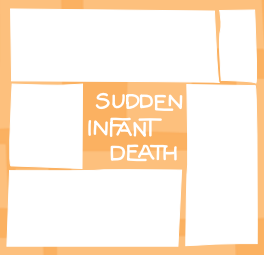

National SIDS/
Infant Death
Resource Center

Sudden Infant Death Syndrome Research

A Selected Bibliography 2002

U.S. Department of Health and Human Services
HRSA
Health Resources and Services Administration
Maternal and Child Health Bureau

Sudden Infant Death Syndrome Research: A Selected Bibliography, 2002

Introduction

Sudden Infant Death Syndrome (SIDS) is defined as the sudden death of an infant under 1 year of age which remains unexplained after a thorough case investigation, including performance of a complete autopsy, examination of the death scene, and review of the clinical history (Willinger et al., 1991).

This bibliography provides information on research published in 2002 on Sudden Infant Death Syndrome (SIDS) and other sudden infant deaths, as well as related topics. The entries in this bibliography have been taken from English-language technical journals. The bibliography excludes editorials, letters, and non-research articles. Each entry includes a bibliographic citation, abstract, and list of database descriptors. Most of the journals cited in the bibliography are available at public, medical, or university libraries or through interlibrary loan.

We welcome suggestions and comments about *Sudden Infant Death Syndrome Research: A Selected Bibliography, 2002.*

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Bach V, Telliez F, et al.
The interaction between sleep and thermoregulation in adults and neonates.
Sleep Med Rev 2002 Dec;6(6):481–492.

The interaction between sleep and thermoregulation leads to different thermoregulatory responses depending on the sleep stage and alterations in sleep when in a cool or warm environment. In the human adult, differences in thermoregulatory efficiency during rapid eye movement (REM) sleep and slow wave sleep (SWS) are less pronounced compared to other mammals: although thermoregulatory processes persist in REM sleep, they are less efficient than during SWS. Cold and warm loads disturb the efficiency and structure of sleep. The duration of REM sleep and (to a lesser extent) of SWS decreases. In contrast, pre-sleep warm loads enhance SWS and improve sleep continuity. This procedure may promote and maintain sleep in depressed patients, whose sleep and body temperature rhythms are modified. In contrast to adults, homeothermic processes in neonates are maintained or even enhanced during active sleep (AS) when compared to quiet sleep (QS). Sleeping in a cool environment increases the duration of AS at the expense of QS. As a result, the thermoregulatory function overcomes the need to conserve energy that would otherwise lead to increased QS. An interaction between sleep, respiration, and thermoregulation may be involved in sudden infant death syndrome: an alteration in the thermal balance may perhaps induce respiration instability, especially during AS.

Descriptors: Sudden infant death syndrome. SIDS. Sleep. Thermoregulation. Neonates. Adults. Depression. REM. Rapid eye movement. Slow wave sleep. SWS.
ACCN: SIDS-06900

Crowell DH, Kulp TD, et al.
Infant polysomnography: Reliability and validity of infant arousal assessment.
J Clin Neurophysiol 2002 Oct;19(5):469–483.

Infant arousal scoring based on the Atlas Task Force definition of transient EEG arousal was evaluated to determine (1) whether transient arousals can be identified and assessed reliably in infants and (2) whether arousal and no-arousal epochs scored previously by trained raters can be validated reliably by independent sleep experts. Phase I for inter- and intrarater reliability scoring was based on two datasets of sleep epochs selected randomly from nocturnal polysomnograms of healthy full-term, preterm, idiopathic apparent life-threatening event cases, and siblings of sudden infant death syndrome infants of 35 to 64 weeks postconceptional age. After training, test set 1 reliability was assessed and discrepancies identified. After retraining, test set 2 was scored by the same raters to determine interrater reliability. Later, three raters from the trained group rescored test set 2 to assess inter- and intrarater reliabilities. Interrater and intrarater reliabilities, with 95% confidence intervals, ranged from substantial to almost perfect levels of agreement. Interrater reliabilities for spontaneous arousals were initially moderate and then substantial. During the validation phase, 315 previously scored epochs were presented to four sleep experts to rate as containing arousal or no-arousal events. Interrater expert agreements were diverse and considered as noninterpretable. Concordance in sleep experts' agreements, based on identification of the previously sampled arousal and no-arousal epochs, was used as a secondary evaluative technique. Results showed agreement by two or more experts on 86% of the Collaborative Home Infant Monitoring Evaluation Study arousal scored events. Conversely, only 1% of the Collaborative Home Infant Monitoring Evaluation Study-scored no-arousal epochs were rated as an arousal. In summary, this study presents an empirically tested model with procedures and criteria for attaining improved reliability in transient EEG arousal assessments in infants using the modified Atlas Task Force standards. With training based on specific criteria, substantial inter- and intrarater agreement in identifying infant arousals was demonstrated. Corroborative validation results were too disparate for meaningful interpretation. Alternate evaluation based on concordance agreements supports reliance on infant EEG criteria for assessment. Results mandate additional confirmatory validation studies with specific training on infant EEG arousal assessment criteria.

Descriptors: Arousal. Infants. Polysomnography. Sudden infant death syndrome. Comparative studies. Female. Male. Sleep stages. Wakefulness. Electroencephalography.
ACCN: SIDS-06899

Holt J, Fagerli I, et al.
Audit of neonatal deaths of nonmalformed infants of 34 or more weeks gestation: Unavoidable catastrophic events or suboptimal care?
Acta Obstet Gynecol Scand 2002 October;81(10):899–904.

Background: The neonatal death rate (death < or = 28 days/1,000 live births) has decreased and the level is now so low that it has been questioned whether further improvement is possible. The aim of this study was to categorize nonmalformed infants of 34 weeks' or more gestational age dying in the neonatal period to analyze if these deaths might have been prevented. *Material and Methods*: We used the audit method to study neonatal deaths during 1986–98 in a county population of approximately 240,000 inhabitants. *Results*: Twenty-six neonatal deaths from a population of 41,901 live births were analyzed. The neonatal deaths were found to be associated with antepartum hypoxia (six cases); intrapartum catastrophes (seven cases); intrapartum monitoring deficiencies (five cases); resuscitation and stabilization after birth (two cases); infection (one case); sudden infant death syndrome (four cases); and peritonitis (died at home, one case). Suboptimal care was recorded in 16 cases. Neonatal death was unlikely to be associated with suboptimal care in six cases, but in 10 cases suboptimal care might or was likely to have brought about the fatal outcome. *Conclusion*: Avoiding suboptimal care might or is likely to prevent neonatal death in 10/26 (38.5%) of nonmalformed infants of 34 weeks' or more gestational age. Such improvements may, however, only slightly influence the neonatal death rate, with a reduction from 4.4 to 4.2/1000 live births.

Descriptors: Abnormalities. Neonatal. Gestational age. Female. Hypoxia. Infant mortality. Infant. Medical audit. Medical errors.
ACCN: SIDS-06898

Lawson AB, Clark A.
Spatial mixture relative risk models applied to disease mapping.
Stat Med 2002 Feb 15;21(3):359–370.

An important issue within health services research is the correct allocation of resources within health authority regions and the capability of public health professionals to make such allocation appropriately. This allocation is often based on a mapping of relevant disease incidence and the assessment of the geographical distribution of relative risk of disease in small areas within the health authority administrative domain. Existing methods for the statistical analysis of small area risk are mostly based on smoothing methods. However, these methods often smooth over large discontinuities in the risk surface, which might be important to maintain for the purposes of resource allocation. In this paper we propose a method that involves the use of spatial mixtures of components that can provide a balance between smoothness and the maintenance of discontinuity. The method is applied to a sudden infant death incidence data set.

Descriptors: Comparative study. Infant. Incidence. Statistical models. Geography. Disease. Risk assessment. Sudden infant death. Public health administration.
ACCN: SIDS-06897

Sahni R, Saluja D, et al.
Quality of diet, body position, and time after feeding influence behavioral states in low birth weight infants.
Pediatr Res 2002;52(3):399–404.

The effects of variations in carbohydrate and fat intake and body position on behavioral activity states were evaluated in 64 healthy, growing low birth weight infants (birth weight, 750-1600 g). The infants, enrolled in a prospective, randomized, double-blind, controlled study of effects of quality of dietary energy, were fed one of the five formulas. These formulas contained fixed intakes of protein (4 g/kg per day) but different intakes of carbohydrate (9.1 to 20.4 g/kg per day) and fat (4.3 to 9.5 g/kg per day). Six-hour daytime sleep studies were performed at 2-wk intervals from time of full enteral intake until discharge (mean postconceptional age at first study, 33.2 +/- 1.8 wk). Infants were randomly assigned to the prone or supine position for the first 3-h postprandial period; the position was reversed during the second 3 h. Behavioral activity state, i.e. quiet sleep

(QS), active sleep, indeterminate sleep, awake, or crying was coded each minute throughout the postprandial period. The overall incidence of QS was almost double in the prone position versus the supine ($p < 0.0001$). In contrast, the probability of being in either of the two wakeful states (awake and crying) was increased when infants were placed in supine position ($p < 0.0001$). Increased likelihood of being in QS while prone was found only during the 30 min after and before feeding in a 150-min prandial cycle. In contrast, increased amounts of awake and crying in supine position were observed throughout the feeding interval. As carbohydrate intake increased, time spent in QS in supine position increased (from 8.6% to 12.5%, $p < 0.02$), and a trend in the same direction was noted for the prone position ($p = 0.06$). However, during postprandial minutes 10-100, when QS is likely to be entrained by the nutrient intake, enhancement of QS was found in the prone position only ($p < 0.02$). Carbohydrate intake influences the total time spent and the distribution of behavioral activity states within the postprandial period in low birth weight infants. The effect of nutrient intake on sleep profile is dependent on body position and time after feed. Mechanistic hypotheses relating sudden infant death syndrome to sleeping position may need to take these observations into account. 35 references.

Descriptors: Low birthweight. Carbohydrates. Infants. Newborns. Sudden infant death syndrome. SIDS. Quiet sleep. Active sleep. Prone position. Supine position. Statistics. Sleep position.
ACCN: SIDS-06896

Touch SM, Epstein ML, et al.
The impact of cobedding on sleep patterns in preterm twins.
Clin Pediatr 2002 Jul–Aug;41(6):425–431.

Interest in cobedding multiple-gestation infants has grown as focus has increased on the developmental approach to the care of the neonate. Little data, however, exist on the infants' response to cobedding. It is important to evaluate the safety, efficacy, and physiologic impact of this practice. Cobedding was offered to parents of twin infants < 37 weeks gestation, without arterial lines or ventilator requirements, by the health care team according to standard practice in our nursery. After parental informed consent, infants were placed on an event-recording cardiorespiratory monitor for 12 hours before cobedding and for the first 12 hours of cobedding. Recordings were evaluated by an investigator blinded to the bedding status of the infant. Apnea (a pause of respiration > 10 seconds, central apnea), bradycardia (a decline in heart rate to < 80 beats per minute), periodic breathing (a respiratory pattern in which there are > or = 3 pauses in respiration of > or = 3 seconds with < 20 seconds of breathing between pauses), adverse events (changes in medication, changes in oxygen requirements, temperature instability, the need for sepsis evaluation, or death) were evaluated. Other physiologic parameters were obtained through the use of standard bedside monitoring. Eleven sets of preterm infants, n = 22, with a mean gestation of 31.8+/-2.9 weeks and a mean birth weight of 1,698.7+/-552.0 grams were studied. Infants were evaluated at a corrected gestational age of 33.5+/-1.9 weeks and a mean weight of 1,713.2+/-484.0 grams. The number of events of central apnea before cobedding (57) was greater than those recorded during cobedding (18), $p<0.05$. There was no difference found in any of the other parameters compared. The numbers of events recorded before and during cobedding were compared by Student's t-test and significance was determined by $p < 0.05$. No adverse events (AE) were noted, and all infants remained cobedded throughout the study. This preliminary study suggests that cobedding of healthy preterm twins showed no increase in adverse events. Of the physiologic parameters studied, only the occurrence of central apnea changed with cobedding. This decrease in central apnea may reflect a change in sleep pattern due to more frequent arousal by the twin. Alternatively, a more regular breathing pattern may reflect a positive physiological response to contact between twins.

Descriptors: Cobedding. Preterm. Twins. Premature. Sleep apnea syndrome.
ACCN: SIDS-06805

de la Grandmaison GL, Durigon M.
Pulmonary embolism: A rare cause of sudden infant death.
Am J Forensic Med Pathol 2002 Sep;23(3):257–259.

Pulmonary embolism can be observed at any age, but it occurs very rarely in the infant. The authors report the case of a 12-month-old boy who suddenly died during clinical improvement of gastroenteritis associated with

otitis. Autopsy showed signs of dehydration and acute left pulmonary embolism, which was the cause of death. Thrombosis of the inferior vena cava extending into renal veins was seen. In this case, plasma hyperosmolality caused by dehydration might have favored the formation of venous thromboses. The various risk factors of pulmonary embolism in the child are discussed, including genetic factors. 9 references.

Descriptors: Sudden infant death. Pulmonary. Infant. Embolisms. Autopsy.
ACCN: SIDS-06703

Havlik DM, Nolte KB.
Sudden death in an infant resulting from torsion of the uterine adnexa.
Am J Forensic Med Pathol 2002 Sep;23(3):289–291.

A 2-month-old infant girl died suddenly as a result of torsion of the uterine adnexa. The infant was found unresponsive in bed and was pronounced dead shortly after her arrival at a hospital. There were no antecedent signs of illness. At autopsy, the right ovary and right fallopian tube were twisted and were dark purple, swollen, and necrotic. The right ovary was enlarged by a follicle cyst 4 cm in diameter, which likely precipitated the torsion. The mechanism of death was unclear but may have resulted from the release of cytokines produced in response to necrotic adnexal tissue. Fatal uterine adnexal torsion has been reported rarely in infants; in all those cases there were antecedent symptoms. Torsion of the uterine adnexa should be included in the differential diagnosis of sudden death in infancy. In infants, precipitous death without significant antecedent signs of illness is most commonly attributed to the sudden infant death syndrome (1). However, other conditions such as congenital heart disease, infectious diseases, and metabolic disorders may also present as sudden infant death (2). Fatal uterine adnexal torsion has rarely been reported in infants; in all reported cases there were antecedent symptoms (3-5). We report the case of an apparently asymptomatic infant who died suddenly of uterine adnexal torsion.

Descriptors: Forsenic pathology. Adnexal torsion. Sudden death. Ovarian torsion. Sudden infant death syndrome. SIDS.
ACCN: SIDS-06687

Sawaguchi A, Sawaguchi T, et al.
Research for improving the autopsy rate for infant death—medical economic assessment of the forensic autopsy system in Japan.
Forensic Sci Int 2002 Sep 14;130 Suppl:S91–S95.

The rate at which autopsies are performed in Japan for cases of infant death is not adequate for diagnosing sudden infant death syndrome (SIDS). In Japan, it will be necessary to increase the autopsy rate at the time of infant deaths in order to improve the certainty of diagnosing SIDS and improving the accuracy of determining the cause of death with respect to infant death. The objective of this research is to provide basic documentation required for administrative implementation of this objective. In Japan, the Medical Examiner System and its related Approved Autopsy System are not deployed nationwide. The estimated budget in the case of deploying the Medical Examiner System nationwide for the purpose of improving the infant death autopsy rate is in excess of 5 trillion yen, and that in the case of deploying the Approved Autopsy System nationwide is estimated at roughly US$ 130 million. However, since the rate of autopsies performed for SIDS has not changed following the implementation of approved autopsies, the efficacy of the Approved Autopsy System has come to be viewed questionably. In addition, it is also necessary to enact legislation that mandates the conducting of autopsies for all cases of infant death as is done in Scandinavia. The required cost in the case of performing autopsies for all cases of abnormal infant death is estimated at US$ 200,000–700,000 and is considered to be within a range that could be implemented through local government regulations. In addition, the cost per body of an autopsy performed at the State Crime Laboratory in the State of Arkansas in the US in 1999 was about US$ 6,000. In contrast, the same cost at the Tokyo Medical Examiner Office is much less at only about US$ 4,000. 4 references.

Descriptors: Sudden infant death syndrome. SIDS. Japan. United States. Autopsy. Medical examiner.
ACCN: SIDS-06685

Matoba R.
A study on how to increase the sudden infant death syndrome (SIDS) autopsy rate.
Forensic Sci Int 2002 Sep 14;130 Suppl:S104–S108.

To clarify the real cause of death of sudden infant death syndrome (SIDS), it is the most urgent and important subject to increase the autopsy rate of SIDS. So, we make following three proposals.
1) SIDS must be reported to the police.
2) Autopsy of SIDS must be performed in the area where a medical examiner's system is established. A medical examiner's system or similar system must be established in all big cities.
3) It is desirable to perform autopsy in the area having no medical examiner's system by judicial autopsy or pathological autopsy by pathologists having a diploma in postmortem medical examination.

Descriptors: Sudden infant death syndrome. SIDS. Autopsy. Medical examiner. Diploma.
ACCN: SIDS-06684

Sawaguchi T, Nishida H, et al.
Comparison between SIDS-related court cases in the United States and Japan—A trend seen in legal precedents in the United States.
Forensic Sci Int 2002 Sep 14;130 Suppl:S88–S90.

A bibliographic search of "Lexis," a database on foreign legal cases, was conducted, using sudden infant death syndrome (SIDS) as a key word to retrieve legal cases related to SIDS in the United States. The procedure yielded 156 cases, which included many that were brought to the courts for reasons other than SIDS. The following explanation was given for this outcome: because the public in the United States is much better informed about SIDS than in Japan, few cases are brought to the courts with SIDS as the main cause of the argument; the acronym, SIDS, is simply quoted during the court proceedings. Nevertheless, 26 cases that were particularly related to SIDS were selected and compared against 33 cases recorded and retrieved in the previous year in Japan to find the difference in the trends in legal disputes. The difference in the trends in litigation in the two countries was evident: in most cases in Japan, the legal dispute was over the recognition of SIDS or asphyxiation as the cause of death that had occurred in a nursery or hospital, with the family acting as the plaintiff and the nursery or hospital as the defendant. In the majority of cases in the United States, on the other hand, the state was the plaintiff and the family or baby sitter the defendant; the focal point of the dispute was the distinction between SIDS and child abuse. Compared with the trend in Japan, a much greater number of cases were brought before the court of final appeals in the United States. As the public becomes more aware of SIDS through campaigns and other means, the pattern seen in the legal disputes refer to SIDS lawsuits in Japan may change into that seen in the United States. 2 references.

Descriptors: Sudden infant death syndrome. SIDS. Cause of death. Homicide. Comparative study. Infant. Child abuse. Sudden infant death. Japan. United States.
ACCN: SIDS-06683

Sawaguchi T, Nishida H, et al.
Analysis of SIDS-related civil and criminal court cases in Japan.
Forensic Sci Int 2002 Sep 14;130 Suppl:S81–S87.

Thirty-three sudden infant death syndrome (SIDS)-related civil and criminal lawsuits in Japan were retrieved from judicial precedent databases "Hanrei Masutar (Judicial Decisions Master)" and "Hanrei Taikei (Judicial Decisions System)" using "SIDS" as a keyword. Sleeping posture and developmental stage of occurrence were studied in each of the cases retrieved, whether or not a legal autopsy had been performed. The influence exerted on court decisions by Japanese definitions of SIDS as well as the relationship between causes of death and court decisions were studied. Of 33, two were criminal cases (business/professional negligence on the part of the defendants, leading to death), and the rest were civil cases (claims for damages). Because the decision handed down in both criminal cases was "cause of death unknown," these defendants were found innocent. One of these cases was argued in both the court of appeals and the superior court: these courts found SIDS to be the cause of death and consequently the claim for damages was rejected. Both criminal and civil courts

dealt with another case: the former found the cause of death to be “unknown” and the defendant innocent, while the latter, finding SIDS the cause of death, declined to review. In cases where the sleeping posture was prone, courts tended to decide the cause of death to be suffocation, especially with neonates. Because diagnosis by exclusion is required in cases of a legal autopsy for SIDS, the diagnosis is difficult without an autopsy. Disagreements between the results of legal autopsy and court decisions occurred in eight cases. With such a discrepancy, a detailed case examination is necessary. In 1983, SIDS was defined in Japan in two different ways; one in a more strict sense and the other being more inclusive. The wider and narrower definitions were unified in 1995 by requiring a survey of the circumstances of death in addition to the narrower definition. Because of this situation, the two cases in the 1980s when legal autopsy was not enforced fell into the category of “SIDS in a wider sense.” In no case was a defendant found guilty when the cause of death was judged to be either SIDS/ALTE or unknown. Four cases were rejected when the cause of death was judged to be neither due to suffocation nor SIDS, while seven were accepted either as cases of ‘joint faults that canceled each other,’ or as ‘partial acceptance.’ In Japan, official views concerning a SIDS diagnosis differ among pediatricians, legal scholars of forensic medicine, and pathologists. These differences appeared to influence the legal decisions. Several conferences should be convened as soon as possible to provide an opportunity to resolve the main points of difference between these three professional groups and, thus, attain a unified view. 1 reference.

Descriptors: Sudden infant death syndrome. SIDS. Japan. Civil case. Criminal case. Judicial precedent.
ACCN: SIDS-06682

Sawaguchi T, Nishida H, et al.
Study on social responses (encouraging public awareness) to sudden infant death syndrome: Evaluation of SIDS prevention campaigns.
Forensic Sci Int 2002 Sep 14;130 Suppl:S78–S80.

The sudden infant death syndrome (SIDS) prevention campaign promulgated by the SIDS Family Associations was initiated and directed to medical professionals in 1996 and to mothers in 1997. In mid-1998, the Ministry of Health and Welfare began to support this campaign. In parallel with these moves and with cooperation from the study group of the Ministry of Health and Welfare and the SIDS Family Associations of Japan, a Japanese segment of the International Child Care Practices Survey (ICCPS) was conducted in two phases—from 1996 to 1997 and from 1998 to 1999 to observe the trends in risk factors for SIDS that may exist in the child rearing environment in Japan. Consequently, after the SIDS prevention campaign, the risk factors for SIDS, such as the practice of placing infants in a prone posture, smoking, and formula feeding, were reduced. Correspondingly, it was shown that the incidence of SIDS in Japan and in Kanagawa Prefecture where the survey was carried out considerably decreased (0.42–0.24 per 1000 live births). These data indicate that this prevention campaign has been effective. 10 references.

Descriptors: Sudden infant death syndrome. SIDS. Infant. Sudden infant death. Health education. Health promotion. Infant mortality. Incidence. Questionnaires. Risk factors. Japan.
ACCN: SIDS-06681

Sawaguchi T, Sawaguchi A, Matoba R
Comparative evaluation of diagnostic guidelines for sudden infant death syndrome (SIDS) in Japan.
Forensic Sci Int 2002 Sep 14;130 Suppl:S65–S70.

It is a well-recognized fact among professionals that the diagnosis of sudden infant death syndrome (SIDS) involves difficult elements; a SIDS diagnosis is not uniform throughout Japan; and such a diagnosis is not made based on any internationally recognized definition. Faced with this situation, guidelines have been prepared and proposals have been made to standardize and improve the accuracy of SIDS diagnoses, viz. the following three can be cited: ‘guideline for diagnosis of SIDS’ prepared by a Study Group of the Ministry of Health and Welfare; ‘case studies of SIDS’ and a ‘guideline for its diagnosis’ prepared by the Case Study Committee of Japan SIDS Research Society; and a ‘proposal on the principles of medico-legal pathology concerning SIDS’, included in the research report supported by a Grant-in-Aid for Scientific Research from the Ministry of Education. In the current study, a comparison was made focusing on the discrepancies among

these three documents. The major discrepancies among these three are: (1) handling of the patient's age (by months or years) in the diagnosis of SIDS; (2) dealing with those cases for which no autopsy has been conducted; (3) attitudes concerning whether sleeping in a prone posture is a cause for asphyxia and (4) opinions concerning the aspiration of vomited milk. It is anticipated that these discrepancies will invite confusion and affect judgments and recognition of SIDS-related cases that will be brought to court. It is essential that those involved with these three documents have an opportunity at the earliest time to discuss the matter and come to a uniform understanding. 5 references.

Descriptors: Sudden infant death syndrome. SIDS. Sudden infant death. Infant. Comparative study. Practice guidelines. Japan.
ACCN: SIDS-06680

Nishida H, Takashima S.
Quantification of trace elements in the brain of SIDS victims.
Forensic Sci Int 2002 Sep 14;130 Suppl:S63–S64.

In this report, the quantification and analysis of trace elements in the frontal lobes of the brains of sudden infant death syndrome (SIDS) cases were carried out. In all materials, V, Cr, Sn and Sb were not observed and Mg, Na, K, Fe, Zn and Br were observed. As for all of these trace elements, there was no significant difference between SIDS and non-SIDS. Only Ca was not observed in SIDS and observed only in non-SIDS. It is well known that Ca moves from outside of cells to inside of cells and induces cell damage by membrane disturbance in a hypoxic situation. The result in this report suggests that the deaths in SIDS cases are so sudden and are not sufficient for the kinetics of Ca into brain cells in the hypoxic situation. 1 reference.

Descriptors: Sudden infant death syndrome. SIDS. Calcium. Trace element. Brain.
ACCN: SIDS-06679

Sawaguchi T, Takashima, S, et al.
Molecular biology in cerebral cortex of sudden infant death syndrome.
Forensic Sci Int 2002 Sep 14;130 Suppl: S60–S62.

Full-scale investigations of sudden infant death syndrome (SIDS) by methods of molecular pathology have been carried out. This paper reports the basic preliminary data of SIDS cerebral cortex analyzed by restriction landmark genomic scanning (RLGS) method, which is the second dimension electrophoresis of DNA recently developed in Japan. The RLGS method was carried out separately using the cerebral cortex of a 4-month-old infant with SIDS and using the cerebral cortex of a 3-month-old infant as a control to investigate SIDS-specific spots. As a result, the coincidence rate of spots between the infant with SIDS and the infant without SIDS was 98.12%. The average coincidence rate of spots in humans is usually 99.07%. Therefore, it was confirmed that the coincidence rate of spots by RLGS between the infant with SIDS and the infant without SIDS was lower than that in humans. In addition, the incidence of SIDS-specific spots was 1.19% and the incidence of non-SIDS-specific spots was 0.6%. 18 references.

Descriptors: Sudden infant death syndrome. SIDS. Case control studies. Cerebral cortex. Comparative study. Infant. Sudden infant death. Restriction mapping.
ACCN: SIDS-06678

Ozawa Y, Takashima S.
Developmental neurotransmitter pathology in the brainstem of sudden infant death syndrome: A review and sleep position.
Forensic Sci Int 2002 Sep 14;130 Suppl:S53–S59.

Developmental studies on neurotransmitters and their receptors in sudden infant death syndrome (SIDS) infants and controls are reviewed, including comparison between the prone and supine positions at death. In

SIDS infants, there are an increase of glial fibrillary acidic protein (GFAP)-positive astrocytes in the brainstem, an increase of substance P (SP) in the medulla and pons, a decrease of tyrosine hydroxylase (TH)-positive catecholaminergic neurons in the ventrolateral medulla (VLM), and vagal nuclei in the medulla oblongata and basal ganglia, a decrease of tryptophan hydroxylase (TrH)-positive serotonergic neurons in the periaqueductal gray matter (PAG), and decreases of 5-hydroxytryptamine 1A (5-HT1A) and 5-HT2A receptor immunoreactivities in the VLM and vagal nuclei in the medulla oblongata. These findings may be the result of chronic or repeated hypoxia and at the same time suggest hypofunction or immaturity of cardiorespiratory regulation. In contrast, 5-HT1A and 5-HT2A receptor immunoreactivities are increased in the PAG of SIDS infants. These increased immunoreactivities may reflect delayed neuronal maturation or a developmental abnormality of the nocicetive reaction of cardiorespiratory and arousal control in SIDS. Also, there are no differences of brainstem gliosis and catecholaminergic neuron changes between the prone and supine positions. Therefore, these changes may be predisposing factors for SIDS. 56 references.

Descriptors: Sudden infant death syndrome. SIDS. Anoxia. Astrocytes. Brain stem. Case control studies. Glial fibrillary acidic protein. gliosis. Catecholamines. Infant. Prone position. Risk Factors. Serotonin. Supine position. Respiration. Receptors. Neurotransmitter. Sudden infant death.
ACCN: SIDS-06677

Sawaguchi T, Franco P, et al.
Association between sleep apnea and reactive astrocytes in brainstems of victims of SIDS and in control infants.
Forensic Sci Int. 2002 Sep 14;130 Suppl:S30–S36.

Among 27,000 infants studied prospectively to characterize their sleep-wake behavior, 38 infants died under 6 months of age; 27 infants died from sudden infant death syndrome (SIDS), 5 from congenital cardiac abnormalities, 2 from infected pulmonary dysplasia, 2 from septic shock with multi-organ failure, 1 with a prolonged seizure, and another with prolonged neonatal hypoxemia. The frequency and duration of sleep apneas recorded some 3–12 weeks prior to the infants' death were analyzed. Brainstem material was retrospectively collected from these 33 infants and studied in an attempt to elucidate the relationship between sleep apnea and hypoxic gliosis. The findings were compared between the SIDS victims and the control infants. Brainstem materials were immunohistochemically studied for quantitization of reactive astrocytes using an anti-glial fibrillary acidic protein (GFAP) antibody. The pathological materials were collected within 24h of death. This study focuses on the association between respiratory characteristics and pathology. Physiological and pathological data in the arousal pathway of the brainstem were linked for each infant and variant–covariant analyses were carried out using physiological data as dependent variables and pathological data and categorical data to evaluate the association with SIDS or non-SIDS as independent variables. The study failed to statistically support an association between hypoxic loads, reflected by the GFAP-positive reactive astrocytes in brainstems, the classification of being SIDS or non-SIDS infants, and the characteristics of sleep apnea. 25 references.

Descriptors: Sudden infant death. Obstructive sleep apnea. Brain stem. Astrocytes. Gliosis. Infant. Polysomnography. Case control studies. Prospective Studies. Sleep arousal disorders.
ACCN: SIDS-06676

Sawaguchi, T, Franco P, et al.
From epidemiology to physiology and pathology: Apnea and arousal deficient theories in sudden infant death syndrome (SIDS) with particular reference to hypoxic brainstem gliosis.
Forensic Sci Int 2002 Sep 14;130 Suppl:S21–S29.

Among 27,000 infants studied prospectively to characterize their sleep–wake behavior, 38 infants died under 6 months of age. They included 26 cases of sudden infant death syndrome (SIDS). Five infants who died from congenital cardiac abnormalities, two from infected pulmonary dysplasia, two from septic shock with multi-organ failure, one during a prolonged seizure, one from a prolonged neonatal hypoxemia, one from meningitis with brain infarction. All the infants had been recorded during one night in a pediatric sleep laboratory some 3–12 weeks before death. The frequency and duration of sleep apneas were analyzed. The infant's brain stem

material was collected and immunohistochemistry of glial fibrillary acidic protein (GFAP) was carried out. The density of GFAP-positive reactive astrocytes was measured in the cardiorespiratory and arousal pathway. Akaike information criterion statistics (AIC) were calculated to elucidate the relationship between the epidemiological data on sleep position, the physiological data and the pathological data in SIDS victims. The duration of obstructive apnea was the most significant variable to differentiate between SIDS victims and control infants. In conclusion, the present study sustains the possibility of an organic fragility within the arousal pathway in SIDS victims with repetitive sleep apneas. 25 references.

Descriptors: Sudden infant death syndrome. SIDS. Gliosis. Apnea. Arousal. Brainstem.
ACCN: SIDS-06675

Kahn A, Sawaguchi T, et al.
Sudden infant deaths: From epidemiology to physiology.
Forensic Sci Int 2002 Sep 14;130 Suppl:S8–S20.

The incidence of sudden infant death syndrome (SIDS) has dropped significantly in most countries following the development of education campaigns on the avoidance of risk factors for SIDS. However, questions have been raised about the physiological mechanism responsible for the effects of these environmental risk factors. Since 1985, a series of prospective, multicentric studies have been developed to address these questions; over 20,000 infants were recorded during one night in a sleep laboratory and among these, 40 infants eventually died of SIDS. In this review, the following methods were employed: sleep recordings and analysis, monitoring procedure, data analysis of sleep stages, cardiorespiratory and oxygen saturation, scoring of arousals, spectral analysis of the heart rate and the determination of arousal thresholds, and statistical analysis and the results including sleep apneas, arousals and heart rate and autonomic controls in both future SIDS victims and normal infants were introduced separately. In addition, the physiological effect of prenatal risk factors (maternal smoking during gestation) and postnatal risk factors (administration of sedative drugs, prone sleeping position, ambient temperature, sleeping with the face covered by a bed sheet, pacifiers and breastfeeding) in normal infants were analyzed. In conclusion, the physiological studies undertaken on the basis of epidemiological findings provide some clues about the physiological mechanisms linked with SIDS. Although the description of the mechanisms responsible for SIDS is still far from complete, it appears to involve both arousal responses and cardiac autonomic controls during sleep–wake processes. 53 references.

Descriptors: Sudden infant death syndrome. SIDS. Epidemiology. Physiology. Polysomnography. Smoking. Substance-related disorders. Arousal. Pacifiers. Breast feeding. Prone sleeping. Sleep Apnea.
ACCN: SIDS-06674

Sawaguchi A, Sawaguchi T.
Japanese national SIDS project: 1998–2000 Research for the improvement of infant mortality.
Forensic Sci Int 2002 Sep 14;130 Suppl:S1–S7.

