MD.

genation, Dr. Carlo pointed out the potential toxicity associated with the use of higher inhaled oxygen concentrations. He then summarized the data on the use of lower oxygen saturations in very low birth weight (VLBW) neonates and offered target values to be employed in this patient population. The take-home message was that most current data suggested that oxygen saturations in the mid-to high 80s and low 90s are sufficient for preterm infants, and that additional oxygen supplementation may worsen pulmonary outcomes and increase the risk of ROP (retinopathy of prematurity). Current oxygen saturation targets generally utilized in clinical practice may be too high, and permissive hypoxemia may be advantageous in neonatal respiratory care. However, he warned that appropriately designed prospective randomized clinical trials are needed before firm recommendations can be made on the most desirable levels of oxygen saturation and $PaCO_2$ in the VLBW patient population.

Session 1: Pain Management

Two complementary talks were presented within this session: "Pharmacologic Management of Pain and Sedation in the NICU" by K.J.S. Anand MBBS, DPhil from the UAMS College of Medicine, and "Nonpharmacologic Management of Pain in the NICU" by Björn Westrup, MD, PhD, Karolinska University Hospital-Danderyd, Stockholm, Sweden.

First, Dr. Anand summarized the available data regarding the administration, safety and effectiveness of different analgesic medications to the neonate. The level of evidence pertaining to these medications on short and long-term outcomes, as well as potential side effects, was then systematically presented.

Next, Dr. Westrup focused primarily on the findings of the Newborn Individualized Development Care and Assessment Program (NIDCAP) and

indicated that the use of developmentally appropriate nursing and medical care focusing on decreased stress and pain may enhance neurodevelopment and result in a decrease in the use of pharmacological agents. He emphasized the importance of the suggested positive impact of such care on mental and motor development, long-term behavior, performance intelligence, and mother-infant interaction.

Session 2: Noninvasive Ventilation Strategies and Surfactant Support

Discussion of noninvasive ventilation strategies was the focus of Session 2 during the conference. Roger Soll, MD, University of Vermont, College of Medicine, provided a meta-analysis overview of the available data on the use, safety and efficacy of noninvasive ventilation techniques in preterm neonates. Dr. Soll concluded that, in preterm infants with RDS, the application of continuous positive airway pressure (CPAP), has been associated with reduced mortality and that nasal intermittent positive pressure ventilation (NIPPV) is a useful method of respiratory support that augments the beneficial effects of nasal CPAP in preterm infants with significant evidence indicating that its use leads to a decrease in extubation failure.

Next, Dr. Ramanathan of the Keck School of Medicine of the University of Southern California in Los Angeles, CA presented his talk "Early Surfactant Therapy and Noninvasive Ventilation." He reviewed the findings on short and long-term outcomes associated with the use of the different surfactant preparations and compared the available data between natural and synthetic surfactants. Dr. Ramanathan critically examined the available evidence presented by the various surfactant trials where face to face comparisons between different surfactant preparations were made. He also mentioned that there is some evidence that the use of poractant alfa (Curosurf®; DEY, L.P., Napa, CA) may be associated with decreased neonatal mortality and fewer administered doses compared with beractant (Survanta®; Ross Laboratories, Columbus, OH). However, he warned that more data is needed before a final conclusion could be reached regarding these findings. Dr. Ramanathan then indicated that, based on the available evidence, avoidance of intubation appears to be associated with a decline in the incidence of bronchopulmonary dysplasia (BPD). However, he warned that it remains to be seen whether patients tolerating CPAP from the beginning represent a population of decreased disease severity, which then contributes to the decreased incidence of BPD in the "non-intubated" VLBW