The aim of the present study is to see if by conducting research on sudden infant death syndrome (SIDS), one of major contributing factors to infant mortality in Japan, infant mortality can be reduced. Concrete approaches taken in this study took four different directions: elucidation of SIDS etiology, prevention, elucidation of its social aspects (education), and the investigation of administrative aspects. At the same time, an attempt was made to get better grasp on the epidemiological trends in infant mortality, including that of SIDS. The idea behind this etiological approach was to unify hitherto separate approaches taken by those in epidemiological, physiological, and pathological fields. A molecular-biological approach was also added. Physiologically hypothesized causes of SIDS–apnea and arousal disorder–together with the epidemiologically presumed risk factor of sleeping position, were examined jointly from a pathological viewpoint. Research in the first 2 years of the grant found that hypoxia reflected by gliosis in the brain stem arousal pathway was related to the duration of sleep apnea. Research in the final year of the grant found the possibility of organic fragility in the brain stem arousal pathway, particularly in periaqueducal gray matter and pedunculopontine nucleus reflected by apoptosis and neuronal plasticity. These findings gave support to the arousal disorder hypothesis in SIDS. Application of the restriction landmark genomic scanning (RLGS) method supported the possibility of locating a site for a SIDS-specific gene. The US collaborative home infant monitoring evaluation (CHIME) currently in use

was evaluated. In addition, three new monitoring methods were developed: a non-invasive multi-channel pressure-sensing bed, microwave radar, and a pacifier that functions as a suckometer which can be used to evaluate a neonate's autonomic nervous functions. Social (educational) activities included: surveys of the current state of educational campaigns on SIDS in other countries, epidemiological evaluation of campaigns run by the Japan SIDS families' Association to evaluate the effectiveness of the SIDS campaign, and creation of a home page, mostly to inform the public about the output from this research group. "Guidelines for Death Scene Investigation of Sudden, Unexplained Infant Deaths: Recommendations of Interagency Panel on sudden infant death syndrome" was translated into Japanese. Activities that concerned administrative measures included clarification of the unique nature of SIDS-related trials in Japan when compared to those in the United States. Other concrete administrative proposals were: a pressing need to increase the rate of SIDS-related autopsies to facilitate a better etiological understanding and, for this purpose, establishing regulations in local jurisdictions and amending Article 8 of the Postmortem Examination and Corpse Preservation Act, keeping in perspective the medico-economic evaluation of the Japanese medical examiner system. For these proposals to be realized, establishment of a new office in charge of administrative and approved autopsies at the national level of government is desirable. Also pointed out were the different opinions held among specialists concerning the diagnosis of SIDS and their need to hold multiple conferences to unify their views. Basic data for these conferences were provided from epidemiological examinations of infant mortality.

D**escriptors:** Sudden infant death syndrome. SIDS. Japan. Infant. Infant mortality. Epidemiology. Etiology. Physiology. Pathology.
ACCN: SIDS-06673

Hafstrom O, Milerad J, Sundell HW.
Prenatal nicotine exposure blunts the cardiorespiratory response to hypoxia in lambs.
Am J Respir Crit Care Med 2002 Dec 15;166(12 Pt 1):1544–1549.

Because smoking during pregnancy is a major risk factor for late fetal death and the sudden infant death syndrome, we investigated cardiorespiratory defense mechanisms to hypoxia in 7 prenatally nicotine-exposed (N) lambs (approximate maternal dose: 0.5 mg/kg/day) and 11 control (C) lambs all at an average age of 5 days. The ventilatory response to 10% oxygen (hyperpnea) was significantly attenuated during quiet sleep in N lambs compared with C lambs and in N lambs aroused from sleep later compared with C lambs (161 ± 90 versus 75 ± 66 seconds, $p < 0.05$). The ventilatory response to hypoxia was similar in the two groups during wakefulness (W), whereas the heart rate response (tachycardia) was significantly lower in N lambs compared with C lambs during both activity states. The ventilatory response to hyperoxia was significantly lower in N lambs compared with C lambs during both activity states. Transition from W to quiet sleep was associated with a significant decrease in ventilation in C lambs but not in N lambs. In conclusion, prenatal nicotine exposure, at a dose comparable with moderate smoking, blunts major elements of the cardiorespiratory defense to hypoxia, i.e., the heart rate and ventilatory and arousal responses, and abolishes the normal decrease in ventilation during sleep compared with W.

Descriptors: Nicotine exposure. Hypoxia. Smoking. Sudden infant death. Sudden infant death syndrome. SIDS. Chemoreceptors. Respiration. Lambs.
ACCN: SIDS-06672

Goldhammer EI, Zaid G, et al.
QT dispersion in infants with apparent life-threatening events syndrome.
Pediatr Cardiol 2002 Dec;23(6):605–607.

Apparent life-threatening event (ALTE) is a term used to define an event of unknown cause after an infant is found limp, cyanotic, bradycardic, and/or requires resuscitation. Eight to 15% of children with ALTE die of sudden infant death syndrome. Obstructive sleep apnea, bradycardia, gastroesophageal reflux, and laryngotracheal abnormalities are frequently associated with ALTE. Wide QT dispersion is associated with sudden death in heart failure and increased risk of ventricular fibrillation in acute myocardial infarction. Here, we assess QT dispersion in infants with ALTE and its correlation to clinical and electrocardiographic indices. The study included eighty nine infants (age 2.14–1.8 months, 46 males and 43 females) referred with ALTE to

the pediatric emergency room and 18 controls (age 2.77–2.2 months) who underwent electrocardiogram assessment of QTmin, QTmax, QT dispersion (QT-D), and as well as QTmin, QTmax, and QT-D corrected for heart rate (QTcmin, QTcmax, QTC-D, respectively). All infants were referred at the usual diagnostic tests–the gastroesophageal reflux test, apnea monitoring, Holter ECG monitoring, electroencephalogram, and Doppler echocardiography. QT-D, QTc-D, and QTc-min were significantly greater in the ALTE group ($p < 0.01$). Greater QTc-D was found in males compared to females ($p < 0.001$). QT-D and QTc-D showed little or no correlation with age of infant or positivity of diagnostic tests. QTc has been found by multiple regression analysis to be the independent variable with the greatest impact on QTc-D (beta = -0.68, $p < 0.001$).

Descriptors: ALTE. QT dispersion. Resuscitation. Sudden infant death syndrome. SIDS.
ACCN: SIDS-06671

Uezono S, Kamata A, et al.
Intraoperative awareness and the depth of anesthesia in children: A perspective from pediatric anesthesia.
Sleep Med 2002 Dec;3 Suppl2:S67–S70.

The bispectral index (BIS) monitoring, using electroencephalographically derived method, has shown some promise to measure 'depth of anesthesia' for various anesthetics. A large fraction of the literature that has investigated BIS monitoring demonstrates that BIS correlates well with clinically important endpoints and many clinical utility trials have been undertaken in adults to prove its effectiveness to improve perioperative patient care. As the use of the technology grows, other potential applications have been investigated; BIS as a monitor in pediatric anesthesia and BIS as a monitor to measure the depth of sleep may serve as examples. If the two are proved useful, these successes may bring clinicians another application of this technology: BIS to monitor unconsciousness state of babies to prevent sudden infant death syndrome or apparent life threatening event. 17 references.

Descriptors: Bispectral index. BIS. Sudden infant death syndrome. SIDS. Monitoring. Pediatric anesthesia.
ACCN: SIDS-06670

Horne RSC, Parslow PM, et al.
Arousal responses and risk factors for sudden infant death syndrome.
Sleep Med 2002 Dec;3 Suppl2:S61–S65.

Background: Failure to arouse from sleep has been postulated as a mechanism to explain the final pathway of sudden infant death syndrome (SIDS). *Methods*: We have reviewed the effects of the major risk factors for SIDS, prone sleep position, maternal smoking, prematurity, and recent infection on arousability from sleep. In human infants it has been consistently demonstrated that arousal from sleep in response to a variety of stimuli is more difficult to induce from quiet sleep (QS) compared to active sleep (AS) over the first 6 months of life. *Results*: In the prone position both stimulus-induced and spontaneous arousability from both QS and AS were impaired at 2–3 weeks and 2–3 months, but not at 5–6 months of age in both term and preterm infants. In term infants exposed to maternal smoking during pregnancy both stimulus-induced and spontaneous arousability were impaired when infants slept supine in QS at 2–3 months of age. Healthy preterm infants showed no impairment in arousability compared with term infants at matched postconceptional ages. However, preterm infants with a history of apnoea and bradycardia of prematurity showed decreased arousal responses in both QS and AS and this impairment was positively correlated to their 'perinatal risk score'. Infants who had recently suffered an infection requiring hospitalization showed decreased arousability in QS on the day of discharge when compared to 2 weeks later when they were completely well. *Conclusions*: In summary it has been found that the major risk factors for SIDS identified from epidemiological studies also decrease arousability from sleep in infants. We propose that this decreased arousability from sleep may be involved in the final pathway of SIDS.

Descriptors: Sudden infant death syndrome. SIDS. Arousal. Infant. Prone position. Smoking. Prematurity. Infection.
ACCN: SIDS-06669

Sawaguchi T, Kato I, et al.
Arousal deficiency theory in sudden infant death syndrome with reference to neuronal plasticity.
Sleep Med 2002 Dec; 3 Suppl2:S57–S60.

Objective: Among 27,000 infants studied prospectively to characterize their sleep–wake behavior, 38 infants died under 6 months of age (including 26 infant victims of sudden infant death syndrome (SIDS), five with congenital cardiac abnormalities, two from infected pulmonary dysplasia, two from septic shock with multi-organ failure, one with a prolonged seizure, one from prolonged neonatal hypoxemia, and one from meningitis and brain infarction). *Method*: The frequency and duration of sleep apnea events recorded some 3–12 weeks before the infants' deaths were analyzed. Brainstem material from these 38 infants was studied in an attempt to elucidate the relationship between sleep apnea and neuronal pathological changes in the arousal pathway. The histochemical analyses included Bielschowsky staining and the immunohistochemical analyses included the evaluation of growth-associated phosphoprotein 43 (GAP43) and of synaptophysin as markers for synaptic plasticity. Neurofibrae with positive pathological reactions were quantitatively analyzed. Pathological and physiological data were linked for each infant. *Results*: The correlation between sleep apnea and neuronal plasticity in the arousal pathway of the SIDS victims was not seen in the control infants and the correlation between sleep apnea and neuronal plasticity in the arousal pathway found in the control infants was not seen in the SIDS victims. *Conclusion:* These findings suggest that neuronal plasticity in the brainstem arousal pathway is related to SIDS.

Descriptors: Sudden infant death syndrome. SIDS. Arousal. Neuronal plasticity. Sleep Apnea.
ACCN: SIDS-06668

Saito Y, Ezure K, et al.
A review of functional and structural components of the respiratory center involved in the arousal response.
Sleep Med 2002 Dec;3 Suppl2:S71–S74.

State-dependent changes influencing both the central chemoreceptor and vagal inputs to respiratory neurons may provide useful markers to assess some intrinsic factors of the respiratory center. In this paper we discuss the following topics from our recent experiences, and their relevance to the assessment of sleep-related phenomena. (1) `Post-sigh' apnea appears predominantly during non-REM sleep in control subjects, and is a potential marker of respiratory dysfunction during this stage of sleep. (2) The disarranged configuration of the arcuate nucleus in Fukuyama-type congenital muscular dystrophy may represent a disturbance in the tangential migration pathway in the brainstem, and may be related to the sudden death that is common in this disorder. The maldevelopment of the arcuate nucleus in the victims of sudden infant death syndrome (SIDS) may also be related to some abnormality in the differentiation and migration of this neuronal population. (3) The onset of hypoglossal nerve activity precedes inspiratory activity of the phrenic nerve, possibly representing a latent drive from the respiratory rhythm generator. These issues are not only related to respiratory rhythmogenesis itself, but are also important in understanding the pathological conditions of arousal responses.

Descriptors: Arousal response; Muscular dystrophy; Respiration; Leigh syndrome; Apnea.
ACCN: SIDS-06667

Kahn A, Groswasser J, et al.
Sudden infant deaths: Arousal as a survival mechanism.
Sleep Med 2002 Dec;3 Suppl2:S11–14.

The mechanisms responsible for sudden infant death syndrome (SIDS) are still largely unknown. To explain what factors contribute to the deaths, we suggest a model: the '3 S model for SIDS' that includes 'sicknesses,' 'stages of development' and 'surroundings': (1) 'sicknesses' refers to infectious diseases or other medical condition. (2) 'Stages of development' relates to the maturation of vital systems including respiratory, neurovegetative or sleep-wake behavioral controls. (3) 'Surroundings' refers to environmental conditions that enhance the deficiency of cardiorespiratory, vegetative, and/or arousal controls. Such conditions were identified by epidemiological studies and include the following main risk factors: the prone body position during sleep,

high environmental temperature, maternal smoking, or sleep deprivation. An infant could be at higher risk for SIDS because of a deficiency in breathing and cardiac autonomic controls during sleep, inducing repeated episodes of hypoxia and hypoxemia. The risk is increased when the infant has a lower propensity to arouse from sleep and so, to autoresuscitate. The accident has a greater probability to occur when an infection, or an unfavorable environmental factor aggravates the immature cardiorespiratory and sleep/wake behaviors of the infant. The clinical findings could be related to the changes reported in the brainstems of SIDS victims.

Descriptors: Sudden infant death syndrome. SIDS. Arousal. Hypoxia. Resuscitation. Sleep. Resuscitation. Infection.
ACCN: SIDS-06666

Letourneau P, Niyonsenga T, et al.
Influence of 24-hour sleep deprivation on respiration in lambs.
Pediatr Res 2002 Nov;52(5):697–705.

The aim of this study was first to examine the effects of 24-h sleep deprivation on apnea index and duration in lambs. The effects on sleep architecture and sigh and swallowing indices were also studied. The impact of postnatal maturation on all measured variables was assessed by studying two different age groups. Twelve lambs (six aged 1–2 d and six aged 23–24 d on the day of surgery) were chronically instrumented for polysomnographic recordings including sleep state assessment, nasal flow, diaphragm electromyogram, and glottal constrictor muscle electromyogram. Two recordings, one control and one after 24-h sleep deprivation, were performed in all lambs. Results show that the effects of sleep deprivation predominate in rapid eye movement sleep in the younger group, with increased rapid eye movement sleep proportion and apnea, sigh, and swallowing index. Our results in lambs suggest that the consequences of sleep deprivation upon respiration are predominant early after birth. Although the potential relationship of these observations to neonatal apneas and sudden infant death syndrome has yet to be defined, awareness of the effects of sleep deprivation is important for neonatal care.

Descriptors: Animals. Newborns. Deglutition. Electromyography. Heart rate. Polysomnography. Respiration. Sheep. Sleep apnea syndrome. Sleep deprivation. Apnea. Telemetry. Wakefulness.
ACCN: SIDS-06661

Bajanowski T, Furst P, et al.
Dioxin in infants—an environmental hazard?
Int J Legal Med 2002 Feb;116(1):27–32.

The concentrations of the most common dioxin and dibenzofuran congeners were measured in different tissues (e.g. liver, kidneys, subcutaneous fatty tissue, and spleen) from 27 infants who died suddenly and unexpectedly. The cases could be subdivided into 2 groups consisting of 15 infants who died in 1991/1992 and in 12 infants who died in 1996/1997. The autopsies were carried out using a standardised protocol and additionally the parents were asked to supply details of the nutritional conditions. The age of the mother and the birth order of the infants were also recorded. From the results obtained by correlating these parameters with the dioxin concentrations three main factors could be established: 1) there was a significant decrease in the total dioxin concentration in infant tissues from 1991/1992 to 1996/1997 indicating a decrease in the environmental dioxin levels due to a decrease in dioxin emission, 2) the birth order was inversely and the duration of breast feeding directly proportional to the dioxin concentrations thus showing that the mothers can decontaminate themselves by breast feeding, and 3) an accumulation of specific dioxin congeners was observed in the liver tissue but the pathophysiological significance of these observations is not yet fully understood. Because of the well-known beneficial effects of breast feeding and considering the results of the present study, this type of infant nutrition can be recommended without any restrictions.

Descriptors: SIDS. Sudden infant death syndrome. Sudden unexpected death. Dioxin. Breast feeding. Environmental exposure. Toxins. Toxicology.
ACCN: SIDS-06506

Horemuzova E, Katz-Salamon M, Milerad J.
Increased inspiratory effort in infants with a history of apparent life-threatening event.
Acta Paediatr 2002;91(3):280–86, discussion 260–261.

The objective of this study was to compare the results of polysomnography between infants with a history of apparent life-threatening event (ALTE) and controls. In this case-control study, 40 full-term ALTE infants, aged 2-36 wk at the time of the event, were compared with 40 age- and sex-matched randomly selected controls. SaO2, tcpO2, tcpCO2, heart rate (HR), vector of rib cage, and abdominal respiratory movements (phase angle, as an index of inspiratory effort) were recorded during natural nocturnal active and quiet sleep (AS, QS). SaO2, tcpO2, tcpCO2 were similar in ALTE and controls in both sleep states. Phase angle was increased in ALTE infants in both AS (59+/-46 vs 26+/-17 degrees) and QS (53+/-46 vs 18+/-14, $p < 0.001$). Eleven ALTE infants (27.5%) experienced SaO2 < 90%, with a mean decrease in SaO2 to 86+/-1.6% (mean +/- SD), compared with 10% for controls ($p=0.003$). In eight ALTE infants, SaO2 values <90% were linked to thoracoabdominal asynchrony. SaO2 < 90% in conjunction with HR <100 bpm were detected in three ALTE infants and one control. Periodic breathing was observed in 45% of ALTE infants and 40% of controls. In conclusion, the values of oxygen saturation, tcpO2 and carbon dioxide levels in ALTE infants are comparable with those of healthy controls, but the ALTE infants exhibit more hypoxaemic episodes and increased inspiratory effort during sleep.

Descriptors: Polysomnography. Sleep studies. ALTE. Infants. Carbon dioxide. Sleep stages. Respiratory control. Oxygen saturation. SIDS. Sudden infant death syndrome.
ACCN: SIDS-06504

Papacek EM, Collins JW, et al.
Differing postneonatal mortality rates of African-American and White infants in Chicago: An ecologic study.
Matern Child Health J 2002 Jun;6(2):99–105.

Objectives: This study sought to determine whether neighborhood impoverishment explains the racial disparity in urban postneonatal mortality rates. *Methods*: Stratified and multivariate logistic regression analyses were performed on the vital records of all African-Americans and whites born in Chicago by means of a linked 1992-1995 computerized birth-death file with appended 1990 U.S. census income and 1995 Chicago Department of Public Health data. Four community-level variables (low median family income, high rates of unemployment, homicide, and lead poisoning) were analyzed. Communities with one or more ecologic risk factors were classified as impoverished. *Results*: The postneonatal mortality rate of African-Americans (N = 104,656) was 7.5/1000 compared to 2.7/1000 for whites (N = 52,954); relative risk (95% confidence interval) equaled 2.8 (2.3-3.3). Seventy-nine percent of African-American infants compared to 9% of white infants resided in impoverished neighborhoods; $p < 0.01$. In impoverished neighborhoods, the adjusted odds ratio (controlling for infant and maternal individual-level risk factors) of postneonatal mortality for African-American infants equaled 1.5 (0.5-4.2). In nonimpoverished neighborhoods, the adjusted odds ratio of postneonatal mortality for African-American infants equaled 1.8 (1.1-2.9). *Conclusions:* We conclude that urban African-American infants who reside in nonimpoverished neighborhoods are at high risk for postneonatal mortality.

Descriptors: Infant mortality. Mortality rates. Socioeconomic factors. Urban population. Poverty. Whites. African Americans. Chicago. Statistical data.
ACCN: SIDS-06502

Koch LE, Koch H, et al.
Heart rate changes in response to mild mechanical irritation of the high cervical spinal cord region in infants.
Forensic Sci Int 2002 Aug 28;128(3):168–176.

Alterations in the heart rate were monitored before, during, and after the application of a unilateral mechanical impulse to the high cervical spinal cord region which was administered strictly in connection with the so called manual therapy (diagnosis=KISS). The investigation is based on a survey of 695 infants between the ages of 1 and 12 months. A notable change in the heart rate was evident in 47.2% of all examined infants (n=695). In

40.1% of these infants, the change in heart rate was characterized by heart rate decrease of 15-83% compared to control conditions. Infants in their first 3 months of life responded more often with a severe bradycardia (50-83% decrease), older infants (7-12 months) more often with a mild bradycardia (15-49.9% decrease). This comparison revealed a significantly increased occurrence of severe bradycardia in the younger age group compared to the group of children >3 months (significance 0.0017). In 12.1% (n=84) of the infants, the bradycardia was accompanied by an apnea. We discuss the hypothesis that mechanical irritation of the high-cervical region serves as a trigger that may be involved in sudden infant death (SID).

Descriptors: SIDS. Sudden infant death syndrome. Heart rate. Bradycardia. Apnea. Spinal cord.
ACCN: SIDS-06500

Rasten-Almqvist P, Eksborg S, Rajs J.
Myocarditis and sudden infant death syndrome.
APMIS 2002 Jun;110(6):469–480.

This is a retrospective survey of findings of myocarditis in 437 infants under the age of 1 year who died suddenly and unexpectedly between 1982 and 1999, and were investigated at the Department of Forensic Medicine in Stockholm, Sweden. Myocarditis was diagnosed in 69/410 infants who died naturally (16.8%) and in 2/27 violent deaths (7.4%). In 43/410 natural deaths (10.5%) the myocarditis was an isolated finding and the only explanation for cause of death and in 26 (6.3%) there were additional possible causes of death. The myocarditis was acute in 45/69 and chronic in 24/69 natural deaths, and was found to occur as early as at a few weeks of age. No specific risk factors were found when reviewing critical time of year, age, gender, previous symptoms, sleeping position, aspiration of gastric contents, and environmental factors in infant deaths with finding of myocarditis compared to 313 deaths due to sudden infant death syndrome. Myocarditis was found in 13 of 37 deaths where cultures for cytomegalovirus were positive. More than 50% of the foci of the isolated myocarditis were located in the upper part of the interventricular septum and the adjacent part of the right atrium, areas including parts of the conduction system. This localisation is significant for the cause of death when comparing deaths with myocarditis as an isolated finding to deaths with other possible causes.

Descriptors: Sudden unexpected death. Autopsy findings. Myocarditis. SIDS. Sudden infant death syndrome. Diagnosis. Diagnostic accuracy.
ACCN: SIDS-06499

Richmond S, Reay G, Abu Harb M.
Routine pulse oximetry in the asymptomatic newborn.
Arch Dis Child Fetal Neonatal Ed 2002 Sep;87(2):F83–F88.

Objective: To assess the effect of routine measurement of postductal oxygen saturation as an adjunct to routine clinical examination in the asymptomatic newborn. *Design and setting:* Prospective study in a district general hospital. Patients: All 6166 infants inborn between 1 April 1999 and 31 March 2001. *Intervention*: Oxygen saturation was measured over two minutes, after the age of 2 hours and before discharge, in one foot of all babies not admitted directly to the neonatal unit. Babies with fractional (as opposed to functional) oxygen saturation (SaO(2)) below 95% were examined by the midwife. If this examination was abnormal or if normal but further measurements were below 95%, an echocardiogram was performed. All babies with cardiac malformations diagnosed by 1 year of age were identified from databases maintained at the regional cardiology referral unit and the regional congenital malformation survey. *Results:* Measurements were made in 98% of eligible babies. A fractional SaO(2) less than 95% was found in 5% but persisted in only 1%. Structural cardiac malformations were found in 50 (8.1/1000), 26 of whom had isolated ventricular septal defects. Of the remaining 24 with other cardiac malformations, attention was first drawn to six by low SaO(2), and four more, first noticed for other reasons, also had low SaO(2). Low SaO(2) also first drew attention to 13 other babies ill for other reasons. *Conclusion*: Newborn babies with important cardiac malformations are often asymptomatic initially and the yield from clinical examination is poor. Measuring postductal saturation routinely in newborn babies before discharge is easy and can alert staff to ill babies.

Descriptors: Newborns. Infants. Oxygen saturation. Screening. Pulse oximetry. Cardiac conditions. Abnormalities. Risk factor analysis.
ACCN: SIDS-06498

Froen JF, Arnestad M, et al.
Comparative epidemiology of sudden infant death syndrome and sudden intrauterine unexplained death.
Arch Dis Child Fetal Neonatal Ed 2002 Sep;87(2):F118–F121.

Background: Unexplained antepartum stillbirth and sudden infant death syndrome (SIDS) are major contributors to perinatal and infant mortality in the Western world. A relation between them has been suggested. As an equivalent of SIDS, only cases validated by post mortem examination are diagnosed as sudden intrauterine unexplained death (SIUD). *Objective*: To test the hypothesis that SIDS and SIUD have common risk factors. *Methods:* Registration comprised all stillbirths in Oslo and all infant deaths in Oslo and the neighboring county, Akershus, Norway during 1986–1995. Seventy-six cases of SIUD and 78 of SIDS were found, along with 582 random controls surviving infancy, all singletons. Odds ratios were obtained by multiple logistic regression analysis. *Results*: Whereas SIUD was associated with high maternal age, overweight/obesity, smoking, and low education, SIDS was associated with low maternal age, smoking, male sex, multiparity, proteinuria during pregnancy, and fundal height exceeding +2 SD. Thus the effects of maternal age were opposite in SIUD and SIDS (adjusted odds ratio 1.39 (95% confidence interval 1.17 to 1.66) per year, $p < 0.0005$). Heavy smoking, male sex, and a multiparous mother was less likely in SIUD than in SIDS (0.22 (0.06 to 0.83), 0.22 (0.07 to 0.78), and 0.03 (<0.01 to 0.17) respectively). Overweight/obesity and low fundal height were more common in SIUD than in SIDS (7.45 (1.49 to 37.3) and 13.8 (1.56 to 122) respectively). *Conclusions*: The differences in risk factors do not support the hypothesis that SIDS and SIUD have similar determinants in maternal or fetal characteristics detectable by basic antenatal care.

Descriptors: SIDS. Sudden infant death syndrome. Stillbirth. Risk Factors. Norway.
ACCN: SIDS-06497

Lerner H, McClain M, Vance JC.
SIDS education in nursing and medical schools in the United States.
J Nurs Educ 2002 Aug;41(8):353–356.

This study suggests there is a need to support the efforts already present to include SIDS in medical and nursing school curricula. Both programs have indicated a need for audiovisual and printed teaching materials. Consideration should be given to teaching materials that are easily updated such as computer-generated materials because of the many rapid changes that take place in SIDS research. Currently, textbooks are the most common source of educational material used by students. Textbooks could be supplemented with information from recent journals and current Web sites. Facilitation of clinical contact with families affected by SIDS is important. The availability of local SIDS resources should be stressed to both medical and nursing programs as well as opportunities for nursing student involvement in the activities of SIDS organizations. While lectures are often the only feasible way to deliver SIDS content to large groups of students, interactive teaching strategies and involvement with bereaved families probably would increase learning beyond the basic level. Nursing schools as well as medical schools, confronted with the realities of decreased faculty time and budgets, face major challenges in developing case-based curricula that prepare students for the next century (Zimmerman et al., 1997). To address these needs, curriculum notes were developed by the Education Working Party of the SIDS Global Strategy Task Force under the direction of Professor John C. Vance and printed in February 1998. The curriculum is divided into seven modules that include content and questions as well as references on a variety of issues. A problem-based learning package is included and is becoming increasingly popular as a teaching strategy (Amos & White, 1998; David & Patel, 1995). There is one case each for medical and nursing students in the curriculum package. This curriculum can be accessed at www.sidsaustralia.org.au. Other useful Web sites include: www.sidsalliance.org. The SIDS Alliance Web site provides support to families and information about SIDS. www.sidscenter.org. The National SIDS Resource Center Web site provides information and technical assistance for parents and professionals on SIDS and related topics. www.aap.org. The American Academy of Pediatrics Web site provides guidelines on sleep

position and infant sleeping environment. www.asipl.org. The Association of SIDS and Infant Mortality Programs Web site includes publications and position papers. Finally, many states have SIDS services provided by professional programs and parent organizations. Students have the opportunity to work with these organizations to provide bereavement services and risk-reduction education. The organizations listed above can be contacted for further information.

Descriptors: Medical school curricula. Medical textbooks. SIDS. Sudden infant death syndrome. Health professionals education. Nursing education. Nurses. Educational materials. Resource materials. SIDS Alliance. American Academy of Pediatrics. National organizations.
ACCN: SIDS-06496

Ozawa Y, Okado N.
Alteration of serotonergic receptors in the brain stems of human patients with respiratory disorders.
Neuropediatrics 2002 Jun;33(3):142–149.

We compared the developmental changes of 5-hydroxytryptamine (5-HT)1 A and 5-HT2 A receptor immunoreactivity in the nuclei in relation to the cardiorespiratory or autonomic function in the human brain stem in sudden infant death syndrome (SIDS) and congenital central hypoventilation syndrome (CCHS) patients and age-matched controls by means of immunohistochemical methods. There were significant decreases in 5-HT1 A and 5-HT2 A receptor immunoreactivity in the dorsal nucleus of the vagus, solitary nucleus and ventrolateral medulla in the medulla oblongata, and significant increases in the periaqueductal gray matter (PAG) of the midbrain in SIDS victims, but there were no significant differences between those in CCHS patients and controls. The decreased immunoreactivity of the receptors in the medulla oblongata was accompanied by brain stem gliosis. Therefore, the decreases in the receptors may be secondary to chronic hypoxia or repeated ischemia, but may be causally related to some impairment of the developing cardiorespiratory neuronal system. As 5-HT1 A and 5-HT2 A receptors were the most abundant in the fetal period and then decreased with subsequent development, the increases in 5-HT1 A and 5-HT2 A receptor immunoreactivity in PAG may reflect delayed neuronal maturation, but may also reflect compensatory changes in response to hypofunctioning serotonergic neurons in the medulla oblongata in SIDS. There was no abnormal expression of 5-HT1 A and 5-HT2 A receptors in CCHS brain stems, and so the pathophysiology seems to be different between SIDS and CCHS patients.

Descriptors: SIDS. Sudden infant death syndrome. Hypoventilation. Respiration disorders. Brain stem. Serotonin. Immune response. Immunoreactivity. Medulla oblongata.
ACCN: SIDS-06495

Ishikawa T, Isono S, et al.
Prone position increases collapsibility of the passive pharynx in infants and small children.
Am J Respir Crit Care Med 2002 Sep 1;166(5):760–764.

On the basis of two observations that avoiding prone sleeping decreased incidence of sudden infant death syndrome and that obstructive sleep apnea is closely linked with the syndrome, we hypothesized that the prone position may increase upper airway collapsibility in infants and small children. Passive pharyngeal collapsibility of 19 infants and small children (10–101 weeks old) was examined in three postures: supine with face straight up, supine with neck rotated, and prone with neck rotated. The collapsibility was evaluated with the maximal distension of the most collapsible region, pharyngeal stiffness, and pharyngeal closing pressure, estimated from static pressure-area relationship of the passive pharynx. No significant changes in pharyngeal stiffness were detected; however, maximal distension was reduced in the prone position (mean +/- SD, 0.56 +/- 0.26 versus 0.44 +/- 0.20 cm(2); supine with face straight up versus prone position, $p < 0.05$). Pharyngeal closing pressure increased at neck rotation in the supine position (-4.5 +/- 2.4 versus -2.8 +/- 2.3 cm H(2)O; supine with face straight up versus supine with neck rotated, $p < 0.05$), and a further increase was observed in the prone position (-0.3 +/- 2.9 cm H(2)O, $p < 0.05$ versus supine with neck rotation). Pharyngeal closing pressure in the prone position was above atmospheric pressure in half of our subjects, whereas all subjects had negative pharyngeal pressure in the supine position. We conclude that the prone position increases upper airway collapsibility, although the mechanism is yet unclear.

Descriptors: SIDS. Sudden infant death syndrome. Sleep position. Prone position. Pharynx. Upper airway obstruction. Airway collapse. Obstructive sleep apnea.
ACCN: SIDS-06494

Ponsonby AL, Dwyer CJ.
Population trends in sudden infant death syndrome.
Semin Perinatol 2002 Aug;26(4):296–305.

This review documents and assesses recent trends in sudden infant death syndrome. It reviews medical literature, Internet resources, and national governmental data. A striking reduction in SIDS incidence of more than 50% has been observed in various countries after interventions, particularly during the early 1990s, to reduce the prevalence of prone infant sleeping. A reduction in postneonatal mortality has accompanied these lower rates. Evaluation studies from several countries indicate that the SIDS rate drop is largely attributable to a decline in the proportion of babies sleeping prone. Within countries, the SIDS rate decline has not occurred to the same extent for different ethnic and socio-economic groups. Future public health activities must aim to address this issue. In the post-intervention era, the relative importance of the risk factors of side compared to supine sleeping and soft bedding near the infant's airway have become more evident. Recent death scene data indicate that a substantial proportion of the remaining SIDS deaths could be avoided by supine sleeping and by providing a safe sleeping environment for all infants.

Descriptors: SIDS. Sudden infant death syndrome. Mortality rates. Risk factors. Cultural differences. Ethnic groups. Sleep position. Beds. Bedding.
ACCN: SIDS-06493

Mathews TJ, Menacker F, MacDorman MF.
Infant mortality statistics from the 2000 period linked birth/infant death data set.
Natl Vital Stat Rep 2002 Aug 28;50(12):1–28.

Objectives: This report presents the 2000 period infant mortality statistics from the linked birth/infant death data set (linked file) by a variety of maternal and infant characteristics. *Methods*: Descriptive tabulations of data are presented and interpreted. *Results*: Infant mortality rates ranged from 3.5 per 1,000 live births for Chinese mothers to 13.5 for black mothers. Among Hispanics, rates ranged from 4.5 for Cuban mothers to 8.2 for Puerto Rican mothers. Infant mortality rates were higher for those infants whose mothers had no prenatal care, were teenagers, had 9-11 years of education, were unmarried, or smoked during pregnancy. Infant mortality was also higher for male infants, multiple births, and infants born preterm or at low birth weight. The three leading causes of infant death—congenital malformations, low birth weight, and sudden infant death syndrome (SIDS)–taken together accounted for 45 percent of all infant deaths in the United States in 2000. Cause-specific mortality rates varied considerably by race and Hispanic origin. For infants of black mothers, the infant mortality rate for low birth weight was nearly four times that for white mothers. For infants of black and American Indian mothers, the SIDS rates were 2.4 and 2.3 times that for non-Hispanic white mothers.

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Descriptors: Infant mortality. Statistical data. Ethnic groups. Socioeconomic factors. Mortality rates. Birth weight. SIDS. Sudden infant death syndrome. Maternal age. Smoking. Hispanics. National Center for Health Statistics. NCHS. United States.
ACCN: SIDS-06491

Gislason T, Johannsson JH, et al.
Familial predisposition and cosegregation analysis of adult obstructive sleep apnea and the sudden infant death syndrome.
Am J Respir Crit Care Med 2002 Sep 20;166(6):833–888.

Previous studies suggest a familial link between adult obstructive sleep apnea syndrome (OSAS) and sudden infant death syndrome (SIDS). However, most of these studies were hampered by the availability of too few cases of SIDS to draw conclusions. To examine the familial nature of this association in Iceland, hospital-based lists of all patients who were diagnosed with OSAS (n = 2,350) and SIDS (n = 58) from 1979 to 1998 were used to separately determine the familial occurrence of OSAS and SIDS and to search for evidence of cosegregation of these conditions in Icelandic families, using a nationwide genealogy database. The risk ratio for a first-degree relative of a patient with OSAS was 2.0 (1.7-2.8, 95% confidence interval). The risk ratio of the more severely affected patients with OSAS was slightly higher (2.3). Likewise, the kinship coefficient (KC) for the OSAS patient group, which determines the relatedness of the patients, was significantly larger than the mean KC of 1,000 matched control groups. Estimation of the KC for the SIDS group showed a trend toward significance when compared with control groups, but after excluding one of the half-siblings in the SIDS group from the analysis, the difference did not show any trend toward significance. Although the results of the analysis of the relatedness between all patients with OSAS and infants who died of SIDS were not significant, a trend toward significance was evident when the data were separately analyzed for the more severely affected patients with OSAS. Collectively, these results demonstrate a strong familial component in OSAS and suggest that infants who died of SIDS may have shared some of the same susceptibility factors with OSAS.

Descriptors: SIDS. Sudden infant death syndrome. Genetic factors. Inherited disorders. Obstructive sleep apnea.
ACCN: SIDS-06489

Kwon DS, Spevak MR, Fletcher K, Kleinman PK.
Physiologic subperiosteal new bone formation: Prevalence, distribution, and thickness in neonates and infants.
AJR Am J Roentgenol 2002 Oct;179(4):985–988.

Objective: The objective of our study was to determine the prevalence, distribution, and thickness of physiologic subperiosteal new bone formation in neonates and infants. *Materials and methods*: High-detail postmortem skeletal radiologic surveys of 101 neonates and infants who had died from sudden infant death syndrome were reviewed. The average age at the time of death was 2.6 months (range, 2 weeks-8 months 2 weeks). The location, distribution, and thickness of subperiosteal new bone formation of the long bones were noted and measured with an ocular magnification system. *Results*: Subperiosteal new bone formation was identified in 35 infants (35%), all of whom were between 1 and 4 months of age. The prevalence of subperiosteal new bone formation involving one or more bones was 37% for ages 1-2 months, 55% for ages 2-3 months, and 35% for ages 3-4 months. Subperiosteal new bone formation involved the tibia in 29 infants (bilateral involvement in 19) and the femurs in 14 infants (bilateral involvement in 11). The humerus was a site of subperiosteal new bone formation in 12 infants; the ulna, in seven infants; and the radius, in two infants. The thickness of the subperiosteal new bone formation was never more than 1.8 mm, and the average thickness for the various long bones ranged from 0.7 to 0.9 mm. *Conclusion*: Our results suggest that subperiosteal new bone formation is a common finding in infants 1-4 months of age. It is potentially an abnormal finding in neonates (CI = 0.0, 0.007) and in infants older than 4 months of age (CI = 0.0, 0.003). A thickness of 2 mm or more in subperiosteal new bone formation is likely to be abnormal and should prompt further diagnostic evaluation.

Descriptors: Sudden infant death. Infants. Bone structure.
ACCN: SIDS-06488

Williams SM, Mitchell EA, Taylor BJ.
Are risk factors for sudden infant death syndrome different at night?
Arch Dis Child 2002 Oct;87(4):274–278.

Aims: To determine whether the risk factors for SIDS occurring at night were different from those occurring during the day. *Methods*: The nationwide case-control study, with data for 369 cases and 1558 controls in New Zealand. *Results:* Two thirds of SIDS deaths occurred at night (between 10 pm and 7:30 am). The odds ratio (95% CI) for prone sleep position was 3.86 (2.67 to 5.59) for deaths occurring at night and 7.25 (4.52 to 11.63) for deaths occurring during the day; the difference was significant. The odds ratio for maternal smoking for deaths occurring at night was 2.28 (1.52 to 3.42) and that for the day 1.27 (0.79 to 2.03); that for the mother being single was 2.69 (1.29 to 3.99) for a nighttime death and 1.25 (0.76 to 2.04) for a daytime death. Both interactions were significant. The interactions between time of death and bed sharing, not sleeping in a cot or bassinet, Maori ethnicity, late timing of antenatal care, binge drinking, cannabis use, and illness in the baby were also significant, or almost so. All were more strongly associated with SIDS occurring at night. *Conclusions*: Prone sleep position was more strongly associated with SIDS occurring during the day, whereas nighttime deaths were more strongly associated with maternal smoking and measures of social deprivation.

Descriptors: SIDS. Sudden infant death syndrome. Risk Factors. Time of death. Time of day. Sleep position. Prone position. Socioeconomic factors. Smoking. Parent behavior.
ACCN: SIDS-06487

Li J, Hansen D, Mortensen PB, Olsen J.
Myocardial infarction in parents who lost a child: A nationwide prospective cohort study in Denmark.
Circulation 2002 Sep 24;106(13):1634–1639.

Background: The association between psychological stress and coronary heart disease remains unclear. We conducted a prospective follow-up study based on national registers to investigate if the death of a child, one of the most severe stressors, increases the risk of myocardial infarction (MI) in parents. *Methods and results*: From 1980 to 1996, 19,361 parents who lost a child (<18 years of age) in Denmark were recruited to the exposed cohort, and 295,540 parents matched on family structure were selected for the unexposed cohort. The Cox proportional hazards model was used to evaluate the relative risk (RR) of myocardial infarction (MI). The average RRs for a fatal MI and any first MI among the exposed were 1.36 (95% CI, 0.98 to 1.88) and 1.28 (95% CI, 1.08 to 1.51), respectively. The two cohorts had similar MI risk during the first 6 years of follow-up. From the 7th to the 17th year of follow-up, the exposed cohort had a RR of 1.58 (95% CI, 1.08 to 2.30) for fatal MI and a RR of 1.31 (95% CI, 1.09 to 1.57) for first MI. Parents who lost a child unexpectedly, especially from sudden infant death syndrome, experienced higher RRs. *Conclusions*: The death of a child was associated with an increased risk of MI in bereaved parents.

Descriptors: SIDS. Infant mortality. Parents grief. Bereavement. Stress. Heart disease. Myocardial infarction. Risk factor analysis.
ACCN: SIDS-06485

Reid GM.
Sudden infant death syndrome: Is it a transepithelial transport disorder?
Med Hypotheses 2002 Jun;58(6):531–534.

The first limiting factor of dietary zinc deficiency has been described as a loss of the protective role of zinc against auto-oxidation of membrane sulfhydryl (SH) compounds. It has now been established that the prohormones (nutriuretic peptides) of the intestinal guanylin family are activated extracellularly by conversion of cysteines in the peptide to disulfide bridges. The induction of uroguanylin mRNA is elevated in intestinal zinc deficiency and nutriuretic peptides regulate epithelial transport of salt and water. Nitric oxide (NO) is also a modulator of salt and water transport. The constitutive forms of nitric oxide synthase (cNOS) in neurons and endothelial cells are calcium-dependent. The inducible form of nitric oxide synthase (iNOS) is activated by bacterial entero-toxins and damaged mucosa with NO penetrating the cell and acting directly on guanylate cyclase. The activated receptor-guanylate cyclases initiating the intracellular cycle 3'-5' guanasine monophosphate (cyclic GMP) cascade in target cells results in a flux of chloride and water into the intestinal lumen. Most of the actions of NO are mediated by activation of cyclic GMP. High-altitude pulmonary edema (HAPE) is associated with a defect in transepithelial water transport. It is suggested that dietary zinc, by

modulating thiol oxidation to disulfides in guanylin prohormones to active hormones, is associated with salt and water secretion such that the overworked heart in hypoxemia increases the production and release of natriuretic peptides to activate guanylate cyclase receptors in target tissue in sudden infant death syndrome.

Descriptors: SIDS. Sudden infant death syndrome. Zinc. Diet. Intestinal disorders.
ACCN: SIDS-06484

Horne RS, Franco P, et al.
Effects of body position on sleep and arousal characteristics in infants.
Early Hum Dev 2002 Oct;69(1-2):25–33.

The prone sleeping position has been identified in worldwide epidemiological studies as a major risk factor for sudden infant death syndrome (SIDS). Public awareness campaigns throughout the western world have led to an over 50% reduction in postneonatal mortality and frequency of SIDS. This reduction in mortality has been mainly attributed to the avoidance of the prone sleep position. Various mechanisms have been postulated to explain the increased risk of SIDS associated with prone sleeping, among these, impairment of arousal from sleep. This paper reviews the effects of prone sleeping on infant sleep architecture, arousability from sleep and cardiorespiratory controls. Sleeping in the prone position has been shown to increase the amount of time spent sleeping, particularly time spent in quiet sleep (QS). Sleeping prone has also been demonstrated to be associated with a reduced responsiveness to a variety of arousal stimuli. Such impairment of arousal has been demonstrated to be associated with changes in control of autonomic cardiac function. During arousal, heart rate, blood pressure and breathing movements increase, while gross body movements occur to avoid the stimulus. Any impairment in arousability from sleep such as could occur when infants sleep in the prone position, could possibly contribute to the final pathway to SIDS.

Descriptors: SIDS. Sudden infant death syndrome. Risk Factors. Prone sleeping. Sleep patterns. Arousal response. Autonomic control.
ACCN: SIDS-06483

Sawaguchi T, Franco P, et al.
From physiology to pathology: Arousal deficiency theory in sudden infant death syndrome (SIDS)—with reference to apoptosis and neuronal plasticity.
Forensic Sci Int 2002 Sep 14;130 Suppl:S37–S43.

Among 27,000 infants studied prospectively to characterize their sleep-wake behavior, 38 infants died under 6 months of age (including 26 infant victims of sudden infant death syndrome (SIDS), 5 with congenital cardiac abnormalities, 2 from infected pulmonary dysplasia, 2 from septic shock with multi-organ failure, 1 with a prolonged seizure, 1 from prolonged neonatal hypoxemia, 1 from meningitis and brain infarction). The frequency and duration of sleep apneas recorded some 3-12 weeks before the infants' death were analyzed. Brainstem material from these 38 infants was studied in an attempt to elucidate the relationship between sleep apnea and neuronal pathological changes in the arousal pathway. Immunohistochemical analyses included the evaluation of growth-associated phosphoprotein 43 (GAP43) as a marker for synaptic plasticity. The terminal-deoxynucleotidyl transferase-mediated dUTP nick end labeling (TUNEL) method was used to identify apoptosis. The positive pathological reactions were quantitatively analyzed. The pathological and physiological data were linked for each infant. Akaike Information Criterion (AIC) statistics was calculated to elucidate the relationship between the physiological and the pathological data in the SIDS victims. The findings illustrated the possibility of an organic fragility within the arousal pathway, particularly in the midbrain periaqueductal gray matter, which is associated with the "visceral alerting response." This autonomic response occurs within an acetylcholine afferent system and pedunculopontine tegmental nucleus (PPTN). The finding is, in future SIDS infants, associated with repetitive sleep apnea.

Descriptors: SIDS. Sudden infant death syndrome. Sleep Apnea. Sleep patterns. Polysomnography. Apoptosis. Arousal response.
ACCN: SIDS-06478

Sawaguchi T, Franco P, et al.
Interaction between apnea, prone sleep position and gliosis in the brainstems of victims of SIDS.
Forensic Sci Int 2002 Sep 14;130 Suppl:S44–S52.

Among 27,000 infants studied prospectively to characterize their sleep-wake behavior, 38 infants died suddenly and unexpectedly under 6 months of age. Of these, 26 died from sudden infant death syndrome (SIDS), 5 from congenital cardiac abnormalities, 2 from infected pulmonary dysplasia, 2 from septic shock with multi-organ failure, 1 from a prolonged seizure, 1 from prolonged neonatal hypoxemia, and 1 from meningitis and brain infarction. The frequency and duration of apneas recorded some 3-12 weeks prior to the infants' death were analyzed. The brainstem materials were collected and studied in an attempt to elucidate the relationship between sleep apnea, and prone sleep position and gliosis in some nuclei associated with cardiorespiratory characteristics, such as nucleus ambiguus in the medulla oblongata and the solitary nucleus, as well as structures associated with arousal phenomenon, such as the reticular formation, the superior central nucleus and the nucleus raphe magnus in the pons, the dorsal raphe nuclei in the midbrain and medulla oblongata, periaqueductal gray matter in midbrain, and locus ceruleus. Gliosis was estimated as the density of glial fibrillary acidic protein (GFAP)-positive reactive astrocytes. Variant-covariant analyses were carried out using the characteristics of apnea as an independent variable and sleep position and gliosis as dependent variables. A significant association was found only in the frequency of obstructive apnea and prone position ($P<0.001$) and gliosis in the raphe nuclei in the midbrain ($P<0.001$). Although prone position is a well-known risk factor for SIDS, the frequency of obstructive apnea has not been associated with the prone sleep position. The observed relation between prone sleep and the density of gliosis does not relate to epidemiological findings. Further studies are needed to investigate the unexpected statistical association.

Descriptors: SIDS. Sudden infant death syndrome. Autopsy findings. Apnea. Sleep position. Prone position. Brain. Gliosis. Obstructive apnea.
ACCN: SIDS-06477

Fujita T.
Sudden infant death syndrome in Japan 1995–1998.
Forensic Sci Int 2002 Sep 14;130 Suppl:S71–S77.

This study examined the effects of birth characteristics, which reported on birth certificates, on sudden infant death syndrome (SIDS) based on vital statistics between 1995 and 1998 in Japan. One thousand eight hundred and fifty-nine cases of SIDS and 4,787,537 live births were analyzed. The mortality rate from SIDS was 0.388 SIDS deaths per 1000 live births. Based on multivariate analysis using Poisson regression model, risk factors associated with significantly increased SIDS rates included low birth weight, being a male infant, young maternal age, late birth in multiparity, maternal stillbirth experience, residential region of Kyusyu, Tokai or Hokuriku, and employment status as "unemployed or unknown." However, there was no significant difference between single and multiple birth groups after adjusting other characteristics. A decreasing postnatal age of death was observed as birth weight increased. However, there was no difference in postconceptional age of death between birth weight groups. Preterm infants died of SIDS at a later postnatal age than term infants, but there appeared to be little difference in postconceptional age of death amongst preterm infants. This association between birth characteristics and SIDS were consistent with other studies from western countries, suggesting that recommendations for SIDS in western countries are also applicable for Japan.

Descriptors: SIDS. Sudden infant death syndrome. Risk factors. Birth certificate analysis. Low birth weight. Males. Maternal age. Stillbirth. Socioeconomic factors.
ACCN: SIDS-06472

Sawaguchi A, Sawaguchi T, et al.
Study to increase the frequency of autopsies performed for cases of infant deaths—proposed revision of the law on postmortem examination and corpse preservation and other related regulations.
Forensic Sci Int 2002 Sep 14;130 Suppl:S96–S103.

By definition, sudden infant death syndrome (SIDS) requires diagnosis through exclusion by conducting an autopsy. To obtain a reliable diagnosis of this disease, an autopsy is essential. However, the frequency with which autopsies are conducted in Japan is not sufficient to meet the need associated with the diagnosis of SIDS. To improve this frequency, various public policies, such as nationwide implementation of the administrative autopsy system (medical examiner system), the application of the practice of autopsy approved by families, and legally required autopsies, are being considered; but none has been put into practice. On the other hand, attention has been called to the fact that the Law on postmortem examination and corpse preservation, which was instituted at the end of the Second World War, requires updating. In the current report, it is proposed that the following be added to Article 8, item 3 of this Law: "The Metropolitan or Prefectural Governor must insist that an autopsy be conducted on all cases of a sudden and unexpected death of an infant to investigate the cause of this death." At present, the annual incidence of SIDS in Japan is reported to be 500. To put the above-recommended legal requirement into practice, the estimated annual addition to the budget, if conducted as approved or an administrative autopsy, will be in the order of 150,000-500,000 dollar, which is within the prescribed limits for an appropriation.

Descriptors: SIDS. Sudden infant death syndrome. Diagnosis. Autopsy rate. Legal factors. Guidelines. Japan.
ACCN: SIDS-06467

Blood-Siegfried J, Nyska A, et al.
Synergistic effect of influenza A virus on endotoxin-induced mortality in rat pups: A potential model for sudden infant death syndrome.
Pediatr Res 2002 Oct;52(4):481–490.

Sudden infant death syndrome is the most common cause of postneonatal infant mortality in the developed world. It is a diagnosis of exclusion with peak age of incidence between 2 and 6 mo. Fifty to 63% of these infants have a preexisting upper respiratory tract infection before death. We hypothesized that the immature immune system may be altered by a primary infection, preventing a protective response after secondary challenge. To mimic dual infection, we used a nonlethal strain of a rat-adapted influenza A virus and a sublethal dose of endotoxin to establish a model that results in pathology and death in 12-d-old rat pups similar to that seen in infants dying of sudden infant death syndrome. Mortality only occurred when specific criteria such as timing between infectious insults and developmental age of the pup were met. Results suggest that mortality is caused by a rapid systemic shock event rather than lung-specific damage. Gross pathologic findings such as lung petechiae and liquid blood around the heart on necropsy were consistent with those seen in infants dying of sudden infant death syndrome. Histopathologic lesions including subendocardial hemorrhage and mild cortical thymocyte necrosis were found with greater severity and frequency in dually challenged animals. Macrophage subpopulation in rat-adapted influenza A virus-inoculated animals was significantly elevated in the spleen at the time of death. Our model suggests that the developing immune system can be primed to respond in an exaggerated way to a second immune challenge resulting in unexpected death.

Descriptors: SIDS. Sudden infant death syndrome. Animal models. Infections. Lungs. Immune system. Immune response.
ACCN: SIDS-06465

Young JB.
Programming of sympathoadrenal function.
Trends Endocrinol Metab 2002 Nov;13(9):381–385.

Environmental exposures at crucial points in development permanently alter sympathoadrenal function in mammals. The sympathetic innervation of peripheral tissues and the responsiveness of sympathetic nerves and adrenal medulla to standard stimuli are susceptible to modification by exposures in early life, such as environmental temperature, nutrition, and stress. Because the sympathetic nervous system is composed of multiple, function-specific subunits, programming of sympathetic functions occurs on a regional rather than a global basis and can aid development of a phenotype adapted to the local environment. Under some circumstances, however, adaptations in early life might prove maladaptive in adulthood and, as a consequence, might provide a basis for developmental origins of pediatric and adult disease, such as sudden infant death syndrome and obesity.

Descriptors: SIDS. Sudden infant death syndrome. Risk factors. Environmental exposure. Temperature. Nutrition. Stress. Genetic factors.
ACCN: SIDS-06464

Parslow PM, Horne RS, et al.
Temperament ratings do not predict arousability in normal infants and infants at increased risk of sudden infant death syndrome.
J Dev Behav Pediatr 2002 Oct;23(5):365–370.

This study sought to determine whether temperament was an indicator of arousability from sleep in infants. We hypothesized that the “threshold” dimension would be the most predictive characteristic because it measures the stimulus intensity required to evoke a discernible response. Healthy term, healthy preterm, and preterm infants with a neonatal history of apnea underwent polysomnography at 2 to 3 months. Arousal was induced using air-jet stimulation of the nostrils in active (AS) and quiet sleep (QS). Temperament was assessed using the Early Infancy Temperament Questionnaire. Arousal thresholds were elevated in QS compared with AS in each group (<.001), and preterm infants with a neonatal history of apnea were less arousable than healthy preterm infants (<.05). Temperament was not a predictor of arousability in AS. “Adaptability” was the only significant predictor of arousability in QS. This study demonstrates that temperament characteristics as measured by questionnaire may not be reliable indicators of arousability from sleep.

Descriptors: Infant behavior. Sleep. Arousal response.
ACCN: SIDS-06462

Moon RY, Omron R.
Determinants of infant sleep position in an urban population.
Clin Pediatr 2002 Oct;41(8):569–573.

The incidence of SIDS has decreased by 40% since the Back to Sleep Campaign was initiated. However, the rate of SIDS in the District of Columbia continues to be approximately double the national rate. The purpose of this study was to determine the prevalence and determinants of prone sleeping among infants in the District of Columbia and to ascertain what information is being provided to parents by health care professionals by a cross-sectional survey of parents of infants 0-6 months of age presenting for well child care at Children’s Health Center, Children’s National Medical Center, in Washington, DC. We recruited a consecutive sample of 126 parent-infant pairs, of which 92.9% were African-American. The average infant was 73 days old, was 3,003 grams at birth, and was full term. When asked how the infants were placed for sleep the night before the interview, 34.1% of parents had placed the infant supine, 50.8% side, and 15.1% prone. Nearly half (48%) of infants slept in an adult bed with the mother. More than one third of the infants had been placed prone for sleep at least once since hospital discharge. Most common reasons for sleeping supine included SIDS risk reduction or health care professional advice. Side sleepers did so primarily because of concern about vomiting, health care provider advice, or SIDS. Infants were placed prone primarily because the infant slept better. When asked about information received from a health care provider, 70.6% of parents stated that they had received information about sleep position and 64.3% about the hazards of passive smoking. Eight parents observed nursery personnel placing their infants prone. Only 16.7% of the total study population had received a Back to Sleep brochure, read it, and recalled that it recommended back sleeping. Infants were more likely to sleep prone if there was a grandparent in the home (OR 2.9, $p<0.05$) or if they were the firstborn (OR 2.17, $p<0.05$). Infants were more likely to sleep supine if parents had heard a back recommendation from a health care professional (OR 5.7, $p<0.001$). Infants were least likely to sleep supine if the parents had heard a side or a side/back recommendation (OR 0.26, $p=0.001$). Infant sleep position was not affected by receiving or reading the Back to Sleep brochure. In conclusion, more than one third (35.7%) of infants in this predominantly African-American population have been placed prone for sleep at least once; 15% slept prone the night before the interview. Almost one third of parents received no information about sleep position, but parents receiving a verbal supine recommendation were most likely to place their infant supine. Receiving written information did not affect sleep position. Improved educational efforts for parents of African-American newborns should continue to focus on encouraging supine positioning, smoke cessation, and other safe sleep practices.

Descriptors: SIDS. Sudden infant death syndrome. Urban population. Washington DC. Sleep position. Prone position. Infant care practices. Childcare providers. Grandparents. Compliance. Public awareness. Parent education. African Americans.
ACCN: SIDS-06461

Horne RS, Bandopadhayay P, et al.
Effects of age and sleeping position on arousal from sleep in preterm infants.
Sleep 2002 Nov;25(7):746–750.

Study objectives: Preterm infants are at increased risk of sudden infant death syndrome (SIDS). We investigated whether the prone sleeping position impaired arousal from sleep in healthy preterm infants and whether this impairment was related to cardiorespiratory variables, temperature or postnatal age. *Design*: Longitudinal setting/participants: 14 healthy preterm infants (mean 32 +/- 0.4 weeks) were studied using daytime polysomnography on 4 occasions: 36-38 weeks postconception age, 2 to 3 weeks post term, 2 to 3 months postterm, and 5 to 6 months post term. Interventions: N/A. Measurements: Multiple measurements of arousal threshold (cm H2O) in response to air-jet stimulation applied alternately to the nares were made in both active sleep and quiet sleep when infants slept both prone and supine. R*esults*: Arousal thresholds were significantly higher in both AS and QS when infants slept prone at 36 to 38 weeks postconception age and 2 to 3 months post term but not at 2 to 3 weeks or 5 to 6 months post term. These increases were independent of any sleep position-related changes in either rectal or abdominal skin temperature, respiratory rate, oxygen saturation or heart rate. *Conclusions:* At the age when the risk of SIDS is highest, the prone position significantly impairs arousal from both active sleep and quiet sleep in healthy infants born prematurely. This impairment in arousability occurred with no clinically significant changes in cardiorespiratory parameters or body temperature. Decreased arousability from sleep in the prone position may explain its role as a risk factor for SIDS.

Descriptors: Premature infants. SIDS. Sudden infant death syndrome. Risk factors. Sleep position. Prone position. Arousal response. Cardiorespiratory system. Body temperature.
ACCN: SIDS-06460

Zotter H, Kerbl R, Kurz R, Muller W.
Pacifier use and sudden infant death syndrome: Should health professionals recommend pacifier use based on present knowledge?
Wien Klin Wochenschr 2002 Sep 30;114(17-18):791–794.

The aim of this paper is to review and compare results from different studies describing the possible preventive effect of pacifiers on the sudden infant death syndrome. A Medline and Pubmed search was performed in order to find relevant references. Four groups of researchers were found, and referring to the most recent publications of each working group, these papers were reviewed with regard to sample size, setting of the studies, odds ratios and confidence intervals. All four research groups found an association between pacifier use and a reduced risk of sudden infant death syndrome, but they all concluded that the association does not necessarily imply that the use of a pacifier is protective against the sudden infant death syndrome. Therefore, they provide no definite recommendation for pacifier use on the grounds of protection against the sudden infant death syndrome.

Descriptors: SIDS. Sudden infant death syndrome. Prevention. Pacifiers.
ACCN: SIDS-06458

Kurz H, Neunteufl R, et al.
Does professional counseling improve infant home monitoring? Evaluation of an intensive instruction program for families using home monitoring on their babies.
Wien Klin Wochenschr 2002 Sep 30;114(17-18):801–806.

Home apnea/bradycardia monitoring was widely used in the 80s and 90s in the hope that Sudden Infant Death (SIDS) could be prevented. As no evidence could be found in favor of this hypothesis, HM today is restricted to symptomatic preterm infants, infants with cardiorespiratory problems, and infants after an apparent life-threatening event (ALTE). HM can impose substantial stress on families, especially mothers. We introduced an intensive counseling program (IC) for home monitoring and evaluated its effects, using a questionnaire. The control group consisted of families who were using a home monitor before the IC program was instituted, and were instructed according to the standard protocol given by the “Austrian SIDS-Consensus”. The IC program consisted of standard monitor instruction as well as instruction in infant cardiopulmonary resuscitation, and was extended by providing intensive support at the beginning and throughout the monitoring period with special regard to the monitor weaning phase. Results: Fifty-eight percent of the 90 questionnaires of the IC-families and 66% of the 70 questionnaires of the control families were returned. Home monitoring was considered to be reassuring by more than 60% of the families. We found the following differences between the two groups: parents taking part in the IC program liked the instruction better, were less stressed by the monitor and reacted less aggressively to monitor alarms. They used the monitor predominantly during sleeping periods and for a shorter period of time (6 vs. 7 1/2 months). IC could not reduce SIDS related anxiety or change the feelings associated with the use of the home monitor. Conclusion: Intensive counseling leads to a better use of home monitoring and reduces parents’ stress. Even if home monitoring is used less frequently today, families should still be instructed and counseled intensively.

Descriptors: Home monitoring. Monitors. SIDS. Sudden infant death syndrome. Stress. Prevention. Apnea. Bradycardia. Parent education. Parent counseling. Outcome evaluation. Questionnaires.
ACCN: SIDS-06457

Sparks DL.
Neuropathology of sudden infant death (syndrome): Literature review and evidence of a probable apoptotic degenerative cause.
Childs Nerv Syst 2002 Nov;18(11):568–592.

Background: The agonizing enigma of sudden infant death syndrome (SIDS) endures. Contemporary research concentrates on the central nervous system (CNS) as the prime cause. *Review and discussion*: What follows is a review of the neuropathology of SIDS. A persuasive, but as yet unproved, hypothesis is that the lethal pathophysiologic derangement or mechanism in SIDS involves dysfunction of sleep-related cardiorespiratory homeostatic controls or failure to arouse or both. Neuropathological investigation of SIDS continues to be closely linked to the study of specific anatomic structures and regions of the CNS. The structures in these regions underpin and regulate normal cardiorespiratory function. It follows that dysfunction of one or more of these loci probably precipitates SIDS. Under this large umbrella review we include histological, immunohistochemical, and biochemical markers in the cerebrospinal fluid (CSF), cerebrum, cerebellum, brain stem, pituitary gland, and pineal gland. With variable effect, these regions are deemed to mediate the functionality of cardiorespiratory activity and the diurnal rhythms of sleep/arousal. The following factors, which (a) are associated with altered electrochemical or neural transmission and biochemical changes in the CNS and (b) predispose to systemic derangements that most probably precipitate SIDS, are subjects of ongoing investigation: evidence of delayed development; ischemic insult; degenerative changes; and synaptic alterations. *Conclusion*: On the basis of current data, we add to these theoretical constructs by postulating that apoptotic neurodegeneration constitutes the anatomic substrate accounting for the pathophysiologic mechanism and proximate cause of SIDS.

Descriptors: SIDS. Sudden infant death syndrome. Neuropathology. Central nervous system. Cardiorespiratory control. Arousal response.
ACCN: SIDS-06455

Kelmanson IA, Erman LV, Litvina SV.
Maternal smoking during pregnancy and behavioural characteristics in 2–4-month-old infants.
Klin Padiatr 2002 Nov-Dec;214(6):359–364.

The study aimed to assess potential relationship between maternal smoking during pregnancy and behavioural characteristics in 2–4-month-old infants. It covered period from 1999 to 2000 and comprised 250 randomly selected, apparently healthy singleton born infants from community setting (129 boys, 121 girls). The mothers were asked to complete the questionnaires addressing infant, maternal, and demographic major characteristics with particular emphasis on maternal smoking during pregnancy. To objectively assess behavioural peculiarities of the infants, the mothers were requested to complete the Early Infancy Temperament Questionnaire. Of 250 mothers, 64 women (25.6 %) smoked during pregnancy. The infants of smoking mothers were more often born with low birth weight and were also lighter at study; more frequently they were born at earlier gestational age, had lower Apgar score at five minutes, were less frequently breast fed at birth, and at the time of study. Mothers who smoked during pregnancy were younger, had lower educational level, and less frequently were married. The infants born to smoking mothers had more frequent fussy periods occurring at about the same time of the day, protesting behaviour at face washing and washing in bath, indifferent attitude to the mother when held by new person, extreme reactions (either indifference or much feeling) during diapering and bowel movement, less attention to the parents during parent-infant play activity, and more sensitivity to the wet diaper. They were also characterized by more intensive reactions (displayed more amount of energy regardless of positive or negative behaviour) compared with the babies from the non-smoking group. This association remained after adjustment has been made for major potential confounders, and had a significant “dose-response” effect. Maternal smoking during pregnancy may serve as a risk factor for infant’s behavioural deviations.

Descriptors: Maternal behavior. Smoking during pregnancy. Child behavior. Infant behavior. Low birth weight. SIDS. Sudden infant death syndrome.
ACCN: SIDS-06454

Messier ML, Li A, Nattie EE.
Muscimol inhibition of medullary raphe neurons decreases the CO2 response and alters sleep in newborn piglets.
Respir Physiol Neurobiol 2002 Nov 19;133(3):197–214.

Medullary raphe neurons are chemosensitive in vitro (Wang et al., J. Physiol. Lond. 511 (1998)), are involved in the ventilatory response to CO(2) in vivo (Dreshaj et al., Respir. Physiol. 111 (1998); Nattie and Li, J. Appl. Physiol. 90 (2001)), and are abnormal in many sudden infant death syndrome (SIDS) victims (Panigrahy et al., J. Neuropathol. Exp. Neurol. 59 (2000)). In this study we determine whether the ventilatory response to CO(2) is altered when medullary raphe neuronal function is focally and reversibly inhibited in chronically instrumented newborn piglets. Ventilation was measured by whole body plethysmography in room air and in 5% CO(2) before and during microdialysis of muscimol, a gamma-amino butyric acid (GABA(A)) receptor agonist, into the medullary raphe. Muscimol (10 mM in the dialysate), had no effect on eupneic ventilation, but reduced significantly the CO(2) response by 17% during wakefulness. Sleep cycling was also disrupted, as characterized by a significant increase in the percentage of time spent awake and a significant decrease in the percentage of time spent in NREM sleep. Disturbances of medullary raphe function can alter central chemoreception and normal sleep architecture, which may contribute to the pathogenesis of SIDS.