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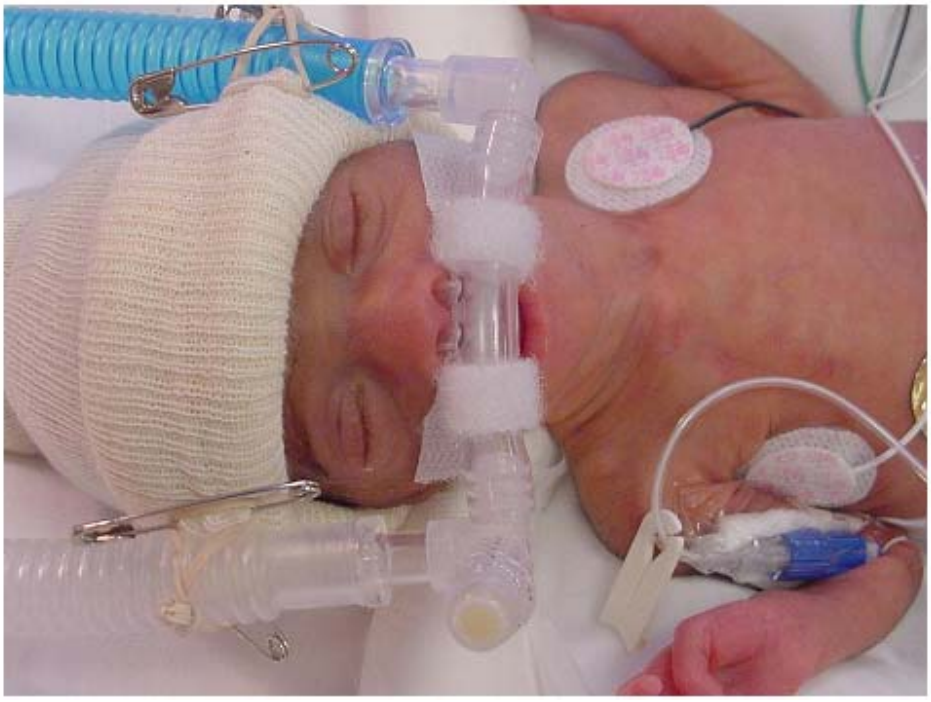

Respiratory advances in the management of neonates: bubble CPAP. With permission: R. Ramanathan, MD.

patient population. In the latter part of the presentation, Dr. Ramanathan compared different types of noninvasive ventilations, including different nasal CPAP interfaces, and discussed using non-intubation ventilation modes with modalities such as nasal IPPV (NIPPV). In closing, Dr. Ramanathan concluded that there is evidence that early CPAP in the delivery room is beneficial for the extremely low birth weight neonate.

Examining BPD in Detail

Christian P. Speer, MD, FRCPE, of the University Children's Hospital Wurtzburg, Germany, examined the pathophysiology of BPD in greater detail. Dr. Speer afforded a detailed review of the mechanisms of early injury of the developing lung, and addressed the question of whether or not higher oxygen concentrations could contribute to the development of BPD. Dr. Speer concluded that there is enough evidence to suggest that oxygen toxicity is indeed a significant factor in the development of BPD. Further, Dr. Speer reported that prophylactic indomethacin does not prevent BPD, and suggested that diuretics, caffeine, steroids, Vitamin A, inhaled nitric oxide or potentially any strategy to reduce inflammation in the airways and pulmonary tissue could help prevent BPD.

Session 3: Exploring Asphyxia and Brain Death

Session three, moderated by Dr. Sekar from the University of Oklahoma Health Sciences Center, included discussions pertaining to perinatal asphyxia. Jeffrey Perlman, MB, ChB, from the Medical College of Cornell University, NY discussed the pathophysiology of hypoxic-ischemic encephalopathy (HIE). Dr. Perlman reviewed the factors contributing to the development of brain injury and the pathophysiology of hypoxic ischemic brain damage at the molecular and cellular level. Dr. Perlman stated that, although the pathogenesis of perinatal brain injury is complex, many of the contributing pathways of potential injury have been successfully studied. He concluded that, based on the available evidence, the majority of infants that are at potential risk for brain injury will not suffer brain damage, thereby indicating that a substantial adaptive mechanism is present even in the developing brain.

"Head and Body Cooling in the Asphyxiated Newborn" was the ensuing discussion presented by Richard A. Polin, MD, from Columbia University, New York, NY. Dr. Polin's discussion, sub-titled "Experiments in Human Refrigeration" reviewed the historical uses of hypothermia and provided evidence that hypothermia has the capability to preserve cerebral metabolism under conditions of decreased oxygen delivery. Dr. Polin reviewed the results of the CoolCap trial, and concluded that there was a benefit only to those infants who had less severe injury indicated by moderately affected amplitude integrated EEG changes. He then reviewed the findings of the whole body hypothermia trial for neonates with HIE and questioned whether induced hypothermia should become routine therapy for the neonate following hypoxic ischemia. He concluded that, while cooling is relatively safe, it should only be done by individuals who are appropriately trained and under well-defined clinical protocols as the effect of cooling on mortality and morbidity remains uncertain. Finally, he stressed that infants that are candidates for cooling should be identified as quickly and precisely as possible.