Descriptors: SIDS. Sudden infant death syndrome. Animal models. Piglets. Sleep stages. Carbon dioxide. Sleep patterns. Ventilatory response. Chemosensitivity.
ACCN: SIDS-06453

Michaud K, Romain N, et al.
Evaluation of a simplified method of the conduction system analysis in 110 forensic cases.
Forensic Sci Int 2002 Nov 5;130(1):13–24.

A simplified method of the His bundle analysis is evaluated by the study of 110 forensic cases. The atrioventricular node or its part were observed in 96 cases (87.3%), penetrating bundle in 92 cases (83.6%), branching and left bundles branch in 109 cases (99.1%) and right bundles branch in 73 cases (66.4%). The changes such as fibrosis and fatty infiltration show statistically significant differences ($P<0.01$) between progressive age groups confirming their degenerative and age-related nature. The study included as well nine

cases of sudden unexpected death and two cases of sudden infant death syndrome (SIDS), for which the autopsy with histological examination and toxicological analysis resulted negative. For nine of these cases, pathological lesions were found which can even explain the fatal issue. Moreover, in the cases with known cause of death, potentially lethal changes were noticed. This simple, low cost technique could be proposed to forensic pathologists as easy to fit into the routine processing of autopsy material, allowing the detection of major abnormalities with minimal effort. The authors also consider the difficulties related to the interpretation of the pathological findings in the conduction system.

Descriptors: SIDS. Sudden infant death syndrome. Autopsy findings. Conduction system.
ACCN: SIDS-06452

Arnestad M, Opdal SH, et al.
Are substitutions in the first hypervariable region of the mitochondrial DNA displacement-loop in sudden infant death syndrome due to maternal inheritance?
Acta Paediatr 2002;91(10):1060–1064.

Aim: To investigate whether all substitutions in the first hypervariable region (HVR1) in sudden infant death syndrome (SIDS) can be recovered along the maternal line of the family (inherited), or whether SIDS victims have new substitutions compared to maternal relatives (somatic mutations) that may be related to environmental factors. *Methods*: Seventy-one SIDS/mother pairs, including 11 families with SIDS, mother and mother's relatives and/or SIDS siblings, were studied. The HVR1 sequence was recorded in the base-pair range 16056-16400. The recorded HVR1 sequence was compared with the Cambridge sequence, and differences were recorded as substitutions. The substitution pattern in the SIDS victims was compared with the pattern found in family members along the maternal line. *Results*: All the substitutions found in SIDS victims could be traced in the maternal line of the family; in 5 cases this was observed through three generations, and in 3 cases through four generations. *Discussion*: In patients with known mitochondrial (mt) DNA disease, a large number of sequence variants have been found in the D-loop region. Substitutions in the D-loop may be part of a haplotype with mutations elsewhere in the mtDNA. Conclusion: HVR1 substitutions in SIDS victims are hereditary and not due to somatic mutations.

Descriptors: SIDS. Sudden infant death syndrome. Genetic factors. Inherited disorders. DNA analysis.
ACCN: SIDS-06451

Ogino S, Wilson RB.
Genetic testing and risk assessment for spinal muscular atrophy (SMA).
Hum Genet 2002 Dec;111(6):477–500.

Spinal muscular atrophy (SMA) is one of the most common autosomal recessive diseases, affecting approximately 1 in 10,000 live births, and with a carrier frequency of approximately 1 in 50. Because of gene deletion or conversion, SMN1 exon 7 is homozygously absent in approximately 94% of patients with clinically typical SMA. Approximately 30 small intragenic SMN1 mutations have also been described. These mutations are present in many of the approximately 6% of SMA patients who do not lack both copies of SMN1, whereas SMA of other patients without a homozygous absence of SMN1 is unrelated to SMN1. A commonly used polymerase chain reaction/restriction fragment length polymorphism (PCR-RFLP) assay can be used to detect a homozygous absence of SMN1 exon 7. SMN gene dosage analyses, which can determine the copy numbers of SMN1 and SMN2 (an SMN1 homolog and a modifier for SMA), have been developed for SMA carrier testing and to confirm that SMN1 is heterozygously absent in symptomatic individuals who do not lack both copies of SMN1. In conjunction with SMN gene dosage analysis, linkage analysis remains an important component of SMA genetic testing in certain circumstances. Genetic risk assessment is an essential and integral component of SMA genetic testing and impacts genetic counseling both before and after genetic testing is performed. Comprehensive SMA genetic testing, comprising PCR-RFLP assay, SMN gene dosage analysis, and linkage analysis, combined with appropriate genetic risk assessment and genetic counseling, offers the most complete evaluation of SMA patients and their families at this time. New technologies, such as haploid analysis techniques, may be widely available in the future.

Descriptors: SIDS. Sudden infant death syndrome. Diagnosis. Diagnostic accuracy. Genetic factors.
ACCN: SIDS-06450

Nelson EA, Wong Y, et al.
Effects of hyperthermia and muramyl dipeptide on IL-1beta, IL-6, and mortality in a neonatal rat model.
Pediatr Res 2002 Dec;52(6):886–891.

The mechanism of sudden infant death syndrome (SIDS) may be linked to an interaction between the SIDS risk factors of hyperthermia and infection, and between their effect on cytokine production and arousal. This study investigated the effects of hyperthermia and a surrogate of infection (muramyl dipeptide or MDP) on cytokine production and mortality in a neonatal rat model. Four temperature groups were studied: 34 degrees C (baseline), 38 degrees C, 39 degrees C, and 40 degrees C. Body temperatures of neonatal rat pups in the hyperthermic groups were raised and maintained at the desired temperature (38 degrees C, 39 degrees C, or 40 degrees C) for 1 h and then returned to the baseline temperature (34 degrees C) for a further hour. The heat source was a covered, heatable aluminum metal plate in a Perspex heating chamber. Intraperitoneal (IP) injection of 0.1 mL normal saline was given 30 min before the start to control for MDP (protocol A). Four equivalent treatment groups were pretreated with MDP (25 nmol/animal) instead of normal saline (protocol B). IP ketamine (55 mg/kg) was used for anesthesia during the experiments and for euthanasia. Blood was collected by direct cardiac puncture immediately after the 2-h experiments and assayed for the cytokines IL-6 and IL-1beta by ELISA. Hyperthermia significantly increased the production of IL-6 ($p = 0.049$) but not IL-1beta and significantly increased mortality. Administration of MDP significantly increased the IL-1beta production ($p = 0.006$) but not IL-6. Cox regression analysis showed that MDP in combination with hyperthermia had a significant effect on mortality in the neonatal rat. The risk of experiencing mortality was two and half times higher in the MDP group than in the non-MDP group ($p = 0.016$) [hazard ratio (95% confidence interval) = 2.66 (1.20-5.92)]. We conclude that hyperthermia and a surrogate of infection (MDP) influence cytokine production and that the combination of heat stress and MDP increases mortality in the neonatal rat.

Descriptors: SIDS. Sudden infant death syndrome. Animal models. Hyperthermia. Infections. Temperature. Fever.
ACCN: SIDS-06449

Billiards SS, Walker DW, Canny BJ, Hirst JJ.
Endotoxin increases sleep and brain allopregnanolone concentrations in newborn lambs.
Pediatr Res 2002 Dec;52(6):892–899.

Infection has been identified as a risk factor for sudden infant death syndrome (SIDS). Synthesis of allopregnanolone, a neuroactive steroid with potent sedative properties, is increased in response to stress. In this study, we investigated the effect of endotoxin (lipopolysaccharide, LPS) on brain and plasma allopregnanolone concentrations and behavior in newborn lambs. LPS was given intravenously (0.7 micro g/kg) at 12 and 15 d of age ($n = 7$), and resulted in a biphasic febrile response ($p < 0.001$), hypoglycemia, lactic acidemia ($p < 0.05$), a reduction in the incidence of wakefulness, and increased nonrapid eye movement sleep and drowsiness ($p < 0.05$) compared with saline-treated lambs ($n = 5$). Plasma allopregnanolone and cortisol were significantly ($p < 0.05$) increased after LPS treatment. These responses to LPS lasted 6-8 h, and were similar at 12 and 15 d of age. Each lamb was then given LPS at 20 d of age and killed 3 h posttreatment to obtain samples of the brain. Allopregnanolone concentrations were increased ($p < 0.05$) in all brain areas except the cerebellum and diencephalon. We suggest that LPS-induced increase of allopregnanolone in the brain may contribute to somnolence in the newborn, and may be responsible for the reduced arousal thought to contribute to the risk of SIDS in human infants.

Descriptors: SIDS. Sudden infant death syndrome. Animal models. Bacterial infections. Endotoxins. Autopsy findings.
ACCN: SIDS-06448

Randall B, Wilson A.
The 2001 annual report of the Regional Infant and Child Mortality Review Committee.
S D J Med 2002 Nov;55(11):471–475.

The annual report of the Regional Infant and Child Mortality Review Committee (RICMRC) is attached. This Committee has as its mission the review of infant and child death so that information can be transformed into action to protect young lives. The Committee review area in 2001 included South Dakota's Minnehaha, Turner, Lincoln, Moody, Lake, and McCook counties. In 2001 there were no deaths in this region due to sudden infant death syndrome (SIDS), however, there was one death due to positional asphyxia that represents the hazards of soft bedding and prone sleeping. In addition to this case, there were seven other deaths due to injury mostly representing immaturity in driving various vehicles. These data reflect the need to remain vigilant in the public campaign to promote "back to sleep" and safe sleeping environments for infants. The RICMRC invites other communities to join in its efforts to review deaths to prevent potential life-threatening hazards to children in their local environs.

Descriptors: Infant mortality. South Dakota. Statistics. SIDS. Sudden infant death syndrome. Bedding. Asphyxia. Injuries. Cause of death.
ACCN: SIDS-06447

Iyasu S, Randall LL, et al.
Risk factors for sudden infant death syndrome among Northern Plains Indians.
JAMA 2002 Dec 4;288(21):2717–2723.

Context: Sudden infant death syndrome (SIDS) is a leading cause of postneonatal mortality among American Indians, a group whose infant death rate is consistently above the U.S. national average. *Objective:* To determine prenatal and postnatal risk factors for SIDS among American Indians. Design, setting, and participants: Population-based case-control study of 33 SIDS infants and 66 matched living controls among American Indians in South Dakota, North Dakota, Nebraska, and Iowa enrolled from December 1992 to November 1996 and investigated using standardized parental interview, medical record abstraction, autopsy protocol, and infant death review. *Main outcome measures:* Association of SIDS with maternal socioeconomic and behavioral factors, health care utilization, and infant care practices. *Results:* The proportions of case and control infants who were usually placed prone to sleep (15.2% and 13.6%, respectively), who shared a bed with parents (59.4% and 55.4%), or whose mothers smoked during pregnancy (69.7% and 54.6%) were similar. However, mothers of 72.7% of case infants and 45.5% of control infants engaged in binge drinking during pregnancy. Conditional logistic regression revealed significant associations between SIDS and 2 or more layers of clothing on the infant (adjusted odds ratio [aOR], 6.2; 95% confidence interval [CI], 1.4-26.5), any visits by a public health nurse (aOR, 0.2; 95% CI, 0.1-0.8), periconceptional maternal alcohol use (aOR, 6.2; 95% CI, 1.6-23.3), and maternal first-trimester binge drinking (aOR, 8.2; 95% CI, 1.9-35.3). *Conclusions:* Public health nurse visits, maternal alcohol use during the periconceptional period and first trimester, and layers of clothing are important risk factors for SIDS among Northern Plains Indians. Strengthening public health nurse visiting programs and programs to reduce alcohol consumption among women of childbearing age could potentially reduce the high rate of SIDS.

Descriptors: SIDS. Sudden infant death syndrome. Native Americans. Risk Factors. Sleep position. Prone position. Alcohol use during pregnancy. Clothing; Infant care practices. Home visits.
ACCN: SIDS-06446

Wilcox RL, Nelson CC, Stenzel P, Steiner RD.
Postmortem screening for fatty acid oxidation disorders by analysis of Guthrie cards with tandem mass spectrometry in sudden unexpected death in infancy.
J Pediatr 2002 Dec;141(6):833–336.

A protocol was developed for the detection of fatty acid oxidation disorders (FOD) in cases of sudden unexpected death in infancy (SUDI). Tandem mass spectrometry blood acylcarnitine analysis of Guthrie card blood spots was performed. In the first 5 years, 1.2% of Oregon's 247 SUDI cases were identified with FOD, 2

with medium-chain acyl-CoA dehydrogenase deficiency, and one with very long-chain acyl-CoA dehydrogenase deficiency.

Descriptors: SIDS. Sudden infant death syndrome. Fatty acid oxidation. Diagnostic tests.
ACCN: SIDS-06444

Schluckebier DA, Cool CD, et al.
Pulmonary siderophages and unexpected infant death.
Am J Forensic Med Pathol 2002 Dec;23(4):360–363.

It has been proposed that the presence of siderophages in the lungs of infants who die unexpectedly should be considered a marker of a previous hypoxic event, which may preclude a diagnosis of sudden infant death syndrome. The authors retrospectively reviewed all infant deaths (<1 year old) going to autopsy at the Denver Office of the Medical Examiner from January 1999 to January 2001. Lung sections were stained with Prussian blue, and siderophages were counted in 20 high-power fields per lobe sampled. Cell counts were performed by two independent pathologists who were blinded to history and cause of death, with good reproducibility. Iron stain results were then categorized by average number of siderophages per 20 high-power field (category 1 = <5, category 2 = 5-100, category 3A = 100-500, category 3B = >100 in a single lobe, category 4 = >500). The results were subsequently correlated to case history, autopsy findings, and cause/manner of death. Forty-three cases were reviewed. The causes of death included sudden infant death syndrome (16), asphyxia (5), undetermined (6), and other (16). Those deaths were categorized by the above criteria as follows: category 1. (32), category 2. (6), category 3. (4), and category 4. (1). All sudden infant death syndrome deaths were in category 1. Categories 1 and 2 also included deaths in which hypoxia might have been present before death because of such factors as pneumonia and congenital heart disease. Categories 3 and 4 included a known homicidal asphyxia in which repeated episodes of intentional smothering were documented, 2 probable asphyxias, 1 nonaccidental trauma, and 1 undetermined. All 5 cases had questionable circumstances surrounding the death of the infant. Pulmonary siderophages were described in only 1 of the 43 autopsy reports. It was concluded that pulmonary siderophages can be markedly increased in cases of repeated asphyxia. Siderophages may also be increased in cases where hypoxia may have been present for another reason, but not to the same degree. Siderophages are not increased in sudden infant death syndrome. Because iron-laden macrophages often are not recognized on routine examination with hematoxylin and eosin staining, iron stains may be helpful in the evaluation of infant deaths. If siderophages are present in increased amounts without an obvious explanation, further investigation is warranted.

Descriptors: SIDS. Sudden infant death syndrome. Lungs. Autopsy findings. Asphyxia. Anoxia.
ACCN: SIDS-06443

Dettmeyer R, Baasner A, et al.
Coxsackie B3 myocarditis in 4 cases of suspected sudden infant death syndrome: Diagnosis by immunohistochemical and molecular-pathologic investigations.
Pathol Res Pract 2002;198(10):689–696.

Immunohistochemical and molecular-pathologic techniques have improved the diagnosis of myocarditis as compared with conventional histologic staining methods done according to the Dallas criteria. Most investigations were carried out on adults, and only a few authors investigating childhood deaths applied these modern methods, used for diagnosing myocarditis. We report on four children under one year of age, who suddenly died without prodromal symptoms. Their deaths were attributed to SIDS (sudden infant death syndrome). Immunohistochemical (LCA, CD68, CD45R0, MHC-class-II-molecules, VP1-capsid-protein of enteroviruses) and molecular-pathologic (RT-PCR) investigations, however, suggested that death was caused by a coxsackie-B3-myocarditis. In the future, these methods should be used for investigating cases with suspicion of SIDS.

Descriptors: SIDS. Sudden infant death syndrome. Diagnosis. Diagnostic accuracy. Myocarditis. Myocardium. Immunohistochemistry.
ACCN: SIDS-06442

Lyon TD, Patriarca M, et al.
Age dependence of potentially toxic elements (Sb, Cd, Pb, Ag) in human liver tissue from paediatric subjects.
J Environ Monit 2002 Dec;4(6):1034–1039.

Toxic elements are present at low concentrations in the environment. This work was undertaken to investigate the age dependence of the liver content of selected elements in paediatric populations, as an index of internal exposure. Liver samples were collected at autopsy from 157 subjects, aged < 1 day to 6 years, as part of investigations on a possible role of Sb compounds in sudden infant death syndrome (SIDS). In addition to Sb, the concentrations of Ag, Cd and Pb were also determined by inductively coupled plasma mass spectrometry on the remaining digest. Comparison of 95% confidence intervals of the median concentrations of the four elements suggested that there were no differences between the two categories of cause of death, SIDS or those who had died of an identified disease. Cadmium, lead and antimony median concentrations were lower than corresponding values observed in adult populations. Silver concentrations were significantly higher at birth and decreased with age. Cadmium levels were almost negligible in neonates and infants, but increased in older children. The finding of non-negligible concentrations of both Ag and Pb in neonatal liver provides further direct evidence that these elements cross the human placental barrier. The reported data, by far the largest collection observed in subjects less than 1 year old, are the result of exposure, during pregnancy and in early childhood, to present levels of these elements in the environment. They can serve as a reference to compare post-mortem values from individuals or groups of subjects in this age range when an exposure risk is suspected and to highlight trends in human exposure.

Descriptors: SIDS. Sudden infant death syndrome. Risk factors. Toxins. Trace elements. Antimony. Lead. Environmental exposure.
ACCN: SIDS-06441

Ansari T, Sibbons PD, Parsons A, Rossi ML.
Quantitative neuropathological analysis of sudden infant death syndrome.
Child Care Health Dev 2002 Sep;28 Suppl1:3–6.

Detailed stereological analyses of specific regions of brains of children who had died from sudden infant death syndrome (SIDS) was undertaken to determine whether global evidence of an underlying pathology exists, contributing to an increased susceptibility to SIDS. A significant reduction in the total number of neocortical neurones and neurone volume was observed in SIDS normal birth weight (NBW) infants in comparison to controls. A significant reduction in both volume and total neurone number were also noted in the dorsal motor nucleus of the vagus in SIDS NBW group when compared with controls. Anomalies in regions of the brain involved with cardiorespiratory control (brainstem) and arousal (brainstem and neocortex) may play a crucial role in the chain of events resulting in a SIDS event.

Descriptors: SIDS. Sudden infant death syndrome. Autopsy findings. Brain development. Neuronal density. Brain stem.
ACCN: SIDS-06440

Morgan B, Finan A, et al.
Assessment of infant physiology and neuronal development using magnetic resonance imaging.
Child Care Health Dev 2002 Sep;28 Suppl1:7–10.

Previous work has demonstrated both that there are substantial individual differences in the rate of physiological development, and that infants with risk factors for sudden infant death syndrome (SIDS) develop more slowly, suggesting that their increased vulnerability may be due to delayed neuronal development associated with compromised development in fetal or early neonatal life. This project aims to test the hypothesis that individual differences in the rate of physiological development of infants correlate with measurable differences in the rate of brain development as assessed by magnetic resonance imaging (MRI). Sixty infants were recruited to this study in three different groups that are known to have differing rates of physiological development. MRI was performed successfully in 49 cases at 6 weeks of age without sedation.

Forty-one of these cases had full follow-up (15 normal; 19 IUGR; 11 'high risk'). Postnatal physiological development was assessed by measuring age-related deep body temperature patterns during sleep. Neuronal development was assessed by subjective analysis of MRI images and objective measurements relating to myelination using T1 and diffusion weighted (23 cases) MRI images. As expected, the normal group acquired the adult temperature pattern earlier, but this was not statistically significant. All MRI scan appearances were within normal limits. Ranking cases subjectively in order of maturity revealed no significant pattern. The normal group had a significantly higher myelination score than the IUGR and 'high risk' groups (P = 0.001). This trend was also shown by the diffusion weighted myelination score but did not reach statistical significance. No significant differences were seen in both the subjective and objective MRI measurements and development of nocturnal temperature patterns. The results suggest there may be differences in neurodevelopment between the different groups at 6 weeks of age but these are not linked to late development of temperature patterns. It is therefore unlikely that this related to a global delay in maturation.

Descriptors: SIDS. Sudden infant death syndrome. Child development. Brain development. Neuronal maturation. Great Britain.
ACCN: SIDS-06439

Wailoo M, Thompson JR, et al.
Patterns of symptoms in siblings of sudden infant death syndrome infants.
Child Care Health Dev 2002 Sep;28 Suppl1:19–21.

Longitudinal day-to-day recordings of symptoms in the siblings of sudden infant death syndrome (SIDS) infants show a wide variety of symptoms varying with season and days of years. Implications are discussed.

Descriptors: SIDS. Sudden infant death syndrome. Siblings. Seasonal variation. Longitudinal studies.
ACCN: SIDS-06438

Gordon AE, El Ahmer OR, et al.
Why is smoking a risk factor for sudden infant death syndrome?
Child Care Health Dev 2002 Sep;28 Suppl1:23–25.

Smoking is a major risk factor for both sudden infant death syndrome (SIDS) and respiratory tract infections. Such infections, both viral and bacterial, also increase the SIDS risk. This study investigated the effect of cigarette smoke at two stages of infection: 1) mucosal surface colonization; 2) induction and control of inflammatory responses. For colonization, RSV or influenza A infected cells bound several bacterial species in significantly higher numbers due to increased expression of host cell antigens. Buccal epithelial cells from smokers bound significantly more bacteria. For *Staphylococcus aureus*, this was associated with increased tar levels. Some SIDS deaths have been proposed to result from high levels of pro-inflammatory mediators elicited by infection and/or cigarette smoke during a developmental period when infants are less able to control inflammatory responses. Inflammatory Responses were compared between blood samples from smokers (n = 42) and non-smokers (n = 60) stimulated with TSST-1 or LPS. Non-smokers had significantly higher IL-6 (P = 0.011), IFN (P = 0.003) and IL-10 (P = 0.000) baseline levels. Non-smokers had higher IFN (P = 0.008) and IL-1 (P = 0.001, 0.007) responses to LPS and higher IL-10 responses to TSST-1 (P < 0.05) and LPS (P < 0.000). This study highlights that smoking increases the SIDS risk by greater susceptibility to viral and bacterial infections and enhanced bacterial binding after passive coating of mucosal surfaces with smoke components. In animal models, IL-10 reduced the lethal effect of staphylococcal toxins. In this study, smokers had lower IL-10 responses toTSST-1 and LPS. Dose response effects of cigarette smoke exposure needs to be established in relation to inflammatory response control and infantile infections.

Descriptors: SIDS. Sudden infant death syndrome. Smoking. ETS. Infections. Inflammation. Great Britain.
ACCN: SIDS-06437

Gordon AE, MacKenzie DA, et al.
Evidence for a genetic component in sudden infant death syndrome.
Child Care Health Dev 2002 Sep;28 Suppl1:27–29.

There is increasing evidence that inflammatory responses have been elicited in some sudden infant death syndrome (SIDS) infants and that these responses are under genetic control. The objective of this study was to investigate the hypothesis that the cytokine responses of SIDS parents (n = 41) differed significantly from control donors (n = 61). Blood samples were stimulated with the staphylococcal toxin TSST-1 and LPS from Eschericia coli and assessed for production of TNF, IL-1, IL-6, IFN and IL-10. In response to TSST-1 ($P < 0.02$) and LPS ($P < 0.002$), SIDS parents produced higher levels of IL-1 than the controls. SIDS parents produced higher levels of IFN in response to TSST-1 compared to LPS ($P < 0.001$) although in response to LPS, the IFN ($P = 0.0008$) and IL-6 ($P < 0.0002$) responses of the SIDS parents were lower than those of the controls. For TNF and IL-10, there was little difference between the two groups unless the effect of smoking was considered. As part of this work, a small pilot genotyping study was carried out using DNA from SIDS parents (n = 10), control donors (n = 10) and Bangladeshi subjects (n = 10). An IFN polymorphism (3/3) was found in 40%, 15.4%, and 0% of donors respectively. Staphylococcal toxins have been identified in SIDS infants therefore this study highlights the importance of assessing IL-1 levels. Determination of cytokine polymorphisms and consideration of interactions between these and environmental factors such as smoking in high, average, and low risk ethnic groups will assist in establishing the contribution of these factors to an infant's susceptibility to SIDS.

Descriptors: SIDS. Sudden infant death syndrome. Genetic factors. Inflammation. Polymorphism.
ACCN: SIDS-06436

Burchell A, Forsyth L, Hume R.
Polymorphisms in genes involved in glucose metabolism in cases of sudden infant death syndrome.
Child Care Health Dev 2002 Sep;28 Suppl1:37–39.

Background: Infants with intra-uterine growth retardation have an increased risk of sudden infant death syndrome (SIDS). Hypoglycaemia is also significantly correlated with retardation of intra-uterine growth. A number of mutations in key proteins involved in regulation of blood glucose (e.g. glucokinase) have been found to result in reduced birth weight. Heterozygous mutations in the coding region of the glucokinase gene have been shown to cause MODY (a form of early onset Type II diabetes mellitus). The aim was to screen a cohort of SIDS and control infants who were either growth retarded or appropriately grown for gestational age to determine if any mutations and/or polymorphisms were present in the glucokinase gene. *Methods:* PCR, denaturing high performance liquid chromatography on an automated Transgenomic WAVE DNA fragment analysis system and DNA sequencing. *Results:* Genomic DNA was isolated from 129 infants who were either growth retarded or appropriately grown for gestational age. We found several rare novel polymorphisms in the glucokinase gene in the infant samples. However, none of the samples contained any of the mutations in the glucokinase gene previously reported in cases of MODY. *Conclusions*: We have found rare novel polymorphisms in the glucokinase gene in the infant samples. In contrast in these samples, we have not found any examples of the previously reported mutations in the coding region of the glucokinase gene found in MODY. This clearly shows that while MODY babies are often small, MODY is not a common cause of either intra-uterine growth retardation or of SIDS.

Descriptors: SIDS. Sudden infant death syndrome. Genetic factors. Intra-uterine growth retardation. Polymorphism. Hypoglycemia. Great Britain.
ACCN: SIDS-06435

Matthews, T.
Sudden infant death syndrome—a defect in circulatory control?
Child Care Health Dev 2002 Sep;28 Suppl 1:41–43.

The majority of sudden infant death syndrome (SIDS) infants die during sleep and especially during the overnight sleep period. Recent evidence from SIDS cases, which occurred while on a cardiorespiratory monitor

at home, has suggested that the mechanism of death involves circulatory failure, with the development of a shock like state, associated with a progressive bradycardia in the presence of continued breathing movements. In this paper we explore the circulatory effects of sleep and in particular the down regulation of the baroreceptor reflex, associated with a reduction in vasomotor tone and a fall in central venous return, cardiac output and blood pressure. This sequence of events would be exacerbated by many of the known SIDS risk factors, namely the prone sleeping position, overheating and co-sleeping. Poor central venous return, with diminished cardic distension could induce a progressive bradycardia as occurs in adults with neuro-cardiogenic syncope. Alternatively, a reduced cardiac output could result in the rapid onset of severe hypoxia through poor lung perfusion. The effects of sleep on circulatory control deserve further study in infants.

Descriptors: SIDS. Sudden infant death syndrome. Circulatory factors. Bradycardia. Blood pressure. Sleep.
ACCN: SIDS-06434

Blair P, Fleming P.
Epidemiological investigation of sudden infant death syndrome infants—recommendations for future studies.
Child Care Health Dev 2002 Sep;28 Suppl 1:49–54.

In recent years the study of infant care practices within the sleeping environment has proved to be the single most important set of observations for reducing the risk of sudden infant death syndrome (SIDS). To further reduce the number of deaths and resolve the debate on safe infant care practice, a closer scrutiny of this environment is required. However, anecdotal observation from uncontrolled death-scene investigations and a reluctance to diagnose SIDS because of adverse social conditions or circumstantial evidence at the time of death is undermining future research. To investigate SIDS now means investigating the wider umbrella of all Sudden Unexpected Deaths in Infancy (SUDI) because of the potential for misdiagnosis. In trying to find out why SIDS infants die we have increasingly been forced to search for why infants survive in the first few months of life and it is this comparative component of epidemiological observation that has saved so many lives. A death-scene investigation is vital to any planned future investigation of SIDS but equally essential is a sleep-scene investigation of surviving infants to put any findings into context. SIDS infants are no longer scattered across the social strata and the cot is not the only environment in which they are found, social deprivation and use of the parental bed are now more discernable. Future studies should therefore reflect these changes with a second control group of surviving infants more closely matched to the type of environment in which SIDS infants might be found.

Descriptors: SIDS. Sudden infant death syndrome. Study design. Infant care practices. Sleep environment. Diagnosis. Diagnostic accuracy. Sudden unexpected death. Siblings.
ACCN: SIDS-06433

Ball HL.
Triadic bed-sharing and infant temperature.
Child Care Health Dev 2002 Sep;28 Suppl 1:55–158.

The effects on infants of sleeping with their parents is currently the subject of much debate. One concern regarding infants who sleep in their parents' bed involves the possibility of overheating. Previous research reported a significantly greater core temperature of 0.1 degrees C among a cohort of bed-sharing infants compared with a matched cohort of infants sleeping alone. This paper presents a preliminary analysis of the overnight rectal temperature of 12 of the 20 infants who were monitored sleeping alone and with their parents on separate nights at the University of Durham Parent-Infant Sleep Lab. No significant differences were found in all night rectal temperature, or temperature from 2 h after sleep onset between bed sharing and cot sleeping nights. These preliminary analyses suggest a nighttime difference in rectal temperature between routine bed-sharers and routine cot sleepers; however, these findings will be further explored in the full analyses for this study.

Descriptors: SIDS. Sudden infant death syndrome. Risk factors. Bed sharing. Temperature. Body temperature. Sleep environment. Infant care practices. Great Britain. Overheating.
ACCN: SIDS-06432

Edner A, Ericson M, Milerad J, Katz-Salamon M.
Abnormal heart rate response to hypercapnia in boys with an apparent life-threatening event.
Acta Paediatr 2002;91(12):1318–1323.

Aim: To determine instantaneous cardiac variability responses to increased carbon dioxide (CO2) during quiet sleep in infants who may be at risk for the Sudden Infant Death syndrome (SIDS). *Methods*: The cardiac rate variability before, during, and after a CO2 challenge was examined in 41 infants who had experienced an apparent life-threatening event (ALTE) and 41 gender-and age-matched control infants. *Results:* The ALTE infants responded to CO2 breathing with a significant increase in R-R intervals, i.e. decreases in heart rate, compared to the controls (45.1% increase in R-R intervals vs. 41.4%; p = 0.005). The differences between ALTE infants and controls depended primarily on the boys' responses. *Conclusion*: ALTE infants, particularly ALTE boys, have an autonomic dysfunction-lower sympathetic stimulation and/or inhibited vagal withdrawal when stressed with CO2. The outcome might provide clues to the mechanisms underlying the cardiovascular processes contributing to the terminal event in SIDS.

Descriptors: SIDS. Sudden infant death syndrome. Heart rate. Carbon dioxide. Hypercapnia. Sleep Apnea. ALTE. Respiratory rate. Autonomic dysfunction.
ACCN: SIDS-06429

Tutka P, Wielosz M, Zatonski W.
Exposure to environmental tobacco smoke and children health.
Int J Occup Med Environ Health 2002;15(4):325–335.

This paper reviews the investigations of the effects of pre- and/or postnatal exposure to environmental tobacco smoke (ETS) on children's health reported in the literature. The evidence from epidemiological studies demonstrate that children's exposure to ETS is a risk factor for a variety of diseases, including respiratory disorders and middle ear disease. However, the current research base on the ETS-associated risks is still inadequate to fully support strategies, programs, and policy development in this area. For example, it is not definitively determined what methods should be used for assessing ETS exposure and predicting potential health risks of exposed children. Based on the available data, we tried to find out which methods seem to be most desirable for quantifying ETS exposure in children. It is our opinion that among all biomarkers, the measurements of blood, saliva, or urinary cotinine and hair nicotine are, as for today, the most specific and sensitive methods for an objective assessment of ETS exposure in children. A combination of the measurement of body fluids cotinine and hair nicotine with the questionnaire and interview-derived information seems to be the optimal method for assessing ETS exposure in children.

Descriptors: SIDS. Sudden infant death syndrome. Risk factors. ETS. Smoking. Air pollution. Screening. Methods. Measurement techniques.
ACCN: SIDS-06427

Wasley A, Lepine LA, Jenkins R, Rubin, C.
An investigation of unexplained infant deaths in houses contaminated with methyl parathion.
Environ Health Perspect 2002 Dec;110 Suppl 6:1053–1056.

In Lorain County, Ohio, unexplained infant deaths in homes sprayed with methyl parathion (MP), an organophosphate (OP) pesticide, prompted an investigation to determine whether infants living in treated homes are at higher risk for unexplained death. A case was defined as any death of an infant (12 months of age) in Lorain County between 1 January 1990 and 31 December 1994, attributed to sudden infant death syndrome (SIDS) or other unknown natural causes. For each case infant, birth certificate data were used to identify two control infants matched with regard to date of birth, sex, city of residence, and maternal race and educational level. Wipe samples from the home address listed on the birth certificate of control infants or the death certificate of case infants were analyzed for MP. Birth certificates provided additional risk factor information. The relationship between MP contamination and unexplained death was analyzed by exact conditional logistic regression. Wipe samples were collected from the residences of 34 case infants and 72 control infants. MP (>0.02 mg/100 cm2) was detected in five homes, three of which had been occupied by case

infants. Case infants were 4.6 times more likely than control infants to have lived in MP-treated homes, but the confidence interval (CI) was wide (95% CI: 0.2, 274.7) and included 1. Maternal smoking, young maternal age, and the presence of other siblings in the family were each independently predictive of case status. In a multivariate model adjusting for these other variables and the matching variables, the estimated risk associated with MP exposure was 13.0 (95% CI: 0.2, 2,685.0). Although this association was not statistically significant and should be interpreted cautiously, it suggests an increased risk for unexplained death among infants living in MP-contaminated homes. The relationship between children's health and exposure to OP pesticides including MP should be evaluated further.

Descriptors: Sudden unexpected death. Sudden unexplained death. Environmental exposure. Toxic chemicals. Toxins. Ohio.
ACCN: SIDS-06426

Durlach J, Pages N, et al.
Magnesium deficit and sudden infant death syndrome (SIDS): SIDS due to magnesium deficiency and SIDS due to various forms of magnesium depletion: Possible importance of the chronopathological form.
Magnes Res 2002 Dec;15(3-4):269–278.

sudden infant death syndrome (SIDS) might be due to the fetal consequences of a Mg maternal deficiency, which might be prevented by simple atoxic nutritional Mg intake by the mother. Various stresses in the pregnant women or in the infant may transform a simple Mg deficiency into Mg depletion which may not be cured by nutritional Mg supplement, but requires a correction of its causal dysregulation. Beside the well-established risk factors in baby care and in the environment, it is important to stress the possible role of a primary hypofunction of the biological clock. This may be treated by darkness therapy: total light deprivation at night for the infant and atoxic nutritional Mg supplement for the pregnant women. The place in the prevention of SIDS of Mg therapy for the infant and of the use of melatonin, L-tryptophan and taurine is now uncertain yet.

Descriptors: SIDS. Sudden infant death syndrome. Magnesium deficiency. Nutrition. Prenatal care. Light deprivation therapy.
ACCN: SIDS-06425

Dancea A, Cote A, et al.
Cardiac pathology in sudden unexpected infant death.
J Pediatr 2002 Sep;141(3):336–342.

Objectives: To determine the spectrum of cardiac pathology and circumstances of death in infants with sudden unexpected death and to define the impact of sudden cardiac deaths to overall sudden infant death. *Study design*: Retrospective analysis of all autopsies of infants with sudden death 7 days to 2 years of age between January 1987 and December 1999 in the province of Quebec (Canada). *Results*: Eighty-two cases of sudden death with cardiac pathology were found, representing 10% of the total number of sudden infant deaths. A structural malformation was present in the majority of cases (54%); however, cardiac pathology in anatomically normal hearts was also common (46%). Most (64%) anatomic malformations were detected before death compared with 13% of nonstructural heart disease. Although a major proportion of children were found dead during sleep, a significant number were described as being awake at time of death (32%). *Conclusions*: Heart disease is present in a significant percentage of autopsies of infants with sudden death. Structural heart malformations predominate, although nonstructural pathologic features of the heart are common and usually unrecognized before an autopsy is performed. Cardiac pathologic features are frequent when the child is witnessed to be awake at the time of sudden death.

Descriptors: SIDS. Sudden infant death syndrome. Risk factors. Heart disease. Autopsy findings. Canada.
ACCN: SIDS-06421

Gerard CM, Harris KA, Thach BT.
Physiologic studies on swaddling: An ancient childcare practice, which may promote the supine position for infant sleep.
J Pediatr 2002 Sep;141(3):398–404.

Objective: The calming effects of swaddling may help infants accept back sleeping and so reduce the risk of sudden infant death syndrome. We hypothesized that swaddling, with minimal leg restraint, would be accepted by postneonatal infants with minimal respiratory effects. *Study design*: Postneonatal infants (n = 37) were studied for the introduction of swaddling. Four infants were studied by using traditional swaddling techniques. Swaddle tightness was increased in 13 infants, simulating traditional swaddles. Respiratory variables-respiratory rate, tidal volume, oxygen saturation, heart rate, sigh rate, and “grunting”-were measured. *Results*: Hips were flexed and abducted in the swaddle. The majority of infants accepted swaddling while supine, including 78% of infants who slept prone at home. Acceptance decreased with increasing age. With increased swaddle pressure, respiratory rate increased during quiet sleep (P <.05). In rapid eye movement sleep, a slight effect on heart rate was observed (P <.05). Other variables did not change. *Conclusions*: Older infants including usual prone sleepers generally accept a form of swaddling that has minimal respiratory effects. The reintroduction of swaddling, without restricting hip movement or chest wall excursion, combined with supine sleeping, may promote further sudden infant death syndrome reduction.

Descriptors: SIDS. Sudden infant death syndrome. Prevention. Bedding. Sleep position. Swaddling.
ACCN: SIDS-06419

Vockley J, Whiteman DA.
Defects of mitochondrial beta-oxidation: A growing group of disorders.
Neuromuscul Disord 2002 Mar;2(3):235–246.

Two disorders of fatty acid metabolism were described in 1973. Since then, at least 22 different inborn errors of metabolism affecting beta-oxidation in skeletal muscle and other tissues have been identified. Neurological findings are prominent in many of these, including hypotonia, myopathy (often with lipid storage), and peripheral neuropathy. Recurrent rhabdomyolysis and hypoglycemia are frequent clinical problems. In many cases, a correct diagnosis will only be made if these disorders are specifically considered and appropriate tests are obtained, since screening tests which detect other inborn errors of metabolism are often normal in patients with beta-oxidation defects under many circumstances. Clinical symptoms, diagnostic testing, and issues of newborn screening for this important group of disorders are discussed.

Descriptors: Sudden infant death. Metabolism. Fatty acids. Diagnosis. Screening tests. Newborns. Infants.
ACCN: SIDS-06417

Fewell JE, Wong VH.
Interleukin-1[beta]-induced fever does not alter the ability of 5- to 6-day-old rat pups to autoresuscitate from hypoxia-induced apnoea.
Exp Physiol 2002 Jan;87(1):17–24.

Experiments were carried out to determine if endogenous pyrogen-induced fever impairs protective responses of newborn rats to hypoxia. Twenty-seven 5- to 6-day-old conscious rat pups received a subcutaneous injection of 0.20 microg of recombinant rat interleukin-1beta (rrIL-1beta) per kilogram of body weight to induce fever, or an equal volume of vehicle. They were then either exposed to a single period of hypoxia produced by breathing an anoxic gas mixture (97 % N (2)-3 % CO(2)) and their time to last gasp was determined, or they were exposed repeatedly to hypoxia and their ability to autoresuscitate from primary apnoea was determined. Core temperature increased significantly following administration of rrIL-1beta but did not change following administration of vehicle (i.e. vehicle, 0.0 +/- 0.1 degrees C; rrIL-1beta, 0.7 +/- 0.3 degrees C; P < 0.001) before exposure to hypoxia. IL-1beta-induced fever did not alter the time to last gasp when the pups were exposed to a single period of hypoxia or the number of successful autoresuscitations upon repeated exposure to hypoxia. Thus, our data do not support the hypothesis that endogenous pyrogen-induced fever impairs the protective

responses in newborns that may prevent death during hypoxia as may occur during single or repeated episodes of prolonged sleep apnoea.

Descriptors: SIDS. Sudden infant death syndrome. Animal models. Sleep apnea. Fever. Hypoxia. Autoresuscitation. Body temperature.
ACCN: SIDS-06416

Wilson A, Talley RC.
State of South Dakota's child: 2001.
S D J Med 2002 Jan;55(1):23–30.

In the year 2000, there was a reversal of the previous year's increase in births in South Dakota, with the total number of births decreasing by 170. There also was an increase in the percentage of low birth weight newborns (< 2500 grams), but a slight decrease in the percent of babies born weighing less than 1500 grams. Most dramatic, was the drop noted in the year 2000 in the state's infant mortality, achieving its lowest ever rate of 5.5 per thousand live births. This drop was observed in both the neonatal (< 29 days of age) and post neonatal (28-364 days of age) rates of death, and for both the White and American Indian populations. An analysis of the causes of infant death showed that during the year 2000 there was an approximate 50% decrease in previous years' rate of death attributable to congenital anomalies and sudden infant death syndrome. As its special topic, this year's report discusses the epidemic of overweight and obesity that affects approximately one-third of school age youth in South Dakota and is associated with risks for their current and future health.

Descriptors: SIDS. Sudden infant death syndrome. Infant mortality. Statistical data. Low birth weight. Obesity. Public awareness. Health education campaigns. Compliance. Whites. Native Americans.
ACCN: SIDS-06415

Vestergaard M, Basso O, et al.
Febrile convulsions and sudden infant death syndrome.
Arch Dis Child 2002 Feb;86(2):125–126.

It has been suggested that sudden infant death syndrome (SIDS) and febrile convulsions are related aetiologically. We compared the risk of SIDS in 9877 siblings of children who had had febrile convulsions with that of 20,177 siblings of children who had never had febrile convulsions. We found no support for the shared susceptibility hypothesis.

Descriptors: SIDS. Sudden infant death syndrome. Risk factors. Febrile convulsions.
ACCN: SIDS-06414

Hunsley, M, Thoman EB.
The sleep of co-sleeping infants when they are not co-sleeping: Evidence that co-sleeping is stressful.
Dev Psychobiol 2002 Jan;40(1):14–2.

Co-sleeping proponents consider the practice to be "natural" and a potential protection against sudden infant death syndrome (SIDS); others consider the practice of an infant sleeping in the parents' bed for prolonged periods at night to place an infant at risk for harm or death. For this study, co-sleeping was investigated from a different perspective, that is, as a significant early experience to investigate as it may have implications for the infant's development. The sleep of 101 normal, full-term infants was recorded nonintrusively in the home for 24 hr periods when they were 5 weeks and 6 months old. Infants were assigned to three groups: short-term co-sleepers, long-term co-sleepers, and non-co-sleepers. Their sleep states and wakefulness were compared at the two ages and over age. At 5 weeks and 6 months, the long-term co-sleeping infants differed significantly from the non-co-sleepers on a number of measures: At 5 weeks, they showed more quiet sleep and longer bouts of quiet sleep; and at 6 months, they also showed less active sleep, fewer arousals in active sleep, and

less wakefulness. Each of these differences indicates a markedly lower arousal level in the long-term co-sleeping infants. This sleep pattern has been repeatedly found to be an indicator of stress. We infer that a major source of stress for these infants is the experience of sleep disturbance documented for infants when they were co-sleeping. Based on extensive evidence for long-term effects of early stress, we conclude that co-sleeping should have significant implications for infants' neurobehavioral development.

Descriptors: SIDS. Sudden infant death syndrome. Bed sharing. Co-sleeping. Sleep patterns. Sleep stages. Infant development. Child development.
ACCN: SIDS-06413

Mathews TJ, MacDorman MF, Menacker F.
Infant mortality statistics from the 1999 period linked birth/infant death data set.
Natl Vital Stat Rep 2002 Jan 30;50(4):1–8.

Objectives: This report presents 1999 period infant mortality statistics from the linked birth/infant death data set (linked file) by a variety of maternal and infant characteristics. *Methods*: Descriptive tabulations of data are presented. *Results*: In general, mortality rates were lowest for infants born to Chinese and Japanese mothers (2.9 and 3.4 per 1,000, respectively). Infants of Cuban, Central and South American, Mexican, and non-Hispanic white mothers had low rates, while rates were higher for infants of Puerto Rican and highest for non-Hispanic black mothers (13.9). Filipino mothers also had low rates. Rates were high for infants of Hawaiian and American Indian mothers. Infant mortality rates were higher for those infants whose mothers had no prenatal care, were teenagers, had 9-11 years of education, were unmarried, or smoked during pregnancy. Infant mortality was also higher for male infants, multiple births, and infants born preterm or at low birth weight. The three leading causes of infant death–congenital malformations, low birth weight, and sudden infant death syndrome (SIDS)–taken together accounted for 45 percent all infant deaths in the United States in 1999. Cause-specific mortality rates varied considerably by race and Hispanic origin. For infants of black mothers, the infant mortality rate for low birth weight was four times that for white mothers. For infants of American Indian mothers, the SIDS rate was 2.4 times that for non-Hispanic white mothers. SIDS rates for infants of Hispanic and Asian or Pacific Islander mothers, were 40-50 percent lower than those for non-Hispanic white mothers.

Descriptors: Infant mortality. Death certificates. Statistical data. Mothers. Socioeconomic factors. Ethnic groups.
ACCN: SIDS-06412

Gozal D, Gozal E, Reeves SR, Lipton AJ.
Gasping and autoresuscitation in the developing rat: Effect of antecedent intermittent hypoxia.
J Appl Physiol 2002 Mar;92(3):1141–1144.

Gasping is a critically important mechanism for autoresuscitation and survival during extreme tissue hypoxia. Evidence of antecedent hypoxia in sudden infant death syndrome suggests that intermittently occurring hypoxic episodes may modify gasping and autoresuscitation. To examine this issue, an intermittent hypoxia (IH) profile consisting of alternating room air and 10% O(2)-balance N(2) every 90 s was applied to pregnant Sprague-Dawley rats (IHRA; n = 50) and to pups after a normal pregnancy (RAIH; n = 50) as well as to control pups (RARA; n = 50). At postnatal day 5, pups were exposed to 95% N(2)-5% CO(2), and gasping and the ability to autoresuscitate were assessed. Compared with RARA, IHRA- and RAIH-exposed pups had a reduced number of gasps, decreased overall gasp duration, and were less likely to autoresuscitate on introduction of room air to the breathing mixture during the last phase of gasping ($P < 0.001$ vs. RARA). We conclude that both prenatal and early postnatal IH adversely affect gasping and related survival mechanisms.

Descriptors: SIDS. Sudden infant death syndrome. Animal models. Pregnancy complications. Hypoxia. Oxygen deprivation. Gasping response. Autoresuscitation.
ACCN: SIDS-06411

Froen JF, Akre H, Stray-Pedersen B, Saugstad OD.
Prolonged apneas and hypoxia mediated by nicotine and endotoxin in piglets.
Biol Neonate 2002;81(2):119–125.

Objective: Infections and maternal smoking are risk factors for SIDS, and toxins from common bacteria have been proposed as a causative link between infections and SIDS. Nicotine can be transferred in significant amounts postnatally to the infant through environmental tobacco smoke or maternal smoking before nursing. We investigated the acute effects of nicotine and endotoxin on repeated apnea by laryngeal reflex stimulation and the following autoresuscitation. *Design*: Thirty-four 1-week-old (+/- 1 day) piglets were sedated and randomized to 1 of 4 pretreatment groups: (1) 1 microg endotoxin i.v./kg; (2) 5 microg nicotine i.v./kg; (3) 1 microg endotoxin i.v./kg and 5 microg nicotine i.v./kg, and (4) placebo. Apnea was induced by insufflation of 0.1 ml of acidified saline (pH 2) in the subglottic space of the trachea three times with intervals of 2 min. Results: Pretreatment with endotoxin caused a significant increase in plasma TNF-alpha in the endotoxin groups (mean value +/- SEM 953 +/- 246 and 980 +/- 226 pg/ml, respectively) but no significant change in plasma IL-1 beta. Blood pressure, respiratory rate or S(a)O(2) was not significantly affected before induced apnea. Both pretreatment with nicotine and endotoxin caused prolonged apneas by 35-45%, a complete loss of normal hyperventilation during autoresuscitation, and prolonged hypoxia after apnea. *Conclusions*: Nicotine and endotoxin interferes with autoresuscitation after apnea. This experimental model on piglets may shed light over important mechanisms involved in the causation of SIDS.

Descriptors: SIDS. Sudden infant death syndrome. Animal models. Piglets. Risk Factors. Smoking. Nicotine. Infections. Bacterial toxins. Apnea. Anoxia.
ACCN: SIDS-06410

Leung WC.
The prosecutor's fallacy—a pitfall in interpreting probabilities in forensic evidence.
Med Sci Law 2002 Jan;42(1):44–50.

Forensic evidence is often given in terms of a mathematical probability. However, it is easy to make a particular type of error, 'the prosecutor's fallacy', in the interpretation of such probability. This paper highlights the source of this error and briefly introduces Bayes Theorem as the correct theoretical basis for interpreting such evidence. The first Californian legal case in which this error was committed is discussed, followed by all cases in the UK in which this error was highlighted and rectified by the Court of Appeal. It is important for all parties concerned–expert witnesses, lawyers and judges–to understand these principles correctly. Furthermore, the criminal courts face dilemmas when juries are involved. This paper concludes by discussing recent guidance from the Court of Appeal on how such evidence should be presented to the jury and the implications of this guidance.

Descriptors: SIDS. Sudden infant death syndrome. Legal factors. Data analysis. Forensic medicine.
ACCN: SIDS-06409

Klonoff-Cohen HS, Srinivasan IP, Edelstein SL.
Prenatal and intrapartum events and sudden infant death syndrome.
Paediatr Perinat Epidemiol 2002 Jan;16(1):82–89.

The purpose of this study was to evaluate specific pregnancy and labour and delivery events that may increase the risk of sudden infant death syndrome (SIDS). A matched case-control study was conducted in five counties in southern California, using California death certificate records. The sample consisted of 239 Caucasian, African-American, Hispanic, and Asian mothers of SIDS infants and 239 mothers of control infants matched on sex, race, birth hospital and date of birth. Mothers participated in a detailed telephone interview and provided access to obstetric and paediatric records. More case than control mothers reported a family history of anaemia (OR=2.12, P < 0.001). Placental abruptions were strongly associated with SIDS (unadjusted OR=7.94, [95% CI 1.34,47.12]). There was an increased risk of SIDS death associated with maternal anaemia during pregnancy (OR=2.51, [95% CI 1.25,5.03]), while simultaneously adjusting for maternal smoking during pregnancy, maternal years of education and age, parity, infant birthweight, gestational age, medical conditions at birth,

infant sleep position and post-natal smoking. Interactions of anaemia and prenatal smoking as well as anaemia and post-natal smoking were not statistically significant. There were no other statistically significant differences between case and control mothers for pregnancy conditions, labour and delivery events (e.g. caesarean sections, anaesthesia, forceps) or newborn complications (e.g. nuchal cord, meconium aspiration). Anaemia and placental abruptions were significantly associated with an increased risk of SIDS; both are circumstances in which a fetus may become hypoxic, thereby compromising the subsequent growth, development, and ultimate survival of the infant.

Descriptors: SIDS. Sudden infant death syndrome. Risk factors. Pregnancy complications. Labor complications. Anemia. Abruptio placentae.
ACCN: SIDS-06408

Person TL, Lavezzi WA, Wolf BC.
Cosleeping and sudden unexpected death in infancy.
Arch Pathol Lab Med 2002 Mar;126(3):343–345.

Context: The practice of infants cosleeping with adults has long been the subject of controversy. Autopsy findings in cases of sudden infant death syndrome (SIDS) are usually indistinguishable from those found with unintentional or intentional suffocation, and the determination of the cause of death in cases of sudden unexpected death in infancy is often based on investigative findings and the exclusion of natural or traumatic causes. *Objective:* To further elucidate the risk of cosleeping. *Methods:* We reviewed 58 cases of sudden unexpected infant deaths. Cases were excluded if there was any significant medical history or evidence of trauma or abuse. *Results*: Twenty-seven of the infants were cosleeping. Eleven of these cases had been previously diagnosed as SIDS, and in 7 cases parental intoxication was documented. *Conclusion*: Our findings support recent studies that suggest that cosleeping or placing an infant in an adult bed is a potentially dangerous practice. The frequency of cosleeping among cases diagnosed as SIDS in our study suggests that some of these deaths may actually be caused by mechanical asphyxia due to unintentional suffocation by the cosleeping adult and/or compressible bedding materials.

Descriptors: SIDS. Sudden infant death syndrome. Risk factors. Bed sharing. Cosleeping. Infant care practices. Parent child relations. Asphyxia. Bedding. Suffocation. Overlaying.
ACCN: SIDS-06407

Mahabee-Gittens M.
Smoking in parents of children with asthma and bronchiolitis in a pediatric emergency department.
Pediatr Emerg Care 2002 Feb;18(1):4–7.

Objectives: To determine smoking habits, levels of nicotine-addiction, readiness to quit, and beliefs about the effects of environmental tobacco smoke (ETS) of parents of children with bronchiolitis and asthma who present to a children's emergency department (ED). *Design/methods*: This was a cross-sectional prevalence study of parents or legal guardians of children with asthma or bronchiolitis presenting to a pediatric ED. *Results*: Two hundred forty-nine parents/legal guardians comprised the study group. The mean age (+/-SD) was 30.0 (+/-8.9) years; 88% were female; 51% were nonwhite; 37% were educated beyond high school. The self-reported smoking prevalence was 41% (95% CI = 32-51). Smoking prevalence among parents of wheezing children varied according to education, income, and race, but not according to gender, age, or employment status. Of the 102 smokers in the sample, 84 (82.4%, 95% CI = 73-88) reported that they wanted to quit; 78 (76.5%, 95% CI = 68-84) stated that they wanted to quit within the next month. Forty-nine percent (95% CI = 39-59) scored above 4 on the Fagerstrom Test for Nicotine Dependence and were considered nicotine-dependent. The majority of smokers admitted to smoking around their children (66.7%, 95% CI = 57-75). Many parents knew that ETS might contribute to the development of the following illnesses: colds/upper respiratory tract infections - 77.5%, otitis media - 68.6%, pneumonia - 50%, wheezing/asthma attacks - 86.3%, and SIDS - 31.4%. *Conclusion*: The prevalence of smoking and nicotine addiction among parents of children with asthma or bronchiolitis who bring their children to a pediatric ED is high. Many parents have some knowledge about the effects of ETS, and the majority would like to quit. Future studies to help determine the best way to deliver advice to parents on ETS exposure reduction and smoking cessation are warranted.

Descriptors: SIDS. Sudden infant death syndrome. Risk factors. Smoking. Smoking cessation. Public awareness. Parental smoking. Parent counseling. Parent education.
ACCN: SIDS-06406

Horne RS, Osborne A, et al.
Arousal from sleep in infants is impaired following an infection.
Early Hum Dev 2002 Feb;66(2):89–100.

Numerous studies have postulated a link between recent infection and sudden infant death syndrome (SIDS). In this study we contrasted arousal responses from sleep in infants on the day of discharge from hospital following an infection with those when fully recovered and also with well age-matched control infants. Thirteen term infants comprised the infection group and nine well infants acted as age-matched controls. All infants were studied using daytime polysomnography and multiple measurements of arousal threshold (cm H(2)O) in response to air-jet stimulation applied alternately to the nares were made in both active sleep (AS) and quiet sleep (QS). All infants were studied on two occasions: firstly, immediately before discharge from the Paediatric ward, and secondly, 10-15 days later when they were completely well in the case of the infection group. Arousal thresholds in QS in the infection group were significantly elevated on the day of discharge (262 +/- 48 cm H (2)O) compared with 10-15 days later (205 +/- 31 cm H(2)O, $p<0.05$). Thresholds in the control group were not different between studies. This study provides evidence that arousability from QS is impaired following an infection and we postulate that this may explain the increased risk for SIDS following infection observed in previous studies.

Descriptors: SIDS. Sudden infant death syndrome. Risk factors. Infections. Arousal response. Body temperature.
ACCN: SIDS-06405

Tonkin SL, Gunn TR, et al.
A review of the anatomy of the upper airway in early infancy and its possible relevance to SIDS.
Early Hum Dev 2002 Feb;66(2):107–121.

Background: Since the danger of prone sleeping in the first 6 months of life has been publicized, there has been a dramatic and consistent reduction in the incidence of sudden infant death syndrome (SIDS). However, unexpected infant deaths and apparent life-threatening events (ALTEs) continue to occur that are clearly not associated with known epidemiological risk factors. *Aims*: To review the unique features of the anatomy and function of the upper airway of the young infant which contribute to increased vulnerability to hypoxia in this age group. We discuss the clinical identification of those infants at risk of obstruction or restriction of the upper airway and the management of the ‘at risk’ infant. *Conclusions*: In the era after the “back to sleep” campaigns, it is likely that an increasing proportion of cases of ALTEs and SIDS will be related to obstruction or limitation of upper airway size leading to sleep hypoxia/asphyxia. This type of problem may be anticipated by evaluation and investigation of infants with signs or a clinical history consistent with possible upper respiratory tract compromise, including micrognathia.

Descriptors: SIDS. Sudden infant death syndrome. Risk factors. Anatomy. Upper airway. Sleep Apnea. New Zealand.
ACCN: SIDS-06404

Buckley P, Rigda RS, Mundy L, McMillen IC.
Interaction between bed sharing and other sleep environments during the first six months of life.
Early Hum Dev 2002 Feb;66(2):123–132.

This investigation was carried out to determine the relationship between bed sharing and other places of infant sleep in the first six months of life, and to identify patterns of change in the place of infant sleep for infants who do and do not routinely bed share in the first six months of life. The sleep–wake behavior and place of infant

sleep were recorded, at weekly intervals, for bed sharing (n = 25) and non-bed sharing (n = 68) infants between 2 and 24 weeks after birth. Bed sharing infants spent a significantly increased proportion of their total sleep time per 24 h in other sleep environments that favored close parental proximity and significantly less time in solitary sleep. Non-bed sharing infants spent a substantial proportion of their time sleeping alone from 2 weeks of age whereas the transition to sleeping alone occurred after 16 weeks for bed sharing infants. We have found that bed sharing acts as a proxy for increased close parental proximity during the first six months of life. This may be of significance in studies that examine the relationship between bed sharing and sudden infant death syndrome.

Descriptors: Infants. Bed sharing. Infant care practices. Sleep environment. Sleep-waking states. Parent child relations. Socioeconomic factors.
ACCN: SIDS-06403

Grafe MR, Kinney HC.
Neuropathology associated with stillbirth.
Semin Perinatol 2002 Feb;26(1):83–88.

Neuropathologic findings in stillbirths oftentimes provide insight into the specific mechanisms leading to death. Examination of the brains of stillborn infants may also identify pathophysiologic processes that result in prenatal brain injury in live born as well as stillborn infants and that lead to neurologic disorders in liveborn infants, such as cerebral palsy or the sudden infant death syndrome (SIDS). A variety of abnormalities are found in the brains of stillborns, the most common including cerebral white matter necrosis (periventricular leukomalacia) or gliosis, germinal matrix or intraventricular hemorrhage, cerebral infarcts, pontosubicular necrosis, and spinal cord or brainstem necrosis. The 2 major hypotheses that have been proposed for the pathophysiology of cerebral white matter injury in the perinatal period are hypoxia/ischemia and infection/cytokines as the basis for injury. The fetal brain may be selectively vulnerable to various insults at specific stages of development.

Descriptors: SIDS. Sudden infant death syndrome. Stillbirth. Stillborn studies. Autopsy results. Fetal development. Brain injuries. Hypoxia.
ACCN: SIDS-06402

Fifer WP, Myers MM.
Sudden fetal and infant deaths: Shared characteristics and distinctive features.
Semin Perinatol 2002 Feb;26(1):89–96.

Recent evidence suggests sudden infant death syndrome (SIDS) infants have a diminished capacity to respond to autonomic challenges during a vulnerable developmental period. We speculate that a dysfunction or altered trajectory in the development of the autonomic nervous system may be detected in utero and also may play a role in the pathogenesis of unexplained late stillbirth. Some fetuses, as well as infants, may be more vulnerable than others to autonomic challenges during periods of autonomic instability. Investigation of potential shared underlying mechanisms in both SIDS and unexplained stillbirth will require expanded epidemiological investigation of genetic and environmental correlates along with a systematic study of developmental physiology and neuropathology. As with SIDS, there are likely important interactions between genetic susceptibility and environmental exposures occurring during gestation, which lead to infants who have altered trajectories or deficits in autonomic function and who need to be identified before they enter the periods of greatest risk.

Descriptors: SIDS. Sudden infant death syndrome. Fetal development. Autonomic nervous system. Genetic factors.
ACCN: SIDS-06401

Blackwell CC, Gordon AE, et al.
The role of bacterial toxins in sudden infant death syndrome (SIDS).
Int J Food Microbiol 2002 Feb;291(6-7):561–570.

There is increasing evidence for the involvement of bacterial toxins in some cases of sudden infant death syndrome (SIDS), particularly the pyrogenic toxins of Staphylococcus aureus. This had led to the hypothesis that some SIDS deaths are due to induction of inflammatory mediators by infectious agents or their products during a period in which the infant is unable to control these normally protective responses. The genetic, developmental, and environmental risk factors identified for SIDS are assessed in relation to frequency or density of mucosal colonisation by toxigenic bacteria and their effects on induction and control of inflammatory responses to the toxins.

Descriptors: SIDS. Sudden infant death syndrome. Bacteria. Bacterial toxins. Staphylococcus. Smoking.
ACCN: SIDS-06400

Macchi V, Snenghi R, De Caro R, Parenti A.
Monolateral hypoplasia of the motor vagal nuclei in a case of sudden infant death syndrome.
J Anat 2002 Feb;200(Pt 2):195–198.

During the development of motor vagal nuclei (MVN), the neuroblasts of the myeloencephalic basal plate migrate in the dorsolateral direction to form the dorsal motor vagal nucleus (DMVN) and ventrolaterally to form the ventral motor vagal nucleus (VMVN). Those neuroblasts that remain close to the median sulcus will form the hypoglossal nucleus. In support of the congenital origin of the alteration of the MVN in sudden infant death syndrome (SIDS), we report the case of an 8-month-old female child who was found dead in her cot. The neuropathological assessment revealed that the medullary triangle of the 4th ventricle floor was asymmetric, owing to the presence of three prominences to the left side of the median sulcus. The medial prominence corresponded to the hypoglossal nucleus, which showed a marked increase in the number of large neurons; the intermediate prominence corresponded to the DMVN whose large neurons were reduced and were recognizable mainly at the level of the medial fringe; the lateral prominence corresponded to the solitary nucleus. The left solitary tract showed a reduction of the transverse diameter. Also, the left VMVN showed marked reduction in the number of neurons. Inflammatory and astrocytic reactions were absent. We suggest that in SIDS cases the hypocellularity of the MVN and the increased number of neurons of the hypoglossal nucleus are intimately related, indicating a congenital alteration due to incomplete migration of the vagal neuroblasts with abnormality of the autonomic cardio-respiratory control.

Descriptors: SIDS. Sudden infant death syndrome. Case reports. Congenital abnormalities. Vagus nerve.
ACCN: SIDS-06399

Freed GE, Meny R, Glomb WB, Hageman JR.
Effect of home monitoring on a high-risk population.
J Perinatol 2002 Mar;22(2):165–167.

A large cohort of infants (8,998) at high risk for sudden and unexpected death was followed with home cardiorespiratory monitoring over a five-year period. These infants included premature infants (23-36 weeks post-conceptual age), SIDS siblings, and infants who experienced an Apparent Life-Threatening Event. The overall SIDS rate in this high-risk population was 0.55/1,000, a rate significantly less than the 0.85 deaths/1,000 reported in the “general population” of Georgia over this same time period. In addition, we report our experience with using home monitors as a diagnostic tool, as well as how monitors can actually be cost-effective. Editorial opinions, and lay press summaries of the CHIME study (JAMA, May 2, 2001) imply that home cardiorespirtory monitors are of little value. Despite the fact that the study never made this claim, many clinicians are now referring to this study as evidence that home monitoring is ineffective and not needed. This article disputes those misconceptions about home cardiorespiratory monitors based on our experience with a large high-risk population of infants.

Descriptors: SIDS. Sudden infant death syndrome. Prevention. Home monitoring. Diagnosis. Monitors.
ACCN: SIDS-06398

Silvers LE, Varricchio FE, et al.
Pediatric deaths reported after vaccination: The utility of information obtained from parents.
Am J Prev Med 2002 Apr;22(3):170–176.

Background: The federally administered Vaccine Adverse Event Reporting System (VAERS) is a passive reporting system that receives domestic and foreign reports of adverse events that occur following immunization. This investigation explored whether routinely interviewing parents for follow-up of VAERS pediatric deaths would provide additional information important to vaccine safety. *Methods*: The study was designed to follow up 100 consecutive pediatric deaths reported to VAERS by interviewing a parent and a healthcare provider (HCP) for each case. Several strategies contributed to successful follow-up. A standardized questionnaire was utilized to interview HCPs and parents. Overall and specific group frequencies (HCPs and parents) were calculated for each variable. McNemar's statistical tests of exact inference were calculated to assess whether there were statistically significant differences between HCP and parent knowledge by case for various variables. *Results*: The median age of the cases was 4 months. Approximately half of the deaths were attributed to sudden infant death syndrome. In many instances, the information was equivalent in quality. For certain variables, such as knowledge of the child's position when found in distress, more parents than HCPs indicated that they knew the answer. *Conclusions*: Conducting parental and HCP follow-up for pediatric deaths reported to VAERS was resource intensive. In some instances, parents were more likely than HCPs to provide information regarding some important variables about the nature of the death. None of the additional information obtained from parents, however, provided a signal or confirmation of a causal link between the vaccine and death.