In the last presentation of this session, Dr. Sekar presented his talk "Brain Death in the Newborn." Dr. Sekar reviewed the available clinical data, and the consensus among caregivers, families and society and stated that it would be prudent if brain death were determined based on repeated clinical examination, with particular attention to brain

stem reflexes, apnea test, EEG, and cerebral blood flow examinations. He also suggested that, if the EEG is isoelectric or if cerebral blood flow is absent, the observation period can be shortened from the suggested 48 hours. Dr. Sekar summarized his talk by pointing out that religious beliefs, cultural issues, and legal ethical considerations make this topic extremely complex and not only medically related as it concerns the immediate and extended family, as well as society in general.

Session 4: Review of Nutritional Issues and Controversies

Dr. Bhatia, from the Medical College of Georgia, discussed human milk and the premature infant to open the final session. He reviewed the benefits of human milk and the limiting nutrients present in human milk for the VLBW neonatal patient population. He emphasized that, in the VLBW neonate, the sole use of human milk has been associated with poorer growth and metabolic bone disease and, therefore, fortification of human milk in this patient population has become an accepted concept.

Two final discussions entitled "Nutritional Support and BPD" and "Controversies in Neonatal Nutrition: DHA and Nucleotides" were presented by Thomas E. Young, MD from the University of North Carolina, and David H. Adamkin, MD from the University of Louisville, respectively. Dr. Young reported that nutritional support in the extremely low birth weight (ELBW) neonate plays a role in the prevention, and amelioration of, and recovery from BPD, and that no evidence-based guidelines currently exist for the nutritional management of BPD patients. Specific nutrients likely have a role in the prevention and treatment as well as catch-up growth in patients with BPD. Overall, Dr. Young concluded that these patients require appropriately fortified breast milk.

Finally, Dr. Adamkin focused on the trials that provided evidence that docosahexaenoic acid (DHA) and arachidonic acid (ARA) supplementation of formulas may increase visual acuity and impact neurodevelopment. He stated that, although the evidence on neurodevelopment of these substances in the term neonate is less convincing, this issue needs further investigation. In support of this statement, Dr. Adamkin reviewed some of the available analysis from the Cochrane Database and stated that although most trials could not find significant effects on neurodevelopment or growth following supplementation with long-chain polyunsaturated fatty acids, some indirect evidence suggests otherwise. Finally, Dr. Adamkin presented some of the evidence on the immunoprotective effects of human milk, and concluded that human milk has unmatchable components, and biological variability, and that it contains more than just nutrients. Regarding this last point he warned that the bioavailability of nutrients present in human milk may be altered by processing and that this issue needs to be considered when deciding the most appropriate form of nutritional support in the preterm or term neonate.

"The next 'Evidence vs. Experience in Neonatal Practices Conference' will be held in Chicago, IL on June 22nd and 23rd, 2007 returning to the city of the inaugural meeting. As it becomes available, more information regarding the 2007 program can be obtained at the meeting web site at www.5StarMedEd.org/neonatal or by calling Nina Pratt at 760-773-4500 or toll free at 800-321-3690, 8:00 am to 5:00 pm, Pacific Time."

Program Publication and More to Come in 2007

As with the first two conferences, the proceedings from this year's conference will be published in the Journal of Perinatology (www.nature.com/jp/journal/v26/n1/abs/7211409a.html). The quality of the presentations has resulted in two outstanding supplements which have been distributed during the past two PAS/SPR meetings. The steering committee will be working with faculty and Gil Martin, MD, supplement editor for the Journal, to bring forth this year's proceedings in the spring of 2007.

The next "Evidence vs. Experience in Neonatal Practices Conference" will be held in Chicago, IL on June 22nd and 23rd, 2007 returning to the city of the inaugural meeting. As it becomes available, more information regarding the 2007 program can be obtained at the meeting web site at www.5StarMedEd.org/neonatal or by calling Nina Pratt at 760-773-4500 or toll free at 800-321-3690, 8:00 am to 5:00 pm, Pacific Time. All neonatologists, neonatal nurse practitioners, physician assistants, and neonatal fellows are invited and encouraged to attend next year's event carrying on with the tradition of providing the most up-to-date, state-of-the-art and clinically relevant information for the care of the preterm and term neonate.

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