Descriptors: SIDS. Sudden infant death syndrome. Vaccine. Adverse effects. Vaccine Adverse Event Reporting System. Parents. Interviews.
ACCN: SIDS-06397

Pearl PL.
Childhood sleep disorders: Diagnostic and therapeutic approaches.
Curr Neurol Neurosci Rep 2002 Mar;2(2):150–157.

Pediatric sleep physiology begins with development of the sleep/wake cycle, and the origins of active versus quiet sleep. The 24-hour circadian cycle becomes established at 3 to 6 months. Sleep disorders are rationally approached in pediatrics as age-related. Disorders during infancy commonly include mild, usually self-limited conditions such as sleep-onset association disorder, excessive nighttime feedings, and poor limit-setting. These require behavioral management to avoid long-term deleterious sleep habits. In contrast, other sleep disorders are more ominous, including sudden infant death syndrome (SIDS), central congenital hypoventilation syndrome, and sleep apnea. Childhood is generally the golden age of sleep, with brief latency, high efficiency, and easy awakening. Parasomnias, sometimes stage specific, are manifest here. Adolescents have sleep requirements similar to preteens, posing a challenge for them to adapt to school schedules and lifestyles. Narcolepsy, usually diagnosed in adolescence or early adulthood, is a lifelong sleep disorder that has led to the identification of the hypocretin/orexin neurotransmitter system. This will lead to enhanced understanding of what regulates stage rapid eye movement, and to novel therapeutic advances for hypersomnolence.

Descriptors: SIDS. Sudden infant death syndrome. Sleep disorders. Infants. Adolescents.
ACCN: SIDS-06396

Arnestad M, Vege A, Rognum TO.
Evaluation of diagnostic tools applied in the examination of sudden unexpected deaths in infancy and early childhood.
Forensic Sci Int 2002 Feb;125(2-3):262–268.

During the period between 1984 and 1999, 309 cases of sudden unexpected death in infancy and early childhood (0-3 years) were investigated at the Institute of Forensic Medicine in Oslo. In 73 cases, an explainable cause of death was found. In this non-sudden infant death syndrome (SIDS) group, 42 cases were

due to disease, 14 to accidents, 7 to neglect/abuse and 10 cases were due to homicide. In 43 cases, there were pathological findings at the autopsy or suspect features in the history and/or circumstances, which were, however, insufficient to explain death ("borderline" SIDS). In the remaining 193 cases, nothing of significance was detected ("pure" SIDS). The purpose of the present study was to evaluate the importance of the different diagnostic tools used in diagnosing non-SIDS and borderline SIDS cases. The definition of SIDS requires a negative history as well as a negative autopsy result. Thus, the following variables were analysed: circumstances, medical history and autopsy, which included a gross pathological investigation, histology, neuropathology, microbiology, radiology, and toxicology. In diagnosing deaths due to disease, histology, neuropathology, and microbiology were the most important diagnostic tools. In contrast, information about the circumstances of death and the gross pathological findings at autopsy most often revealed the cause of death in accidents and cases of neglect/abuse and homicide. Following the drop in SIDS rate in Norway after 1989, the share of pure SIDS in proportion to the total population of sudden unexpected deaths in infancy and early childhood has decreased. The increasing proportion of non-SIDS and borderline SIDS cases presents a challenge to improve the quality of the investigation in cases of sudden death in infancy and early childhood.

Descriptors: SIDS. Sudden infant death syndrome. Diagnosis. Autopsy results. Diagnostic tests. Evaluation.
ACCN: SIDS-06395

Higgins S.
Smoking in pregnancy.
Curr Opin Obstet Gynecol 2002 Apr;14(2):145–151.

This update discusses the evidence to link maternal smoking during pregnancy with adverse pregnancy outcome, and also the potential long-term effects on health of in-utero exposure to tobacco smoke. Smoking cessation strategies will also be considered.

Descriptors: SIDS. Sudden infant death syndrome. Pregnancy outcome. Smoking. Smoking during pregnancy. Prenatal influences. Smoking cessation.
ACCN: SIDS-06394

Paterson J, Tukuitonga C, Butler, S, Williams M.
Awareness of sudden infant death syndrome risk factors among mothers of Pacific infants in New Zealand.
N Z Med J 2002 Feb 18;115(1147):33–35.

Aim: To describe the awareness of sudden infant death syndrome (SIDS) risk factors among mothers of Pacific infants in New Zealand. *Methods*: The data were gathered as part of the Pacific Islands Families Study in which 1376 mothers were interviewed when their infants were six weeks old. Included in this interview were questions designed to examine the mothers' awareness of SIDS risk factors. *Results*: Over one third (38.8%) of mothers were unable to accurately report a SIDS risk factor, 53.4% reported the risk associated with putting the baby to sleep in a prone position, 31.5% maternal smoking, and 19.5% correctly reported other SIDS risk factors. Lack of awareness of SIDS risk factors was significantly associated with Samoan and Cook Islands Maori ethnicity, being Pacific Islands born, having no post school qualifications, lower household income, not being fluent in English, having more than five children, and not attending antenatal classes. *Conclusions*: Despite SIDS prevention efforts, a considerable number of mothers in this cohort reported no awareness of SIDS risk factors. More effective methods are needed to provide consistent SIDS prevention information across Pacific ethnic groups.

Descriptors: SIDS. Sudden infant death syndrome. Public awareness. New Zealand. Maoris. Socioeconomic factors. Health education.
ACCN: SIDS-06393

Valdes-Dapena M, Gilbert-Barness E.
Cardiovascular causes for sudden infant death.
Pediatr Pathol Mol Med 2002 Mar–Apr;21(2):195–211.

Although sudden infant death syndrome (SIDS) is a cause for sudden infant death, other causes should be ruled out before diagnosing SIDS. Cardiac causes for sudden infant death include viral myocarditis, congential heart disease particularly congential aortic stenosis, endocardial fibroelastosis, and anomalous origin of the left coronary artery from the pulmonary artery. Other cardiac conditions that may result in sudden death include rhabdomyomas of the heart in tuberous sclerosis and conduction system disorders. The most frequent conduction system disorders resulting in sudden death include histiocytoid cardiomyopathy, congential heart block that may be associated with maternal lupus erythematosus, arrhythmogenic right ventricular dysplasia, noncompaction of the left ventricle, and long QT syndromes.

Descriptors: SIDS. Sudden infant death syndrome. Diagnostic accuracy. Differential diagnosis. Cardiovascular diseases. Congenital defects. Long QT syndrome. Conduction system.
ACCN: SIDS-06392

Quinn JB.
Baby's bedding: Is it creating toxic nerve gases?
Midwifery Today Int Midwife 2002 Spring; (61):21–22.

The author discusses the research done by Barry Richardson in Great Britain and T.J. Sprott in New Zealand on chemicals used in the manufacture of baby mattresses. There are three substances of concern: phosphorus, arsenic, and antimony. Their theory is that a common household fungus, *Scopularis brevicaulis*, establishes itself in the mattresses and by consuming the three substances creates three nerve gases: phosphine, arsine, and stibine. When the baby sleeps on the mattress, warming it to body temperature, the gases are released from the mattress, and the baby breathes in these gases. It is suggested that to prevent this from occurring, mattresses should be wrapped in a gas-impermeable plastic, and only cotton bedding should be used.

Descriptors: SIDS. Sudden infant death syndrome. Risk factors. Bedding. Air pollution. Beds. Adverse effects. Infant products. Toxic gases.
ACCN: SIDS-06391

Horstman K, van Rens-Leenaarts E.
Beyond the boundary between science and values: Re-evaluating the moral dimension of the nurse's role in cot death prevention.
Nurs Ethics 2002 Mar;9(2):137–154.

This article combines a philosophical critique of the idea that public health nurses are primary technicians who neutrally hand over scientifically established facts on risks to the public and an empirical analysis of the actual work of public health nurses. It is argued that the relationship between facts and values in public health is complex and that, despite the introduction of several scientifically based standards and guidelines, public health nurses are not technicians. They do moral work and experience ethical dilemmas. To get a grip on the specific character of this moral work, we distance ourselves from the idea that there are ethical dilemmas in public health nursing for which we can provide general ethical rules and principles. Instead we suggest a contextual ethical approach, in which several different kinds of consideration may be important. To illustrate this, we analyzed 15 in-depth interviews with nurses involved in the prevention of cot deaths in the Netherlands. It is shown that these nurses do not neutrally pass on the epidemiological facts on the risks of prone sleeping, warm bedclothes, and passive smoking, but they are the moral architects of this preventive practice. It is also shown that this moral work and the ethical dilemmas they experience cannot be characterized in terms of general ethical rules and principles. It becomes clear that the moral work of nurses differs according to the three main risks at stake: the balance between virtue, risk taking, and responsibility depends on the specific context.

Descriptors: SIDS. Sudden infant death syndrome. Prevention. Health professionals role. Public health nurses role. Professional ethics. Moral values.
ACCN: SIDS-06390

Harrington C, Kirjavainen T, Teng, A, Sullivan CE.
Altered autonomic function and reduced arousability in apparent life-threatening event infants with obstructive sleep apnea.
Am J Respir Crit Care Med 2002 Apr 15;165(8):1048–1054.

The aim of this study was to examine cardiorespiratory control in infants presenting with an apparent life-threatening event (ALTE). We performed six to eight 45 degrees head-up tilts in 10 ALTE infants (age, 14 +/- 3 weeks) and 12 age-matched control subjects during slow wave sleep and rapid eye movement sleep (REM). All infants underwent full overnight polygraphic sleep recordings with noninvasive measurement of beat-to-beat blood pressure. All control infants had normal sleep breathing. In contrast, 5 of the 10 ALTE infants had more than two obstructive apneas per hour of sleep, with short hypoxic episodes (obstructive sleep apnea [OSA]). In slow wave sleep, in response to the tilt, the ALTE infants with OSA showed a reduced heart rate response, and three of the five showed a marked postural hypotension. The ALTE infants with OSA also had altered heart rate and blood pressure variability and an increased arousal threshold in REM ($p = 0.0002$). By contrast, those ALTE infants with normal sleep breathing had cardiovascular and arousal responses similar to those of the control infants. We conclude that a number of ALTE infants with OSA have abnormal cardiovascular autonomic control that, combined with their decreased arousability in REM, may provide an explanation for the ALTE episodes.

Descriptors: SIDS. Sudden infant death syndrome. ALTE. Cardiorespiratory control. Arousal response. Sleep arousal mechanisms. Sleep studies. Obstructive sleep apnea.
ACCN: SIDS-06389

Garofolo MC, Seidler FJ, Auman JT, Slotkin TA.
Beta-adrenergic modulation of muscarinic cholinergic receptor expression and function in developing heart.
Am J Physiol Regul Integr Comp Physiol 2002 May;282(5):R1356–R1363.

Imbalances of beta-adrenoceptor (beta-AR) and muscarinic ACh receptor (mAChR) input are thought to underlie perinatal cardiovascular abnormalities in conditions such as sudden infant death syndrome. Administration of isoproterenol, a beta(1)/beta(2)-AR agonist, to neonatal rats on postnatal days (PN) 2-5 caused downregulation of cardiac m(2)AChRs and a corresponding decrement in their control of adenylyl cyclase activity. Terbutaline, a beta (2)-selective agonist that crosses the placenta and the blood-brain barrier, was also effective when given either on PN 2-5 or during gestational days 17-20. Terbutaline failed to downregulate brain m (2)AChRs, even though it downregulated beta-ARs; beta-ARs and m(2)AChRs are located on different cell populations in the brain, but they are on the same cells in the heart. Destruction of catecholaminergic neurons with neonatal 6-hydroxydopamine upregulated cardiac but not brain m (2)AChRs. These results suggest that perinatal beta-AR stimulation shifts cardiac receptor production away from the generation of m (2)AChRs so that the development of sympathetic innervation acts as a negative modulator of cholinergic function. Accordingly, tocolytic therapy with beta-AR agonists may compromise the perinatal balance of adrenergic and cholinergic inputs.

Descriptors: SIDS. Sudden infant death syndrome. Animal models. Cardiovascular dysfunction. Metabolism.
ACCN: SIDS-06388

Bradley SR, Pieribone VA, et al.
Chemosensitive serotonergic neurons are closely associated with large medullary arteries.
Nat Neurosci 2002 May;5(5):401–402.

We have previously shown that serotonergic neurons of the medulla are strongly stimulated by an increase in CO(2), suggesting that they are central respiratory chemoreceptors. Here we used confocal imaging and electron microscopy to show that neurons immunoreactive for tryptophan hydroxylase (TpOH) are tightly apposed to large arteries in the rat medulla. We used patch-clamp recordings from brain slices to confirm that neurons with this anatomical specialization are chemosensitive. Serotonergic neurons are ideally situated for sensing arterial blood CO (2), and may help maintain pH homeostasis via wide-ranging effects on brain function. The results reported here support a recent proposal that sudden infant death syndrome (SIDS) results from a developmental abnormality of medullary serotonergic neurons.

Descriptors: SIDS. Sudden infant death syndrome. Animal models. Serotonin. Medulla oblongata. Chemoreceptors.
ACCN: SIDS-06387

Pearl PL, Efron L, Stein MA.
Children, sleep, and behavior: A complex association.
Minerva Pediatr 2002 Apr;54(2):79–91.

Pediatric sleep physiology begins with development of the sleep/wake cycle, and the origins of active versus quiet sleep. The 24-hour circadian cycle becomes established at 3-6 months. Sleep disorders during infancy commonly include mild, usually self-limited conditions such as sleep-onset association disorder, excessive nighttime feedings, and poor limit-setting. These require behavioral management to avoid long-term deleterious sleep habits. In contrast, other sleep disorders are more ominous, including SIDS, central congenital hypoventilation syndrome, and sleep apnea. Childhood is generally considered the golden age of sleep, with brief latency to sleep onset, high efficiency, and easy awakening. Yet parasomnias, psychological factors, and sleep disturbances associated with common disorders such as ADHD disrupt the idealistic notion of childhood being a period of unfettered sleep. Adolescents have sleep requirements similar to adults, posing a challenge for them to adapt to school schedules and increasingly demanding lifestyles. Narcolepsy, usually diagnosed in adolescence or early adulthood, is a lifelong sleep disorder and has led to the identification of the hypocretin/orexin neurotransmitter system. Research advances in the complex interrelationships between developmental neurobiology, sleep disorders and behavior will lead to an enhanced understanding of the pathophysiology of sleep problems and lead to novel therapeutic strategies for sleep disturbances in children.

Descriptors: Sleep disorders. Behavior. SIDS. Sudden infant death syndrome. Apnea.
ACCN: SIDS-06385

Curran AK, Peraza D, Elinsky CA, Leiter JC.
Enhanced baroreflex-mediated inhibition of respiration after muscimol dialysis in the rostroventral medulla.
J Appl Physiol Jun 2002;92(6):2554–2564.

The rostral ventral medulla (RVM) may be important in the control of cardiorespiratory interactions. We hypothesized that inhibition of the RVM would enhance inhibition of breathing associated with transient blood pressure elevations. In 25 piglets 3-16 days of age, we studied the effect of acutely increasing blood pressure, by systemic infusion of phenylephrine, on respiratory activity before and after inhibition of neural activity in the RVM by dialysis of 10 mM muscimol, a GABA(A)-receptor agonist. Muscimol dialysis through probes that were placed along the ventral medullary surface from approximately 1 mm rostral to the facial nucleus to approximately 0.5 mm caudal to the facial nucleus augmented the respiratory inhibition associated with acute increases in blood pressure. No similar enhancement of respiratory inhibition after phenylephrine treatment was seen in six control animals that did not receive muscimol dialysis. We conclude that the piglet RVM participates in cardiorespiratory interactions and that dysfunction of homologous regions in the human infant could lead to cardiorespiratory instability and may be involved in the pathogenesis of sudden infant death syndrome.

Descriptors: SIDS. Sudden infant death syndrome. Animal models. Piglets. Medulla oblongata. Cardiorespiratory function. Respiratory control.
ACCN: SIDS-06384

Okado N, Narita M, Narita N.
A serotonin malfunction hypothesis by finding clear mutual relationships between several risk factors and symptoms associated with sudden infant death syndrome.
Med Hypotheses 2003 Mar;8(3):232–236.

In our recent study allele variants in the promoter of serotonin transporter (5-HTT) gene have been shown as a novel risk factor for sudden infant death syndrome (SIDS). L and XL alleles were more frequent and S allele was less frequent in SIDS victims compared to age-matched controls. Serotonin (5-HT) is suggested as a major agent that is closely involved in the etiology of SIDS. Although many risk factors of SIDS looked mutually unrelated to each other, we found in literature many of them other than prone position to change 5-HT levels in the brain. Along with the genetic factors, environmental and temporal factors appear additively to lower the excitatory function of 5-HT to the respiratory center, and finally SIDS might occur. Now the pathophysiological mechanisms and symptoms of SIDS are explained by decreased levels of 5-HT.

Descriptors: SIDS. Sudden infant death syndrome. Risk factors. Serotonin. Alleles.
ACCN: SIDS-06383

Truman T, Ayoub CC.
Considering suffocatory abuse and Munchausen by proxy in the evaluation of children experiencing apparent life-threatening events and sudden infant death syndrome.
Child Maltreat 2002 May;7(2):138–148.

This study describes 138 young children admitted to the hospital over a 23 year period for recurrent apparent life threatening events (ALTEs), unexplained deaths, or with sudden infant death syndrome (SIDS)-related diagnoses. In examining the potential for suffocatory abuse in living children, we utilized characteristics in the literature that distinguish SIDS or ALTEs due to natural disease states from abuse. Findings demonstrate a co-occurrence of risk factors that raise suspicions of suffocatory abuse or Munchausen by Proxy. Of the 35 children who died, SIDS was the presumed clinical diagnosis at the time of death in 71% of the cases. Comprehensive chart review and autopsy findings revealed a non-SIDS diagnosis in 54% and confirmed or suspicious child abuse in 37% of these deaths. Reports to Child Protective Services were made in 6% of cases. Recommendations for assessment of children including attention to risk indicators, involvement of child protection teams, mandatory autopsies, and death scene investigations are offered.

Descriptors: SIDS. Sudden infant death syndrome. ALTE. Sudden unexplained death. Differential diagnosis. Diagnostic accuracy. Munchausen syndrome by proxy. Intentional suffocation. Asphyxia. Infanticide. Child abuse. Guidelines.
ACCN: SIDS-06382

Krous H, Floyd CW, et al.
Medial smooth muscle thickness in small pulmonary arteries in sudden infant death syndrome revisited.
Pediatr Dev Pathol 2002 Jul-Aug;5(4):375–385.

Increased relative medial thickness (RMT) of smooth muscle in small pulmonary arteries, peripheral extension of smooth muscle into the alveolar wall arteries, and right ventricular hypertrophy (RVH), in response to purported prolonged hypoxia, have been reported in sudden infant death syndrome (SIDS). Prone sleep position, an important risk factor for SIDS, predisposes infants to hypoxia from airway obstruction or rebreathing. Since publication of the earlier pulmonary artery studies, the SIDS definition has been expanded, and sudden infant death investigational protocols have been implemented. Our aims in this study were to (1) compare RMT in preacinar arteries (PA), intra-acinar arteries accompanying small airways (SIA), and alveolar wall arteries (AW) in SIDS infants and controls; (2) correlate RMT with postmortem variables; (3) determine if peripheral extension occurred more often in SIDS infants than in controls; and (4) determine if RVH occurred in SIDS. Movat-stained sections from standardized tissue blocks taken prospectively from the apex of the right upper lobe from 88 SIDS cases and 17 controls were evaluated using a computer-assisted digitizing system with images obtained from a microscope with an attached video camera. When adjusted for age, the RMT

values for the SIA arteries were significantly greater in controls, while the PA and AW arteries were not statistically different between the SIDS cases and controls. Peripheral medial smooth muscle extension did not differ between the groups, and RVH was not seen in SIDS cases. Given the recent identification of brain stem abnormalities interfering with protective cardiorespiratory responses against acute life-threatening hypoxia perhaps precipitated by prone sleeping, our data suggest that SIDS is an acute event not preceded by recurrent or prolonged apnea and hypoxia.

Descriptors: SIDS. Sudden infant death syndrome. Risk factors. Pulmonary arteries. Hypoxia. Lungs. Sleep position.
ACCN: SIDS-06381

Alm B, Wennergren G, Norvenius SG, et al.
Breast feeding and the sudden infant death syndrome in Scandinavia, 1992–95.
Arch Dis Child 2002 Jun; 86(6):400–402.

Aims: To assess the effects of breastfeeding habits on sudden infant death syndrome (SIDS). *Methods*: The analyses are based on data from the Nordic Epidemiological SIDS Study, a case-control study in which parents of SIDS victims in the Scandinavian countries between 1 September 1992 and 31 August 1995 were invited to participate, each with parents of four matched controls. The odds ratios presented were computed by conditional logistic regression analysis. *Results*: After adjustment for smoking during pregnancy, paternal employment, sleeping position, and age of the infant, the adjusted odds ratio (95% CI) was 5.1 (2.3 to 11.2) if the infant was exclusively breast fed for less than four weeks, 3.7 (1.6 to 8.4) for 4–7 weeks, 1.6 (0.7 to 3.6) for 8–11 weeks, and 2.8 (1.2 to 6.8) for 12–15 weeks, with exclusive breast feeding over 16 weeks as the reference. Mixed feeding in the first week post partum did not increase the risk. *Conclusions*: The study is supportive of a weak relation between breast-feeding and SIDS reduction.

Descriptors: SIDS. Sudden infant death syndrome. Prevention. Breast feeding. Infant care practices.
ACCN: SIDS-06380

Gershan WM, Besch NS, Franciosi RA.
A comparison of apparent life-threatening events before and after the back to sleep campaign.
WMJ 2002; 101(1):39–45.

Objectives: The incidence of the sudden infant death syndrome (SIDS) has decreased significantly in the United States since the 1992 recommendation that healthy term infants be placed on their backs or sides during sleep. However, little is known regarding the effect that this recommendation has had on the incidence and epidemiology of apparent life-threatening events (ALTEs) in this country. *Methods*: To examine this, we completed a retrospective chart review study of all infants admitted to the Children's Hospital of Wisconsin with the diagnosis of an ALTE during two study periods before and after the back to sleep initiative: January 1, 1991 to December 31, 1992 and January 1, 1996 to December 31, 1997. *Results:* There were 81 ALTEs in 1991-1992 vs. 102 in 1996-1997. Infants in both groups were similar with respect to gender, race, and age, with approximately 80% in each group < 4 months of age. ALTEs occurred equally throughout the year during both time periods. The majority of episodes occurred during sleep; 74% of the 1991-1992 cohort and 59% of the 1996-1997 infants did not have information in the medical record describing their position during the ALTE. Three infants (2 during 1991-1992) died during the hospitalization and were subsequently diagnosed with SIDS or probable SIDS.

Descriptors: SIDS. Sudden infant death syndrome. Mortality rates. Public awareness. Health education campaigns. Statistical data. Back to Sleep Campaign. Wisconsin.
ACCN: SIDS-06379

Kinney HC, McHugh T, et al.
Subtle developmental abnormalities in the inferior olive: an indicator of prenatal brainstem injury in the sudden infant death syndrome.
J Neuropathol Exp Neurol 2002 Nov;61(5):427–441.

Subtle quantitative abnormalities in neuronal populations derived from the rhombic lip (i.e. arcuate nucleus at the ventral medullary surface, external granular layer of the cerebellum) have been reported in victims of the sudden infant death syndrome (SIDS). In this study, we examined the inferior olive, a major rhombic lip derivative, to determine if subtle rhombic lip abnormalities also involve this nucleus in SIDS. We analyzed the number and density of neurons and reactive astrocytes in the inferior olive in 29 SIDS cases and 29 controls. Computer-assisted cell counting procedures were used in sections stained with hematoxylin and eosin/Luxol fast blue. There was a significant difference in the postconceptionally age-adjusted mean for neuronal density between SIDS cases (7,687 +/- 255 neurons/mm(3)) and controls (8,889 +/- 255 neurons/mm(3)) ($p = 0.002$). The difference in age-adjusted mean neuronal number between SIDS cases (1,932 +/- 89 neurons/2 sections) and controls (2,172 +/- 89 neurons/2 sections) was marginally significant ($p = 0.063$). Reactive astrocytes were present in the inferior olive in SIDS cases, but their number, density, and developmental profile were not significantly different from that of control infants dying of diverse known causes. SIDS victims found dead in cribs, beds, and sofas, prone or supine had subtle olivary abnormalities, suggesting that affected infants are at risk in various sleeping situations. We propose that at least some SIDS victims experience intrauterine brainstem injury including the olivo-arcuato-cerebellar circuitry derived from the rhombic lip. These observations provide future directions for SIDS research concerning the role of early insults in pregnancy, the rhombic lip, and the interactions of the ventral medulla and cerebellum in cardioventilatory control.

Descriptors: SIDS. Sudden infant death syndrome. Nucleus olivaris inferior. Medulla oblongata. Genetic factors. Sleep position.
ACCN: SIDS-06378

Fatemi A, Item C, et al.
Sudden infant death: No evidence for linkage to common polymorphisms in the uncoupling protein-1 and the beta3-adrenergic receptor genes.
Eur J Pediatr 2002 Jun;161(6):337–339.

Thermal stress has been postulated to play a major role in the aetiology of sudden infant death (SID). The human uncoupling protein-1 (UCP-1), expressed in brown adipose tissue dissipates the transmitochondrial proton gradient as heat and plays a central role in energy homeostasis and thermogenesis. A common Bcl I polymorphism in the promoter region of the UCP-1 gene is associated with reduced UCP-1 adipose tissue mRNA and obesity. In addition, a common sequence variation in the beta3-adrenergic receptor gene (beta3-AR), Trp64Arg, has been linked to a decreased resting metabolic rate. To determine whether the UCP-1 Bcl I polymorphism and/or the Trp64Arg variant of beta3-AR are associated with the occurrence of SID, we determined the allele frequencies of these polymorphisms in 53 Austrian SID victims and 54 controls by nested PCR and restriction digestion using DNA extracted from Guthrie cards. We found that the allele frequencies of both polymorphisms did not differ between the SID and control groups (0.65/0.35 versus 0.72/0.28 for UCP-1 Bcl I, and 0.89/0.11 versus 0.93/0.07 for beta3-AR Trp64Arg in SID victims versus controls, respectively). *Conclusion:* Our data do not support a major association between the occurrence of sudden infant death and two common functional polymorphisms in the human uncoupling protein-1 and beta3-adrenergic receptor genes.

Descriptors: SIDS. Sudden infant death syndrome. Genetic factors. Thermal environment.
ACCN: SIDS-06377

Durlach J, Pages N, et al.
Biorhythms and possible central regulation of magnesium status, phototherapy, darkness therapy and chronopathological forms of magnesium depletion.
Magnes Res 2002 Mar;15(12):49–66.

Biological clock and magnesium status are linked. Central magnesium regulation may be hypothetized. Balanced magnesium status is requested to obtain efficiency of suprachiasmatic nuclei and of pineal gland. Conventional bright light therapy appears as a speedy and efficient antidepressant medication useful for the treatment of various types of depression, and of non-migrainous headaches also. Although decrease in melatonin production seems accessory, increases of serotonergy and perhaps of Reactive Oxygen Species constitute the main mechanisms of action. Chromatotherapy emphazizes the effects of short exposure to specific colors. Although the increased production of melatonin constitutes the best marker of darkness, it is only an accessory mechanism of its action. The psycholeptic sedative effects of darkness, like those of magnesium, rely on direct membraneous and oxidant actions, neural mediated effects (i.e., stimulation of inhibitory neuromodulators such as GABA and taurine), and on antagonism of neuroactive gases (CO and NO). Darkness therapy per se, partial substitutive therapy with melatonin and with their mimicking agents (Mg, L-tryptophan, taurine) apply to all the chronopathological forms of magnesium depletion with decreased production of melatonin: sleep disorders, migraine, chronic fatigue syndrome, fibromyalgia, some forms of asthma, and of sudden infant death syndrome. Further research should assess the importance of the chronopathological forms of magnesium depletion in the physiopathology of these disorders.

Descriptors: SIDS. Sudden infant death syndrome. Risk factors. Magnesium deficiency. Melatonin. Light deprivation therapy.
ACCN: SIDS-06376

Panaretto KS, Smallwood VE, et al.
Sudden infant death syndrome risk factors in North Queensland: A survey of infant-care practices in indigenous and non-indigenous women.
J Paediatr Child Health 2002 Apr;38(2):129–134.

Objective: To assess the prevalence of sudden infant death syndrome (SIDS) risk factors in the indigenous and non-indigenous community of Townsville, a large remote urban centre in North Queensland, Australia. *Methods*: Thirty indigenous and 30 non-indigenous women with young children were surveyed using sections of the West Australian Infancy and Pregnancy Survey 1997-1998. The prevalence of SIDS risk factors was compared between the two groups and medians and univariate associations were generated where appropriate. *Results*: The indigenous women were significantly younger and more likely to be single. The median age of the infants was 8 months (range 0.3-26 months) with no difference between the two groups. Thirty-seven per cent of indigenous infants slept prone (cf. 17% of non-indigenous infants; P = 0.03), and 77% shared a bed (cf. 13% of non-indigenous infants; P < 0.001). The indigenous households had significantly more members, with 57% including extended family members (cf. 20% non-indigenous group; P = 0.003). Fifty-three per cent of the indigenous women smoked during pregnancy (cf. 23% of non-indigenous women; P = 0.017), 60% were smokers at the time of the interview, and smoking occurred inside 40% of indigenous houses (cf. 20% and 20% for non-indigenous women, respectively; P < 0.001, 0.09). *Conclusion*: This small survey suggests that the prevalence of SIDS risk factors is higher in the indigenous population, and a new approach to education is needed urgently to promote SIDS awareness among indigenous women.

Descriptors: SIDS. Sudden infant death syndrome. Australia. Queensland. Aborigines. Risk factors. Infant care practices. Smoking. Smoking during pregnancy. ETS.
ACCN: SIDS-06375

Panaretto KS, Whitehall JF, et al.
Sudden infant death syndrome in indigenous and non-indigenous infants in North Queensland: 1990–1998.
J Paediatr Child Health 2002 Apr;38(2):135–139.

Objective: To compare the epidemiology of sudden infant death syndrome (SIDS) in indigenous and non-indigenous infants in north Queensland, and to assess the quality of data recorded for SIDS deaths. *Methods*: Records were obtained for SIDS cases from all coronial courts in North Queensland from 1990 to 1998. Demographic characteristics, ethnicity, age at death, sleeping and feeding patterns, smoking incidences and autopsy findings were compared. Incidences, medians and univariate associations were generated where

appropriate. *Results*: There were 83 248 live births for the 9-year period; 71 389 non-Indigenous and 11 859 Indigenous births. There were 69 SIDS deaths (0.83 per 1000 live births). Overall, recording of demographic and death scene data was poor. Thirty-eight autopsies (55%) were performed by specialist pathologists. There were 22 (32%) non-Indigenous and 22 (32%) Indigenous SIDS deaths (25 ethnicity unknown), giving an estimated relative risk of 2.82 (95% CI 2, 4). Median age at death was 13.1 weeks (range 1-83 weeks) with 14% of deaths occurring in the neonatal period for both groups. Sleeping position was not recorded in 42% of cases and co-sleeping was not recorded in 27% of cases. Bed sharing was more common amongst Indigenous infants. Fifty-two per cent of SIDS cases occurred in the wet season and 48% in the dry season. *Conclusions*: Data recorded for SIDS deaths in north Queensland are poor, preventing specific conclusions concerning SIDS risk factors. However, SIDS rates may be up to three-fold higher in the Indigenous population. A uniform system of post-mortem and death scene data reporting is needed urgently.

Descriptors: SIDS. Sudden infant death syndrome. Statistical data. Australia. Queensland. Aborigines. Socioeconomic factors. Seasons. Infant care practices.
ACCN: SIDS-06374

Colditz PB, Joy GJ, Dunster KR.
Rebreathing potential of infant mattresses and bedcovers.
J Paediatr Child Health 2002 Apr;38(2):192–195.

Objective: To establish the CO2 dispersion and retention properties of some mattresses and bed coverings commercially available in Australia. *Methods*: Five mattresses were studied in (i) an in vivo model in which an infant's head was covered by a headbox, rebreathing was allowed to occur, and the final steady state CO2 concentration was measured; and (ii) an in vitro model in which 5% CO2 in a headbox was allowed to disperse, and the time taken for the concentration to reach 1% was measured. Five types of bedcover were studied in (i) an in vivo model in which an infant's head was covered by a bedcover and the final steady state CO2 concentration was measured; and (ii) an in vitro model in which 5% CO2 under a bedcover was allowed to disperse, and the time taken for the concentration to reach 1% was measured. *Results*: The steady state CO2 concentrations ranged from 0.6% to 3.0% for the mattresses ($P < 0.05$). The time for CO2 to disperse ranged from 5.5 min to 30.4 min ($P < 0.05$). Steady state CO2 concentrations ranged from 2.5% to 3.6% for the bed coverings ($P > 0.05$). The time for CO2 to disperse ranged from 5.4 min to 7.7 min ($P > 0.05$). *Conclusions*: Some commercial cot mattresses and bed coverings allow high concentrations of CO2 to accumulate in rebreathing environments. Some mattress types studied were more diffusive to CO2, whereas there was no difference between the bedcovers studied. This may have implications for vulnerable infants at risk of sudden infant death syndrome.

Descriptors: SIDS. Sudden infant death syndrome. Risk factors. Mattresses. Bedding. Rebreathing. Carbon dioxide. Infant products.
ACCN: SIDS-06373

McGraw EP, Pless JE, Pennington DJ, White SJ.
Postmortem radiography after unexpected death in neonates, infants, and children: Should imaging be routine?
AJR Am J Roentgenol 2002 Jun;178(6):1517–1521.

Objective: The purpose of this study was to determine whether postmortem radiography of neonates, infants, and children provides additional information that is not detected at autopsy in cases of unexpected death. *Materials and methods:* Inclusion criteria for 106 consecutive postmortem skeletal surveys (1998-2000) were neonates, infants, and children 2 years old or younger with no preexisting medical condition to account for mortality. Pediatric radiologists interpreted all the radiographic examinations, which consisted of high-detail, collimated anteroposterior radiographs of the appendicular and axial skeleton, lateral radiographs of the axial skeleton, and oblique radiographs of the ribs. Imaging results were compared with those obtained from standard protocol autopsies on all children. Four categories of death were designated: homicide (i.e., abuse, n = 14), accidental (e.g., drowning, n = 28), natural (e.g., acute illness, n = 43), and undetermined (n = 21). *Results*: The causes of death in the 14 child abuse victims were blunt force injuries to the intracranial (n = 11)

and chest and abdominal (n = 1) areas; asphyxia (n = 1); and shaking injury (n = 1). In six (43%) of these 14 patients, radiography detected 26 extremity fractures that had not been detected at autopsy; four (67%) of these six patients had fractures of different ages that involved more than one extremity. All fractures carried a high index of suspicion of abuse. No skeletal injuries were found in cases of accidental, undetermined, and natural deaths. *Conclusion*: Postmortem radiography provides important additional information regarding the extent and chronicity of extremity trauma that may not be documented at autopsy. This finding supports the routine use of radiography in cases of suspected child abuse. Normal findings on postmortem skeletal radiography may help to distinguish cases of natural, accidental, and undetermined causes of death from those of abuse, aiding in the proper handling of these cases by medical and law enforcement personnel.

Descriptors: Infant death. Child death. Sudden unexpected death. Child abuse. Diagnosis. Radiography. Injuries
ACCN: SIDS-06372

Krous HF, Nadeau JM, Silva PD, Byard RW.
Infanticide: Is its incidence among postneonatal infant deaths increasing? An 18-year population-based analysis in California.
Am J Forensic Med Pathol 2002 Jun;23(2):127–131.

The decline in the incidence of sudden infant death syndrome (SIDS) and recent recommendations regarding the differentiation of SIDS and child abuse has generated speculation that some cases of infanticide were misdiagnosed as SIDS. The aims of this study were to determine the change in incidences and proportions of postneonatal deaths from all causes, SIDS, and infanticide in California over an 18-year interval encompassing years before and after the Back to Sleep Campaign. Selected postneonatal mortality data from 1981 through 1998 obtained from the California Department of Health Services were analyzed and graphically displayed. The total postneonatal mortality and incidence of SIDS deaths per 100,000 live births decreased 45% and 66%, respectively, during the study interval; the incidence of infanticide remained low. The ratio of infanticide to SIDS increased from 4.3 per 100 in 1981 to 10.2 per 100 in 1998. Infanticide deaths, as a percentage of the total number of postneonatal deaths, increased slightly from the first to the second half of the study interval but never rose above 3.2%. It is concluded that this increased percentage is due to a decrease in SIDS deaths and not to an actual increase in infanticide deaths.

Descriptors: SIDS. Sudden infant death syndrome. Diagnosis. Diagnostic accuracy. Infanticide. Child abuse. Infant mortality. Statistical data.
ACCN: SIDS-06371

Langlois NE, Ellis PS, Little D, Hulewicz B.
Toxicologic analysis in cases of possible sudden infant death syndrome: A worthwhile exercise?
Am J Forensic Med Pathol 2002 Jun;23(2):162–166.

The diagnosis of sudden infant death syndrome (SIDS) is one of exclusion. At the Department of Forensic Medicine, Westmead Hospital, toxicologic analysis is performed as part of the postmortem examination of all apparent SIDS deaths. The results for the 5-year period January 1, 1994, to December 31, 1999, were audited to determine whether such routine testing was worthwhile. During this time there were 117 cases with a history consistent with SIDS. Drugs were detected in 19 (16%) of these cases. In 1 case, death was attributed to the finding of methadone. The presence of methadone was regarded as a possible contributing factor to death in a further 2 cases. The presence of possible methadone toxicity had not been expected from the history given before the examination in these 3 cases. In 114 cases there was a suitable sample for alcohol testing; in no case was alcohol detected. In 13 cases the postmortem examination revealed an anatomic cause of death (including 3 cases consistent with whiplash/shaken baby/impact head injury), which excluded a diagnosis of SIDS. In conclusion, routine toxicologic testing in all possible cases of SIDS death supplements the postmortem examination in excluding cases of non-SIDS.

Descriptors: SIDS. Sudden infant death syndrome. Diagnosis. Autopsy results. Toxicology. Diagnostic accuracy.
ACCN: SIDS-06370

Mitic W, Greschner J.
Alcohol's role in the deaths of BC children and youth.
Can J Public Health 2002 May–Jun;93(3):173–175.

Objective: To determine the prevalence and context of alcohol use in the deaths of children and youth reviewed by the BC Children's Commission. *Methods*: In 489 case reviews of BC children and youth, we examined the role that alcohol may have had at the time of death or whether there was a history of alcohol use either by the deceased child or another person in the child's life. *Results*: Alcohol is most prevalent in the lives of 15-18 year olds. It is present at the time of death in two fifths of motor vehicle incidents (MVI) and one third of suicides and drownings. *Interpretation:* Alcohol has a profound presence in the lives and deaths of children reviewed by the Children's Commission. Enhancing deterrence laws and alcohol control policies, and increasing public awareness are warranted.

Descriptors: SIDS. Sudden infant death syndrome. Infant mortality. Child death. Risk Factors. Alcohol use.
ACCN: SIDS-06369

Meny RG, Vreman HJ, et al.
Failure to detect elevated levels of carboxyhemoglobin in infants dying from SIDS.
J Forensic Sci Soc 2002 May;47(3):660–662.

Carboxyhemoglobin (COHb) levels were determined in stored blood samples from 91 infants diagnosed to have died from the sudden infant death syndrome (SIDS) (0.59+/-0.41%, excluding one outlying value of 10.83%); 48 age-matched controls (0.53+/-0.38%); and three individuals who died from fire related causes (41+/-20%). No statistical differences in COHb levels were detected between blood from SIDS and control infants ($p = 0.43$).

Descriptors: SIDS. Sudden infant death syndrome. Autopsy results. Blood.
ACCN: SIDS-06368

Morren G, Van Huffel S, et al.
Effects of non-nutritive sucking on heart rate, respiration and oxygenation: A model-based signal processing approach.
Comp Biochem Physiol A Mol Integr Physiol 2002 May;132(1):97–106.

Several studies support the idea that the use of pacifiers can reduce the risk of sudden infant death syndrome. To investigate the effect of non-nutritive sucking (NNS), we measured heart rate, abdominal respiration, EMG and arterial oxygen saturation of 20 neonates. Also, in 10 of these neonates, changes in cerebral hemoglobin concentrations were acquired by means of near-infrared spectroscopy. Using a parametric technique to model the heart rate as a sum of exponentially damped sinusoids, two main frequency components were found in the heart rate during NNS: a frequency of approximately 0.08 Hz due to the alternation of sucking bursts and pauses, and a frequency of approximately 0.8 Hz that reflects the influence of the respiration. Our analysis shows that it is the alternation of bursts and pauses itself that causes the increased heart rate variability, and that this is not due to increased effort. This suggests that the neuronal mechanism regulating NNS also stimulates the heart rate. From our measurements, no effect of NNS on cerebral or peripheral oxygenation could be found. Furthermore, we show that our model-based signal processing technique is well suited for the analysis of non-stationary biomedical signals.

Descriptors: SIDS. Sudden infant death syndrome. Prevention. Pacifiers. Heart rate. Oxygen consumption.
ACCN: SIDS-06367

Westenberg L, van der Klis KA, et al.
Aboriginal teenage pregnancies compared with non-Aboriginal in South Australia 1995–1999.
Aust N Z J Obstet Gynaecol 2002 May;42(2):187–192.

Objective: To compare pregnancy characteristics and outcomes between Aboriginal and non-Aboriginal teenagers. Design, setting and population: A retrospective cohort study using the perinatal data collection for South Australian births in 1995-1999: 449 Aboriginal and 4,625 non-Aboriginal teenagers. *Methods:* Comparison of socio-demographic and clinical characteristics, using relative risks. Main outcome measures: Rates of pregnancy, smoking during pregnancy, induction, delivery method, preterm and small-for-gestational-age births, and perinatal mortality. *Results*: Aboriginal teenagers have a pregnancy rate more than twice as high as non-Aboriginal, but a smaller proportion of pregnancies are terminated. They have pregnancies earlier, are more likely to be single, to smoke during pregnancy, to have few antenatal visits, to give birth in a country hospital, and to have infections and anaemia. They have lower induction and analgesia rates, but a higher caesarean section rate. Their babies are more likely to be small-for-gestational-age and preterm, to have a congenital abnormality, to require special and intensive nursery care, and stay longer in hospital. While their perinatal mortality rate has halved since a decade ago, their neonatal death rate is still twice that of non-Aboriginal births. *Conclusions*: Aboriginal teenagers need special attention. Support in particular is needed for Aboriginal health workers in preconceptional counseling and health promotion programs that build the capacity of the community, e.g., concerning proper nutrition during pregnancy, smoking cessation, breastfeeding, SIDS prevention, and support for early and regular attendance for antenatal care in friendly and culturally appropriate environments. Outreach services and sexual health services for young Aboriginal people also need expansion.

Descriptors: Adolescent pregnancy. Aborigines. Australia. Pregnancy outcome. Pregnancy complications. Socioeconomic factors.
ACCN: SIDS-06366

Matturri L, Biondo B, Sarez-Mier MP, Rossi L.
Brain stem lesions in the sudden infant death syndrome: Variability in the hypoplasia of the arcuate nucleus.
Acta Neuropathol 2002 Jul;104(1):2–20.

In the present study we investigated quantitatively the incidence of hypoplasia of the arcuate nucleus (ARCn) of the medulla oblongata, reported earlier [Gozal D, Hathout GM, Kirlew KAT (1994) J Appl Physiol 76:207], as well as its distribution in 62 cases of sudden infant death syndrome (SIDS; mean age 14 postnatal weeks, 39 male and 23 female) and 25 controls (mean age 16 postnatal weeks, 14 male and 11 female), using detailed histopathological and morphometric analyses performed on serial sections of medulla oblongata. The SIDS cases were divided into four subtypes: SIDS A (27 cases, 43%) with histologically well-developed ARCn; SIDS B (16 cases, 26%) with severe bilateral hypoplasia along the whole length; SIDS C (11 cases, 18%) with partial bilateral hypoplasia, located mainly in the lateral portions of the caudal two thirds of the nucleus, and SIDS D (8 cases, 13%) with right monolateral hypoplasia of the ARCn. ARCn hypoplasia was detected in 56% of cases (35 cases). Three-dimensional volume reconstruction showed that in the SIDS A victims the mean volume was analogous to controls, whereas in the SIDS group with ARCn hypoplasia, severe or partial, the mean volume was significantly different from controls on both sides of the medulla oblongata (SIDS B group: P=0.003, P=0.002; SIDS C group: P=0.007, P=0.008). The mean ARCn volume in the SIDS D group was statistically significant only on the right side (P=0.005). We also observed reduced neuron density of the ARCn, associated with a decrease in the total number of neurons over the whole length of the nucleus itself. On the basis of the morphometric results of neuronal population in the different portions of the ventrolateral medulla in SIDS cases, we hypothesized that infants without the full complement of neurons and neuropil (ARCn hypoplasia) are at risk for SIDS because they are unable to develop appropriate cardioventilatory control during this crucial developmental period.

Descriptors: SIDS. Sudden infant death syndrome. Risk Factors. Chemoreceptors. Medulla oblongata. Respiratory control.
ACCN: SIDS-06365

Ford KM, Linker LA.
Compliance of licensed childcare centers with the American Academy of Pediatrics' recommendations for infant sleep positions.
J Community Health Nurs 2002 Sum;19(2):83–91.

Sudden infant death syndrome is an elusive and tragic cause of infant mortality. In 1992, the American Academy of Pediatrics (AAP) recommended that healthy term infants be placed in the supine or lateral positions for sleep, based on research conducted in Europe, Australia, and New Zealand. The AAP modified its recommendation in 1994, indicating a preference for the supine position. Since the initial AAP proposal, national educational programs have worked to encourage parents and health care providers to utilize AAP guidelines. Studies have been done on parental use of the supine position. However, very little information exists about the procedures utilized in licensed child care facilities. A survey of child care providers was conducted to determine the risk for sudden infant death syndrome, as indicated by rates of compliance with AAP guidelines. Results show that although the majority of the childcare providers knew the AAP recommendations, only 14.3% were in complete compliance. We make recommendations for the role of the public health nurse in facilitating compliance in childcare centers along with suggestions for future research.

Descriptors: SIDS. Sudden infant death syndrome. Childcare centers. Prevention. American Academy of Pediatrics. Guidelines. Sleep position. Compliance. Public awareness. Health professionals role. Childcare providers.
ACCN: SIDS-06364

Cook P, White DK, Ross-Russell RI.
Bereavement support following sudden and unexpected death: Guidelines for care.
Arch Dis Child 2002 Jul;87(1):36–38.

Dealing with families who have suffered a sudden and unexpected death is a skill that may be needed by any pediatrician. Offering a bereavement follow up meeting to such families is part of accepted practice and is perceived to be of value in helping the family to come to terms with the loss. Unfortunately, there is very little guidance on the objectives for such a meeting, or the training required to help staff conduct such meetings. The nature of the work on a pediatric intensive care unit (PICU) means that staffs have a greater experience of handling families in such a situation. We have reviewed our experience over the past five years following up the families of 51 children who have died suddenly and unexpectedly in our regional PICU. In doing this we have identified five key elements that we suggest are essential to a successful follow up meeting, and have supported this with case studies as illustration.

Descriptors: Child death. Sibling death. Sudden unexpected death. Grief process. Unresolved grief. Bereavement. Parent support. Health professionals role. Bereavement care. Pediatric intensive care units.
ACCN: SIDS-06363

McDonnell M, Mehanni M, et al.
Smoking: The major risk factor for SIDS in Irish infants.
Ir Med J 2002 Apr;95(4):111–113.

The objective of this particular study was to examine the effect of infant cigarette smoke exposure on the risk of sudden infant death syndrome in a contemporary Irish epidemiological database. For each infant that died of SIDS between January 1994 and December 1998, four controls were matched for age and geographical location, yielding a total sample size of 825 infants. Parents of the infants who died were interviewed, and information was collected on sociodemographic details, pregnancy, medical history, parenting practices, and lifestyle habits. Study results showed that 74% of SIDS mothers, and 63% of SIDS fathers smoked during pregnancy compared to 28% of control mothers and 27% of control fathers. For other household members, 29% in the SIDS group smoked, compared to 7% in the control group. There was also a dose response effect, with an increased risk when mothers, fathers, or other household members smoked more than 10 cigarettes a day. The risk increased when both parents smoked, compared to only the mother smoking. These results confirm that cigarette smoke exposure is a serious SIDS risk factor, increasing the risk of SIDS in Ireland almost fourfold.

Descriptors: SIDS. Sudden infant death syndrome. Risk factors. ETS. Parental smoking. Questionnaire. Ireland. Alcohol use.
ACCN: SIDS-06362

Caelli K, Downie J, Letendre A.
Parents experiences of midwife-managed care following the loss of a baby in a previous pregnancy.
J Adv Nurs 2002 Jul;39(2):127–136.

Aims of the study: This article reports on research that explored the impact of the Special Delivery Service, a midwife-managed intervention, developed as an addition to routine care to support and educate high-risk pregnant women and their partners subsequent to the death of a baby in a previous pregnancy. *Background*: Approximately 40,000 families suffer the trauma of a neonatal death annually in the USA, while statistics for Canada and Australia give similar numbers relative to population. Since many more babies die than those accounted for in these statistics, through stillbirth, miscarriage and sudden infant death syndrome, more than the above-cited 2% of childbearing couples will face the trauma of the loss of a baby. *Rationale*: The resultant threat that this situation may pose to the health of the mother has been extensively documented in the literature. However, despite the recent growth in knowledge about the impact of perinatal loss and bereavement, few interventions are specifically designed to support Australian and Canadian women and their partners during a pregnancy following the loss of a baby. *Methodology*: This phenomenological study explored women's and their partners' experiences of grief and loss and the support offered to them through the Special Delivery Service programme. *Results & discussion*: In the face of funding and organizational changes to both the Australian and Canadian health care systems that have eliminated or reduced some services, this research reinforced the need for individualized, compassionate midwifery care and the urgent need for genuinely empathic and supportive health care services for these women and their partners. It also emphasized the need for couples to be informed and supported so that gender differences in grieving do not become a divisive element in the relationship. *Conclusions*: The findings have implications for both nurses and midwives in their practice in countries where optimum care of this vulnerable population is not routinely available. The research supports midwife-managed models of care to ensure women and their families are appropriately supported in crisis. The findings provide insight also into the diverse grief response among couples and the difficulties experienced in a pregnancy following the loss of a baby.

Descriptors: Neonatal death. Subsequent pregnancy. Midwives. Midwives role. Bereavement. Parent support. Health programs.
ACCN: SIDS-06361

Idriss SF, Van Hare GF, Fink D, Rosenbaum DS.
Microvolt T wave alternans inducibility in normal newborn puppies: Effects of development.
J Cardiovasc Electrophysiol 2002 Jun;13(6):593–598.

Introduction: The cause of sudden infant death syndrome is unknown, but increased cardiac vulnerability due to repolarization instability may be a contributing factor. The QT interval normally is long at birth and increases further during the first few postnatal months. Although excessive QT intervals indicate increased cardiac vulnerability in the long QT syndrome, the impact of less pronounced QT prolongation during this developmental period is unclear. In adults and older children, the ease of inducing microvolt-level T wave alternans (TWA) is used as a measure of repolarization instability and arrhythmia vulnerability. The aim of this study was to determine if TWA is inducible in normal newborn puppies. Methods and results: Atrial pacing was performed in 15 anesthetized beagle puppies 7 to 35 days old. The pacing drive cycle length was systematically decreased in 20-msec steps from baseline until AV conduction blocked. Pacing was performed for 8 minutes at each cycle length. Three-lead ECGs were recorded continuously during the last 5 minutes of pacing at each cycle length. The recordings were analyzed off-line for the presence of microvolt-level TWA using a sensitive spectral analysis technique. Microvolt-level TWA was present in all puppies. TWA was not present at baseline but developed and increased in amplitude as heart rate increased. The threshold heart rate for TWA did not correlate with age. However, due to age-dependent changes in baseline heart rate, the 7- to 14-day-old animals needed a 50% to 78% increase in heart rate to reach threshold heart rate, whereas the oldest animals needed only a 5% to 25% increase. *Conclusion*: These data suggest that developmentally dependent dynamic repolarization instability exists in puppies as manifest by the inducibility of TWA.

Descriptors: SIDS. Sudden infant death syndrome. Long QT syndrome. Animal models. Electrocardiography.
ACCN: SIDS-06360

Paterson J, Tukuitonga C, Butler S, Williams M.
Infant bed-sharing among Pacific families in New Zealand.
N Z Med J 2002 May 24;115(1154):241–243.

Aim: To describe infant bed sharing among Pacific families in New Zealand. *Methods*: The data were gathered as part of the Pacific Island Families: First Two Years of Life (PIF) Study in which 1376 mothers were interviewed when their infants were six-weeks-old. Maternal reports of infant bed-sharing practices were assessed by questions about infant sleep location and the number of people who usually shared a mattress with the infant. *Results*: Over half of the mothers (54.9%) reported that their infants shared a mattress with other people, 44.2% sharing with one other person, the remainder sharing with two or more people. Of the bed-sharing infants, 4.7% slept on a mattress on top of the bed, and 4.7% only slept part of the night in the shared bed. *Conclusions*: Together with effective information delivery, the educational and housing issues that many Pacific families in New Zealand face need to be addressed so that parents can make informed decisions about infant care practices.

Descriptors: SIDS. Sudden infant death syndrome. Bed sharing. Infant care practices. New Zealand. Socioeconomic factors.
ACCN: SIDS-06359

Byring RF, Pihko H, et al.
Congenital myasthenic syndrome associated with episodic apnea and sudden infant death.
Neuromuscul Disord 2002 Aug;12(6):548–553.

The sudden infant death syndrome has multiple etiologies. Some congenital myasthenic syndromes can cause sudden infant death syndrome by apnea, but the frequency of this etiology is unknown. We report here a young patient with sudden respiratory crises culminating in apnea followed by recovery, against a background of no or variable myasthenic symptoms without dyspnea. One sib without myasthenic symptoms and one sib who only had mild ptosis died previously during febrile episodes. Studies reported by us elsewhere traced the proband's illness to mutations in choline acetyltransferase. Here, we describe in detail the morphologic investigations and electrophysiologic findings, which point to a presynaptic defect in acetylcholine resynthesis or vesicular filling, in the proband. Analysis of DNA from a sib who previously died of sudden infant death syndrome revealed the same choline acetyltransferase mutation. Thus, mutations in choline acetyltransferase may be a cause of sudden infant death syndrome as, theoretically, could other presynaptic myasthenic disorders.

Descriptors: SIDS. Sudden infant death syndrome. Apnea. Genetic factors. Acetylcholine.
ACCN: SIDS-06358

Opdal SH, Vege A, Egeland T, et al.
Possible role of mtDNA mutations in sudden infant death.
Pediatr Neurol 2002 Jul;27(1):23–29.

Variation in hypervariable region I (HVR-I) and mutations in coding areas of mtDNA were studied in 257 patients of sudden infant death caused by infections, sudden infant death syndrome (SIDS), and borderline SIDS and in a control group of 102 living infants. Nine different point mutations were detected in the coding areas investigated: T3290C, T3308C, T3308G (three patients), A9299G (two patients), G9300A (two patients), T10034C (nine patients), A10042T, C10043T, and A10044G. An association was found between a high number of HVR-I substitutions and potentially pathogenic mtDNA point mutations in coding areas ($P = 0.024$, odds ratio = 1.3). The mean number of substitutions in HVR-I was 3.28 in the infectious death group, 2.63 in the borderline SIDS group, 2.58 in the SIDS group, and 2.02 in the control group ($P = 0.005$). In coding areas, 11.1% of the infectious death patients had a mutation, and the same was true for 9.8% of the borderline SIDS patients, 5.6% of the SIDS patients, and 2.9% of the control subjects ($P = 0.21$). The results indicate that increased levels of HVR-I substitutions may be an indicator of mtDNA instability. Furthermore, mtDNA mutations may play a role in some patients with sudden unexpected infant death that was unexplained or thought to be caused by infection.

Descriptors: SIDS. Sudden infant death syndrome. Genetic factors. Infections.
ACCN: SIDS-06356

Moon RY, Gingras JL, Erwin, R.
Physician beliefs and practices regarding SIDS and SIDS risk reduction.
Clin Pediatr 2002 Jul-Aug;41(6):391–395.

The AAP has alerted pediatricians to the importance of safe sleep environment for infants. The elements of a safe sleep environment include supine sleep position, safe crib, and avoidance of smoke exposure, soft bedding, and overheating. With the Back to Sleep Campaign, prone sleeping among all U.S. infants has decreased to less than 20%, and the incidence of SIDS has decreased 40%. However, the decline in SIDS and prone sleeping has leveled off in recent years. Further declines may be possible with decreasing other modifiable risk factors, such as prenatal and postnatal exposure to cigarette smoking. Prior studies have demonstrated that health care professional advice is influential in determining infant care practices. It is important that physicians caring for infants be aware of the importance of a safe sleep environment and understand other modifiable risk factors for SIDS. We surveyed a random sample of 3,717 physicians in North Carolina and the metropolitan Washington, DC, area to determine knowledge, beliefs, and practices regarding SIDS and SIDS risk reduction among physicians caring for pregnant women and infants. Twenty-three percent (835) responded. Most physicians are aware of prone sleeping and cigarette smoke exposure as risk factors for SIDS. Almost all physicians agree that there are measures that can be taken to reduce the risk of SIDS, and they consider it important to discuss SIDS and SIDS risk reduction strategies with parents of young infants. In spite of this belief, only 56% of family/general practitioners, 18% of obstetrician-gynecologists, and 79% of pediatricians discuss SIDS routinely. Only 35% of pediatricians, 15% of family/general practitioners, and 16% of obstetrician-gynecologists provide written information. In addition, only 38% of physicians recommend supine, while 50% recommend side or back, 6% side, and 7% prone. Only two thirds of pediatricians and one third of family/general practitioners are aware that the AAP recommends supine as the preferred sleep position for infants. Pediatricians are more likely to be aware of the AAP recommendation ($p<0.0001$) and to discuss SIDS risk reduction strategies with parents ($p=0.03$). We conclude that many physicians who care for infants are unaware of the AAP's most current recommendation for sleep position and are incorrectly recommending the side position. Physicians may also be unaware of other sleep environment hazards. Further educational efforts must continue for physicians who provide care to pregnant women and children to ensure a continued decline in the incidence of SIDS.

Descriptors: SIDS. Sudden infant death syndrome. Prevention. Health professionals. Physicians attitudes. Counseling. Compliance. Public awareness. American Academy of Pediatrics. Overheating. Guidelines.
ACCN: SIDS-06355

Sanderson CA, Cowden B, et al.
Is postnatal depression a risk factor for sudden infant death?
Br J Gen Pract 2002 Aug;52(481):636–640.

Background: In New Zealand, an association has been shown between postnatal depression and sudden infant death syndrome (SIDS). *Aim*: To replicate the New Zealand study. *Design of study:* Case-control study. Setting: The city of Sheffield, UK. *Method*: The database of the Sheffield Child Development Study was used Demographic and obstetric data were collected and at one month postpartum the Edinburgh Postnatal Depression Scale (EPDS) was administered. Detailed information on the cause of all infant deaths was available. *Results*: There were 32,984 live births during the study period (from the year 1988 to 1993) and 42 babies died with the cause registered as SIDS. Multivariate analysis showed that smoking was the most important risk factor for SIDS (odds ratio [OR] = 7.24, 95% confidence interval [95% CI] = 2.76 to 19.01), followed by a high EPDS (OR = 3.20, 95% CI = 1.46 to 6.99) and residence in an area of poverty (OR = 2.33, 95% CI = 1.06 to 5.11). *Conclusions*: The Sheffield data confirm the New Zealand findings. A high EPDS score and, by implication, postnatal depression may be risk factors for SIDS, however, there are many possible explanations for the association.

Descriptors: SIDS. Sudden infant death syndrome. Risk Factors. Postnatal depression. Statistical data. New Zealand.
ACCN: SIDS-06354

Galland BC, Taylor BJ, Bolton DP.
Prone versus supine sleep position: A review of the physiological studies in SIDS research.
J Paediatr Child Health 2002 Aug;38(4):332–338.

A number of physiological studies, published over the last 10 years, have investigated the links between prone sleeping and sudden infant death syndrome (SIDS). This review evaluates those studies and derives an overview of the different affects of sleeping prone or supine in infancy. Generally, compared with the supine, the prone position raises arousal and wakening thresholds, promotes sleep and reduces autonomic activity through decreased parasympathetic activity, decreased sympathetic activity, or an imbalance between the two systems. In addition, resting ventilation and ventilatory drive is improved in preterm infants, but in older infants (>1 month), there is no improvement in ventilation, and in 3-month-old infants, the position is adverse in terms of poorer ventilatory drive (in active sleep only). The majority of findings suggest a reduction in physiological control related to respiratory, cardiovascular, and autonomic control mechanisms, including arousal during sleep in the prone position. Since the majority of these findings are from studies of healthy infants, continued reinforcement of the supine sleep recommendations for all infants is emphasized.

Descriptors: SIDS. Sudden infant death syndrome. Risk Factors. Sleep position. Prone position. Autonomic control. Heart rate. Arousal response.
ACCN: SIDS-06353

Vance JC, Boyle FM, Najman, JM, Thearle MJ.
Couple distress after sudden infant or perinatal death: A 30-month follow up.
J Paediatr Child Health 2002 Aug;38(4):368–372.

Objective: To examine, using a 30-month prospective study, patterns of anxiety, depression and alcohol use in couples following stillbirth, neonatal death or sudden infant death syndrome. *Methodology*: One hundred and thirty-eight bereaved and 156 non-bereaved couples completed standardized interviews at 2, 8, 15 and 30 months post-loss. *Results*: At all interviews, bereaved couples were significantly more likely than non-bereaved couples to have at least one distressed partner. Rarely were both partners distressed in either group. For bereaved couples, ‘mother only’ distress declined from 21% to 10% during the study. ‘Father only’ distress ranged from 7% to 15%, peaking at 30 months. Bereaved mothers who were distressed at 2 months reported significantly lower marital satisfaction at 30 months. *Conclusions*: At the couple level, the experience of a baby’s death is multifaceted. Gender differences are common and partners’ needs may change over time. Early recognition of these differences may facilitate longer-term adjustment for both partners. 30 references.

Descriptors: SIDS. Sudden infant death syndrome. Bereavement. Parents grief. Depression. Alcohol abuse. Alcoholism. Marital relationship. Mothers grief. Fathers grief. Gender differences. Psychological adaptation. Case control studies.
ACCN: SIDS-06352

Misra DP. Ananth CV.
Infant mortality among singletons and twins in the United States during 2 decades: Effects of maternal age.
Pediatrics 2002 Dec;110(6):1163-1168.

Objective: Whereas it is well established that maternal age has a U-shaped relationship with infant mortality among singletons, effects on the risk of mortality among multiple births remains unexplored. If there is a relationship, then assessment of maternal age may identify pregnancies and births that should be targeted by both clinical and public health interventions. The objective of this study was to characterize the relationship

between maternal age and infant mortality in singleton and twin births in the United States. *Methods*: A retrospective cohort study was conducted of all live births (singleton: n = 22 546 718; twin: n = 535 544) in the United States in 1985-1986, 1990-1991, and 1995-1996. Risks and relative risks for infant deaths by maternal age before and after adjustments for birth cohort, gravidity, birth weight, and gestational age were measured. *Results*: Maternal age had a U-shaped association with mortality among singletons, with highest rates seen at extremes of age. Among twins, however, there was a steep and inverse relationship between age and mortality, with those born to young mothers experiencing the highest mortality rates. Seven percent of twin births resulted in an infant death for women who were younger than 20 years, 2.7% for those 30 to 34 years, and 2.0% for women 40 to 49 years. Even after adjustments for gravidity, birth weight, and gestational age, these trends persisted. Additional examination by timing of death indicated that this relationship was primarily a function of post neonatal rather than neonatal mortality. *Conclusions*: The highest mortality among twins occurred to women who delivered in their teens and early 20s. The implications of these findings, both from a clinical and a public health perspective, deserve attention.

Descriptors: Singletons. Twins. Infant mortality. Risk Factors. Maternal age. SIDS. Sudden infant death syndrome.
ACCN: SIDS-06294

Frank DA, Jacobs RR, et al.
Level of prenatal cocaine exposure and scores on the Bayley scales of infant development: Modifying effects of caregiver, early intervention, and birth weight.
Pediatrics 2002 Dec;110(6):1143–1152.

Objectives: The objectives of this study were 1) to assess whether there is an independent association between the level of prenatal cocaine exposure and infants' developmental test scores after control of potential confounding variables; and 2) if such an association exists, to determine which biological and social variables, individually and in interaction with each other, may modify it. *Methods*: In a prospective, longitudinal study of 203 urban term infants, 3 cocaine exposure groups were defined by maternal report and infant meconium assay: unexposed, heavier cocaine exposure (>75th percentile self-reported days of use or meconium benzoylecognine concentration), or lighter cocaine exposure (all others). Examiners, masked to exposure history, tested infants at 6, 12, and 24 months of age with the Bayley scales of infant development. *Results:* The final mixed linear regression model included as fixed covariates level of prenatal exposure to cocaine, alcohol, and cigarettes; prenatal marijuana exposure; gestational age and birth weight z score for gestational age; and gender. Age at test, caregiver at time of each test (biological mother, kinship caregiver, unrelated foster caregiver), and any previous child-focused early intervention were included as time-dependent covariates. There were no significant adverse main effects of level of cocaine exposure on Mental Development Index (MDI), Psychomotor Development Index (PDI), or Infant Behavior Record. Child-focused early intervention interacted with level of cocaine exposure such that heavily exposed children who received such intervention showed higher adjusted mean MDI scores than all other groups. Although the sample was born at or near term, there was also a significant interaction of cocaine exposure and gestational age on MDI scores, with those in the heavier exposure group born at slightly lower gestational age having higher mean MDI scores compared with other children born at that gestational age. There was also a significant interaction on MDI between child's age and caregiver. At 6 months, the adjusted MDI of children living with a kinship caregiver was 15.5 points lower than that of children living with their biological mother, but this effect was diminished and was no longer significant at 24 months (difference in means: 4.3 points). The adjusted mean MDI of children in unrelated foster care at 6 months was 8.2 points lower than children of biological mothers, whereas it was 7.3 points higher at 24 months. Early intervention attenuated the age-related decline in PDI scores for all groups. Birth weight <10th percentile was associated with lower PDI scores for children with heavier cocaine exposure and with lower MDI scores for all groups. *Conclusions*: Heavier prenatal cocaine exposure is not an independent risk factor for depressed scores on the Bayley scales of infant development up to 24 months of age when term infants are compared with lighter exposed or unexposed infants of the same demographic background. Cocaine-exposed infants with birth weight below the 10th percentile for gestational age and gender and those placed with kinship caregivers are at increased risk for less optimal developmental outcomes. Pediatric clinicians should refer cocaine-exposed children to the child-focused developmental interventions available for all children at developmental risk.

Descriptors: Cocaine. Prenatal period. Toxins. Infant development. Drug effects.
ACCN: SIDS-06293

Ryan AS, Wenjun Z, Acosta A.
Breastfeeding continues to increase into the new millennium.
Pediatrics 2002 Dec;110(6):1103–1109.

Objective: To update reported rates of breastfeeding and exclusive breastfeeding through 2001 and to compare rates in 2001 to those from 1996. *Methods*: The Ross Laboratories Mothers Survey (RLMS) is a large, national survey designed to determine patterns of milk feeding during infancy. Questionnaires were mailed each month to a representative sample of mothers when their infant was 1 month of age, 2 months of age, 3 months or age, and so forth. In 1996, approximately 744,000 questionnaires were mailed, and in 2001, 1.4 million questionnaires were mailed. Mothers were asked to recall the type of milk fed to their infant in the hospital, and during each month of age. Two categories of breastfeeding were considered: breastfeeding (human milk or a combination of human milk and formula or cow's milk) and exclusive breastfeeding (only human milk). Rates of breastfeeding and exclusive breastfeeding in the hospital and at 6 months of age were evaluated. *Results*: In 2001, the prevalence of the initiation of breastfeeding and breastfeeding to 6 months of age in the United States reached their highest levels recorded to date, 69.5% and 32.5%, respectively. Comparing rates in 2001 and 1996, increases in the initiation of breastfeeding and continued breastfeeding to 6 months of age were observed across all sociodemographic groups but were greater among groups that have been historically less likely to breastfeed: women who were black, younger (<20 years of age), no more than high school-educated, primiparous, employed at the time they received the survey, and who participated in the Supplemental Nutrition Program for Women, Infants, and Children (WIC). Breastfeeding in the hospital and at 6 months of age was most common in the Mountain and Pacific states and among women who were white or Hispanic, older, college-educated, and were not enrolled in WIC. Mothers most likely to practice exclusive breastfeeding in the hospital (46.2%) and at 6 months of age (17.2%) had a similar sociodemographic profile as mothers who breastfed their infants. *Conclusions*: If increases in breastfeeding continue at the current rate (approximately 2% per year), in-hospital breastfeeding in the United States should meet or exceed the Healthy People 2010 goal of 75% for the early postpartum period. However, the Healthy People 2010 goal for continued breastfeeding to 5 to 6 months of age (50%) may not be reached in every subgroup. To ensure that these goals are achieved, educational and promotional strategies for breastfeeding must be continued to support mothers who are young, less educated, and participating in WIC.

Descriptors: Breast feeding. Statistical data. Questionnaires. Socioeconomic differences.
ACCN: SIDS-06292

MacDorman MF, Minino AM, Strobino DM, Guyer B.
Annual summary of vital statistics—2001.
Pediatrics 2002 Dec;110(6):1037–1052.

The number of births, the crude birth rate (14.5 in 2001), and the fertility rate (67.2 in 2001) all declined slightly (by 1% or less) from 2000 to 2001. Fertility rates were highest for Hispanic women (107.4), followed by Native American (70.7), Asian or Pacific Islander (69.4), black (69.3), and non-Hispanic white women (58.0). During the early to mid 1990s, fertility declined for non-Hispanic white, black, and American Indian women. Rates for these population groups have changed relatively little since 1995; however, fertility has increased for Asian or Pacific Islander and Hispanic women. The birth rate for teen mothers continued to fall, dropping 5% from 2000 to 2001 to 45.9 births per 1000 females aged 15 to 19 years, another record low. The teen birth rate has fallen 26% since 1991; declines were more rapid (35%) for younger teens aged 15 to 17 years than for older teens aged 18 to 19 years (20%). The proportion of all births to unmarried women remained about the same at one-third. Smoking during pregnancy continued to decline; smoking rates were highest among teen mothers. The use of timely prenatal care increased slightly to 83.4% in 2001. From 1990 to 2001, the use of timely prenatal care increased by 6% (to 88.5%) for non-Hispanic white women, by 23% (to 74.5%) for black women, and by 26% (to 75.7%) for Hispanic women. The number and rate of twin births continued to rise, but the triplet/+ birth rate declined for the second year in a row. For the first year in almost a decade, the preterm birth rate declined (to 11.6%); however, the low birth weight rate was unchanged at 7.6%. The total cesarean delivery rate jumped

7% from 2000 to 2001 to 24.4% of all births, the highest level reported since these data became available on birth certificates (1989). The primary cesarean rate rose 5%, whereas the rate of vaginal birth after a previous cesarean delivery tumbled 20%. In 2001, the provisional infant mortality rate was 6.9 per 1000 live births, the same as in 2000. Racial differences in infant mortality remain a major public health concern, with the rate for infants of black mothers 2.5 times those for infants of non-Hispanic white or Hispanic mothers. In 2000, 66% of all infant deaths occurred among the 7.6% of infants born low birth weight. Among all states, Maine and Massachusetts had the lowest infant mortality rates. The United States continues to rank poorly in international comparisons of infant mortality. The provisional death rate in 2001 was 8.7 deaths per 1000 population, the same as the 2000 final rate. In 2000, unintentional injuries and homicide remained the leading and second-leading causes of death for children 1 to 19 years of age, although the death rate for homicide decreased by 10% from 1999 to 2000. Among unintentional injuries to children, two-thirds were motor vehicle-related; among homicides, two-thirds were firearm-related.

Descriptors: Birth rates. Racial differences. Infant mortality. Low birth weight. Statistical data.
ACCN: SIDS-06291

Peitsch WK, Keefer CH, LaBrie RA, Mulliken JB.
Incidence of cranial asymmetry in healthy newborns.
Pediatrics 2002 Dec;110(6):e72.

Objective: During recent years, coincident with the recommendation to position infants supine, the incidence of posterior deformational plagiocephaly has increased dramatically. The purpose of our study was to determine whether early signs of cranial flattening could be detected in healthy neonates and to document incidence and potential risk factors. *Design*: A cross-sectional study was performed in healthy newborns. Physical findings, anthropometric cranial measurements, and data on pregnancy and birth were recorded. *Results*: The incidence of localized cranial flattening in singletons was 13%; other anomalous head shapes were found in 11% of single-born neonates. In twins, localized flat areas were much more frequent with an incidence of 56%. The following risk factors for cranial deformation were identified: assisted vaginal delivery, prolonged labor, unusual birth position, primiparity, and male gender. *Conclusion:* We propose that localized lateral or occipital cranial flattening at birth is a precursor to posterior deformational plagiocephaly. The infant lies supine, with the head turned to the flattened area, and is unable to roll. Intrauterine risk factors for localized cranial flattening are the same as for deformational plagiocephaly. To avoid postnatal progression from a localized cranial flattening to posterior-lateral deformational plagiocephaly, we suggest amending the recommendation of the American Academy of Pediatrics on sleep position: Alternate the head position and allow sleeping on the side and, when awake, supervise prone time.

Descriptors: Head asymmetry. Plagiocephaly. Skull flattening. Sleep position. Supine position.
ACCN: SIDS-06290

Gerard CM, Harris KA, Thach BT.
Spontaneous arousals in supine infants while swaddled and unswaddled during rapid eye movement and quiet sleep.
Pediatrics 2002 Dec;110(6):e70.

Objective: Supine sleep is recommended for infants to decrease the risk of sudden infant death syndrome, but many parents report that their infants seem uncomfortable supine. Many cultures swaddle infants for sleep in the supine position. Swaddled infants are said to “sleep better”; presumably they sleep longer or with fewer arousals. However, there have been no studies of the effect of swaddling on spontaneous arousals during sleep. Arousal is initiated in brainstem centers and manifests as a sequence of reflexes: from sighs to startles and then to thrashing movements. Such “brainstem arousals” may progress to full arousal, but most do not. *Methods*: Twenty-six healthy infants, aged 80 +/- 7 days, were studied during normal nap times. Swaddled (cotton spandex swaddle) and unswaddled trials were alternated for each infant. Sleep state (rapid eye movement [REM] or quiet sleep [QS]) was determined by behavioral criteria (breathing pattern, eye movements) and electroencephalogram/electrooculogram (10 infants). Respitrace, submental and biceps electromyogram, and video recording were used to detect startles and sighs (augmented breaths). Full

arousals were classified by eye opening and/or crying. Frequencies of sighs, startles, and full arousals per hour were calculated. Progression of events was calculated as percentages in each sleep state, as was duration of sleep state. *Results*: Swaddling decreased startles in QS and REM, full arousal in QS, and progression of startle to arousal in QS. It resulted in shorter arousal duration during REM sleep and more REM sleep. *Conclusions*: Swaddling has a significant inhibitory effect on progression of arousals from brainstem to full arousals involving the cortex in QS. Swaddling decreases spontaneous arousals in QS and increases the duration of REM sleep, perhaps by helping infants return to sleep spontaneously, which may limit parental intervention. For these reasons, a safe form of swaddling that allows hip flexion/abduction and chest wall excursion may help parents keep their infants in the supine sleep position and thereby prevent the sudden infant death syndrome risks associated with the prone sleep position.

Descriptors: SIDS. Sudden infant death syndrome. Prevention. Sleep position. Supine position. Bedding. Swaddling.
ACCN: SIDS-06289

Schreier H.
Munchausen by proxy defined.
Pediatrics 2002 Nov;110(5):985–988.

Guidelines for diagnosing Munchausen by proxy (MBP) are presented, and the differences between Munchausen, pediatric condition falsification, and factitious disorder by proxy are made clear. In brief, MBP must include a diagnosis in the child and a diagnosis in the caretaker. The usual clinical presentation, motivation, and prognosis in MBP is such that distinguishing it from other forms involving pediatric condition falsification is essential for the protection of the child. This article reviews several cases illustrating one or more of the factitious disorder syndromes, and describes the difficulty involved in diagnosis.

Descriptors: Child abuse. Munchausen syndrome by proxy. Parent child relations. Mother child relations. Mental disorders.
ACCN: SIDS-06288

Simakajornboon N, Beckerman RC, et al.
Effect of supplemental oxygen on sleep architecture and cardiorespiratory events in preterm infants.
Pediatrics 2002 Nov;110(5):884–888.

Objective: To investigate the effect of low-flow supplemental oxygen (SupOx) on sleep architecture and cardiorespiratory events in asymptomatic preterm infants. *Methods*: An overnight polysomnographic evaluation was conducted prospectively in 23 premature infants who were born at 30.0 +/- 3.2 (standard deviation) weeks' gestational age and studied at 38.1 +/- 4.4 weeks' postconceptional age. Infants were free of any adverse events, including cardiorespiratory monitor alarms in the nursery for at least 1 week before the study. Infants received room air (RA) or SupOx via nasal cannula at 0.25 L/min. *Results*: Quiet sleep density was increased during SupOx (33.3 +/- 10.8% vs 26.6 +/- 10.0% total sleep time [TST] in RA), and a reciprocal decrease in active sleep density was observed (61.5 +/- 11.1% vs 68.4 +/- 9.9% TST in RA). No differences in sleep efficiency emerged (69.7 +/- 10.6% SupOx vs 69.7 +/- 8.8% RA). SupOx elicited significant decreases in apnea index (3.8 +/- 2.4 events/h vs 11.1 +/- 6.4 events/h in RA) and in the percentage of time spent in periodic breathing (1.8 +/- 2.9% vs 6.7 +/- 8.9% in RA). In addition, SupOx decreased the frequency of bradycardic events (0.3 +/- 0.8 events vs 2.5 +/- 0.03 events in RA) and improved overall oxygen saturation (98.7 +/- 1.1% vs 96.4 +/- 2.2%). No changes in alveolar ventilation, as derived from end-tidal CO2 measurements, was detected (38.6 +/- 5.8 mm Hg in SupOx vs 38.4 +/- 5.4 mm Hg in RA). *Conclusions:* Asymptomatic preterm infants exhibit frequent and potentially clinically adverse cardiorespiratory events when assessed in the sleep laboratory. Administration of SupOx to these infants is associated with an increase in the overall duration and percentage TST spent in quiet sleep with reciprocal changes in active sleep. In addition, improvement in respiratory stability is observed with the use of low-flow SupOx, as evidenced by a decrease in apnea, periodic breathing, and bradycardia, without adverse effects on alveolar ventilation.

Descriptors: Oxygen therapy. Sleep. Premature infants. Respiratory airflow. Cardiorespiratory events.
ACCN: SIDS-06287

Stening W, Nitsch P, Wassmer G, Roth B.
Cardiorespiratory stability of premature and term infants carried in infant slings.
Pediatrics 2002 Nov;110(5):879–883.

Objective: Parents in industrialized societies make increasing use of infant slings to carry their infants. This study was conducted to determine whether infants who are carried in slings are at risk of experiencing clinically relevant changes in cardiorespiratory measurements. *Methods*: In a 3-period crossover trial, 24 preterm and 12 term newborns were continually monitored while being carried horizontally or vertically in a sling or lying in a pram. Oxygen saturation, heart rate, nasal airflow, abdominal breathing, and movements were recorded. Results: Infants who were carried in slings were not at risk of clinically relevant changes of oxygen saturation or heart rate. The 90% confidence interval of oxygen saturation in both infant sling positions remained within a +/- 2% interval around the average oxygen saturation in the pram. However, a significant decrease of oxygen saturation was observed while infants were carried in a sling with a mean oxygen saturation of 96.3% (standard deviation [SD]: 1.8) in the vertical and 96.1% (SD: 2.0) in the horizontal sling position compared with the mean oxygen saturation in the pram (97.1%; SD: 1.5). The degree and the incidence of desaturations and bradycardia did not change while the infants were carried. Both types of episodes were seen only in preterm infants. *Conclusion*: The use of carrying slings is not associated with an increased risk of clinically relevant cardiorespiratory changes in term and preterm infants.

Descriptors: Infant carriers. Oxygen saturation. Oxygen consumption. Prone position. Supine position.
ACCN: SIDS-06286

Powell EC, Jovtis E, Tanz RR.
Incidence and description of stroller-related injuries to children.
Pediatrics 2002 Nov;110(5):e62.

Objective: To describe the incidence, circumstances, and types of stroller-related injuries among US children. *Design*: Retrospective review of data for children 3 years old and younger from the National Electronic Injury Surveillance System of the United States Consumer Product Safety Commission for 1994-1998. R*esults*: There were an estimated 64 373 stroller-related injuries (95% confidence interval [CI]: 49 223-79 514) to children 3 years old and younger treated in hospital emergency departments in the United States during the 5-year study period. The median age at the time of the injury was 11 months; 51% were males. The annual rate of injury among children <1 year old was 184.4 per 100 000. Seventy-six percent of injuries resulted from a fall from the stroller. A motor vehicle was involved in <1% of cases. Most injuries involved the head (44%) or face (43%). Injury diagnoses included contusions or abrasions (38%), lacerations (24%), closed head injury (22%), and extremity fractures (3%). Two percent of injured children, an estimated 992 (95% CI: 428-1556), were admitted to the hospital during the study period, an annual admission rate of 1.3 per 100 000. Seventy percent of admissions were for head trauma. *Conclusions*: Injuries related to strollers are common, particularly among children in the first year of life. They often result from falls from the stroller. The data suggest that restraint use would prevent many stroller-related injuries.

Descriptors: Children. Injuries. Strollers. Injury prevention.
ACCN: SIDS-06285

Hauck FR, Moore CM, et al.
The contribution of prone sleeping position to the racial disparity in sudden infant death syndrome: The Chicago infant mortality study.
Pediatrics 2002 Oct;110(4):772–780.

Background: Rates of sudden infant death syndrome (SIDS) are over twice as high among African Americans compared with Caucasians. Little is known, however, about the relationship between prone sleeping, other sleep environment factors, and the risk of SIDS in the United States and how differences in risk factors may account for disparities in mortality. *Objective*: To assess the contribution of prone sleeping position and other potential risk factors to SIDS risk in a primarily high-risk, urban African American population. *Design, setting, and population*: Case-control study consisting of 260 infants ages birth to 1 year who died of SIDS between

November 1993 and April 1996. The control group consists of an equal number of infants matched on race, age, and birth weight. Prospectively collected data from the death scene investigation and a follow-up home interview for case infants were compared with equivalent questions for living control participants to identify risk factors for SIDS. Main outcome measures: Risk of SIDS related to prone sleeping position adjusting for potential confounding variables and other risk factors for SIDS, and comparisons by race-ethnicity. *Results*: Three quarters of the SIDS infants were African American. There was more than a twofold increased risk of SIDS associated with being placed prone for last sleep compared with the nonprone positions (odds ratio [OR]: 2.4; 95% confidence interval [CI]: 1.6-3.7). This OR increased after adjusting for potential confounding variables and other sleep environment factors (OR: 4.0; 95% CI: 1.8-8.8). Differences were found for African Americans compared with others (OR: 1.8; 95% CI: 1.2-2.6 and OR: 10.3, 95% CI: 10.3 [3.2-33.8, respectively]). The population attributable risk was 31%. Fewer case mothers (46%) than control mothers (64%) reported being advised about sleep position in the hospital after delivery. Of those advised, a similar proportion of case mothers as control mothers were incorrectly told or recalled being told to use the prone position, but prone was recommended in a higher proportion of black mothers (cases and controls combined) compared with non-black mothers. *Conclusions:* Prone sleeping was found to be a significant risk factor for SIDS in this primarily African American urban sample, and approximately one third of the SIDS deaths could be attributed to this factor. Greater and more effective educational outreach must be extended to African American families and the health personnel serving them to reduce prone prevalence during sleep, which appears, in part, to contribute to the higher rates of SIDS among African American infants.

Descriptors: Sudden infant death syndrome. SIDS. Risk Factors. Sleep position. Prone position. African Americans. Racial differences. Urban population.
ACCN: SIDS-06283

Pitetti RD, Maffei F, et al.
Prevalence of retinal hemorrhages and child abuse in children who present with an apparent life-threatening event.
Pediatrics 2002 Sep;110(3):557–562.

Objective: Child abuse (CA) can present with a spectrum of signs and symptoms. Apparent life-threatening events (ALTEs) may be a subtle presentation of CA. Retinal hemorrhages (RHs) are a well-described finding in some patients with CA. We hypothesized that screening children who present with a chief complaint of an ALTE for RH would detect an otherwise occult presentation of CA. *Methods*: Children who were younger than 24 months of age and presented to the emergency department between March 1, 1997, and February 28, 1999, with signs and symptoms consistent with the National Institutes of Health's definition of an ALTE were studied prospectively. Children were excluded when it was readily apparent on presentation that the child was a victim of CA. Demographic data, a complete blood count with differential, venous blood gas, carboxyhemoglobin level, and urine toxicological screen were collected. A pediatric ophthalmologist performed a dilated funduscopic examination; patients who were found to have RH underwent a noncontrast computerized tomographic scan of the head and skeletal survey to evaluate for occult injury. Evaluations by social services or Children, Youth and Families, the results of all diagnostic tests obtained, and the final discharge diagnosis were recorded. Medical records of all patients were reviewed at 1 year; subsequent visits, hospitalizations, and evaluations by social services or Children, Youth and Families were recorded. *Results*: A total of 128 patients presented to the emergency department with an ALTE during the study period. No patients were excluded. Mean age was 2.1 months (median: 1.27; range: 0.07-16.0; standard deviation: 2.1). Fifty-seven (44.5%) were boys; 86 (67.2%) were white, and 36 (27.9%) were black. A total of 26 (20.3%) of 128 patients had a history of an ALTE, 4 (3.4%) of 117 had a family history of an ALTE, and 15 (12.8%) of 117 had a family history of sudden infant death syndrome. Dilated funduscopic examination was performed on 73 (57.0%) of 128 patients; RH was detected in 1 patient (1.4%). Four children, including the patient with RH, underwent an evaluation for suspected abuse; 3 (2.3%) of 128 were determined to have been abused. *Conclusions:* RH was detected in 1 (1.4%) of 73 patients in our population of infants with ALTEs and 1 of 3 patients who were victims of CA and presented with an ALTE. CA was detected in 2.3% of patients who presented with an ALTE. The diagnosis of CA should be seriously considered in patients who present with an ALTE. The evaluation of ALTEs should include funduscopic examination, as ALTEs and RHs are associated with CA.

Descriptors: Child abuse. Diagnosis. Retinal hemorrhage. ALTE.
ACCN: SIDS-06282

Colson ER, Cohen-Joslin S, et al.
Changing nursery practice gets inner-city infants in the supine position for sleep.
Arch Pediatr Adolesc Med 2002 Jul;156(7):717–720.

Objective: To determine whether an educational intervention to change nursery practice would result in more inner-city parents placing their infants in the supine position for sleep. *Design:* Semistructured interviews were conducted at the 2-week health supervision visit with 1 convenience sample of parents before and a different convenience sample of parents after an educational intervention was conducted to change nursery practice in positioning infants for sleep. *Setting*: University hospital clinic located in an urban setting. *Participants:* Parents of 2-week-old infants at their first health supervision visit in an urban, university-affiliated clinic. All parents who were approached agreed to participate. *Intervention:* Nurses were instructed to place infants exclusively in the supine position in the nursery and to instruct parents to exclusively place infants in the supine sleeping position at home. *Main Outcome Measures:* The usual sleeping position in which parents reported placing their 2-week old infants. *Results*: Before the intervention, 41 percent of parents reported that a clinician had told them to place their infants to sleep in the supine position compared with 81 percent after the intervention (odds ratio [OR], 6.1; 95 percent confidence interval [CI], 3.1-12.3). Before the intervention, 37 percent of parents reported that the nursery staff placed their infants to sleep in the supine position, compared with 88 percent of the intervention, 42 percent of parents reported that they usually placed their infants to sleep in the supine position at home compared with 75 percent after the intervention (OR, 4.2; 95 percent CI, 2.1-7.9). *Conclusion*: After an educational intervention to change practice in a well-newborn nursery, many more parents reported placing their infants in the supine position for sleep, which suggests that such an intervention may have an impact on the position in which parents place their children to sleep.

Descriptors: Sleep position. Supine position. Health education campaigns. Public awareness. Hospital nurseries. Urban population. Outcome evaluation
ACCN: SIDS-06239

Tappin D, Brooke H, Ecob R, Gibson A.
Used infant mattresses and sudden infant death syndrome in Scotland: Case-control study.
Br Med J 2002 Nov 2;325(7371):1007.

Objective: The objective of this study is to examine the proposition that a used infant mattress is associated with an increased risk of sudden infant death syndrome. *Design*: Case-control study. Setting: Scotland (population 5.1 million, with about 53,000 births a year). Participants: 131 infants who died of sudden infant death syndrome between 1 January 1996 and 31 May 2000 and 278 age, season, and obstetric unit matched control infants. *Main outcome measures*: Routine use of an infant mattress previously used by another child and place of last sleep. *Results*: Routine use of an infant mattress previously used by another child was significantly associated with an increased risk of sudden infant death syndrome (multivariate odds ratio 3.07,95 percent confidence interval 1.51 to 6.22). Use of a used infant mattress for last sleep was also associated with increased risk (6.10, 2.31 to 156.12). The association was significantly stronger if the mattress was from another home (4.78, 2.08 to 11.0) than if it was from the same home (1.64, 0.64 to 4.2). *Conclusion*: A valid significant association exists between use of a used infant mattress and an increased risk of sudden infant death syndrome, particularly if the mattress is from another home. Insufficient evidence is available to judge whether this relation is cause and effect.

Descriptors: SIDS. Sudden infant death syndrome. Mattresses. Bedding. Infant products. Scotland.
ACCN: SIDS-06237

Shaoul R, Shahory R, Tamir A, Jaffe M.
Comparison between pediatricians and family practitioners in the use of the prokinetic cisapride for gastroesophageal reflux disease in children.
Pediatrics 2002 Jun;109(6):1118–1123.

The North American Society for Pediatric Gastroenterology, Hepatology and Nutrition and the European Society of Pediatric Gastroenterology, Hepatology and Nutrition have recently issued treatment guidelines for

the use of cisapride in children. Our hypothesis was that cisapride is misused in the community and is not prescribed according to suggested recommendations. Therefore, the aim of this study was to evaluate the knowledge of pediatricians and family practitioners regarding the prescribing practice and adverse effects of cisapride. A standardized questionnaire was sent to a randomly selected group of pediatricians and family practitioners in Northern Israel. The questionnaire was designed to evaluate the knowledge of the physician regarding the treatment of gastroesophageal reflux disease and the use of cisapride in children (indications, dosages, duration of treatment, limitations in certain age groups, the need for pretreatment laboratory tests, interactions with other drugs, and contraindications). Replies were scored from 0 to 100 according to the treatment guidelines of both the North American Society for Pediatric Gastroenterology, Hepatology and Nutrition and the European Society of Pediatric Gastroenterology, Hepatology and Nutrition. In addition, 2 questions dealt with the subjective efficacy of the drug and its adverse events. The knowledge scores were 62% and 51% in the pediatricians and family practitioners, respectively. Other major findings were as follows: 1) 40% of pediatricians and 65% of family practitioners do not prescribe the recommended dose of cisapride, 2) 6% of pediatricians and 42% of family practitioners prescribe cisapride for infantile colic, 3) only 50% of pediatricians and 22% of family practitioners were aware of possible interactions with macrolides, and 4) only 31% of pediatricians and 54% of family practitioners were aware that cisapride might cause prolongation of the QT interval. Only minor adverse events were reported. The knowledge of both pediatricians and family practitioners in the use of cisapride in children is suboptimal. It is essential to improve the education of community physicians to reduce the potential for adverse events arising from the misuse of this prokinetic agent.

Descriptors: Gastroesophageal reflux. Drug therapy. Children. Physicians. Health professionals. Pediatricians. Knowledge level. Drug use. Adverse effects. Questionnaires
ACCN: SIDS-06229

Ferng SF, Lee LW.
Indoor air quality assessment of daycare facilities with carbon dioxide, temperature, and humidity as indicators.
J Environ Health 2002 Nov;65(4):14–18, 22.

Poor indoor air quality (IAQ) in daycare facilities affects both attending children and care providers. Incident rates of upper-respiratory-tract infections have been reported to be higher in children who attend daycare. Excessive carbon dioxide (CO2) exposure can cause several health effects and even sudden infant death. For this study, 26 facilities were randomly selected in a midwestern county of the United States. CO2, room temperature, and relative humidity were used as indicators for IAQ and comfort levels. These IAQ parameters were continuously monitored for eight hours at each facility by a direct-reading instrument that was calibrated before each measurement. More than 50 percent of the facilities had an average CO2 level over the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) standard of 1,000 parts per million (ppm). For temperature and relative humidity, respectively, 42.3 percent and 15.4 percent of facilities were outside of the ASHRAE-recommended comfort zones. The naptime average CO2 level was about 117 ppm higher than the non-nap-time level. The increment of the nap-time CO2 level in the sleeping-only room over the level in multipurpose rooms was statistically significant ($p < .05$). According to stepwise multiple regression analysis, naptime CO2 level was predicted by CO2 level before occupancy, nap-time average temperature, carbon monoxide, and child density ($R2 = .83$). It is recommended that an appropriate IAQ standard for daycare facilities be established and that children should not be placed in a completely isolated room during nap-time.

Descriptors: Child care centers. Air quality. Air pollution. Carbon dioxide. Room temperature. Child welfare. Children. Upper respiratory tract infections.
ACCN: SIDS-06201

Horne RS, Ferens D, et al.
Effects of maternal tobacco smoking, sleeping position, and sleep state on arousal in healthy term infants.
Arch Dis Child Fetal Neonatal Ed 2002 Sep;87(2):F100–F105.

Objectives: To investigate whether a history of maternal tobacco smoking affected the maturation of arousal responses and whether sleeping position and infant age alters these relations. *Design*: Healthy term infants (13 born to mothers who did not smoke and 11 to mothers who smoked during pregnancy) were studied using daytime polysomnography on three occasions: (a) two to three weeks after birth, (b) two to three months after birth, and (c) five to six months after birth. Multiple measurements of arousal threshold in response to air jet stimulation were made in both active sleep (AS) and quiet sleep (QS) when infants slept both prone and supine. *Results*: Maternal smoking significantly elevated arousal threshold in QS when infants slept supine at 2-3 months of age ($p<0.05$). Infants of smoking mothers also had fewer spontaneous arousals from QS at 2-3 months in both prone ($p<0.05$) and supine ($p<0.001$) sleeping positions. In infants of non-smoking mothers, arousal thresholds were elevated in the prone position in AS at 2-3 months ($p<0.01$) and QS at 2-3 weeks ($p<0.05$) and 2-3 months ($p<0.001$). *Conclusions*: Maternal tobacco smoking significantly impairs both stimulus induced and spontaneous arousal from QS when infants sleep in the supine position, at the age when the incidence of sudden infant death syndrome is highest.

Descriptors: Smoking. Smoking during pregnancy. Antenatal exposure. Arousal response. Infants. Sleep position. Prone position. Cotinine. Longitudinal studies.
ACCN: SIDS-06131

Crume T, DiGuiseppi C, et al.
Underascertainment of child maltreatment fatalities by death certificates: 1990–1998.
Pediatrics 2002 Aug;110(2 Pt 1):e18.

Child fatality review teams have emerged across the United States in the past decade to address the concern that systems of child protection, law enforcement, criminal justice, and medicine do not adequately assess the circumstances surrounding child fatality as a result of maltreatment. The authors compared data collected by a multidisciplinary child fatality review team with vital records for all children who were aged birth to 16 years and died in Colorado between January 1, 1990, and December 1, 1998. Odds ratios and 95% confidence intervals for ascertainment by the death certificate were estimated using logistic regression. Results showed that only half of the children who died as a result of maltreatment had death certificates that were coded consistently with maltreatment. Black race and female gender were associated with higher ascertainment, whereas death in a rural county was associated with lower ascertainment. Deaths resulting from violent causes (e.g., shaking, blunt force trauma, striking) were more likely to be ascertained than those that involved acts of omission (e.g., neglect and abandonment, drowning, fire). The most common perpetrators of maltreatment were parents. However, maltreatment by an unrelated perpetrator was 8.71 times (95% confidence interval: 3.52–21.55) more likely to be ascertained than maltreatment by a parent. In conclusion, the degree of under ascertainment found in this study is of concern because most national estimates of child maltreatment fatality in the United States are derived from coding on death certificates. In addition, the patterns recognized in this study raise concern about systematic under ascertainment that may affect children of specific sociodemographic groups.

Descriptors: Child abuse. Death certificates. Vital statistics. Mortality. Infant mortality. Data collection. Public health. Cause of death. Child welfare. Battered child syndrome. Child advocacy. Infanticide.
ACCN: SIDS-06108

McMartin KI, Platt MS, et al.
Lung tissue concentrations of nicotine in sudden infant death syndrome (SIDS).
J Pediatr 2002 Feb;140(2):205–209.

The objective of this study was to compare lung concentrations of nicotine and cotinine in cases of sudden infant death syndrome (SIDS) and controls. The authors measured lung tissue concentrations of nicotine and cotinine in SIDS (n=44) and non-SIDS cases (n=29) stratified according to household smoking status. Results showed that when all the SIDS and non-SIDS cases were compared regardless of smoking status, there was a significantly higher nicotine concentration in the SIDS cases than in the non-SIDS cases, (P=.0001). Upon stratifying for smoking status, there was a nonsignificant trend toward more nicotine in SIDS versus non-SIDS lungs that had come from a reported smoking environment. In the nonsmoking group, there were significantly

higher nicotine concentrations in SIDS than non-SIDS cases (P=.001). It was concluded that children who died from SIDS tended to have higher concentrations of nicotine in their lungs than control children, regardless of whether smoking was reported. These results are based on an objective, biochemical test rather than history, and they further support the relationship between environmental tobacco smoke and the risk of SIDS.

Descriptors: SIDS. Sudden infant death syndrome. Nicotine. Cotinine. Lungs. Autopsy findings.
ACCN: SIDS-06082

Franco P, Lipshutz W, et al.
Decreased arousals in infants who sleep with the face covered by bedclothes.
Pediatrics 2002 Jun;109(6):1112–1117.

The risk of becoming a victim of sudden infant death syndrome is increased in infants who sleep with their face under bedding items. The present study was designed to evaluate auditory arousal thresholds of infants who sleep with their face covered by bedclothes. Twenty healthy infants with a median age of 11.5 weeks (range: 4–22 weeks) were recorded polygraphically for 1 night. Although they slept in their usual supine position, a bed sheet was placed over their face for 60 minutes. Fifteen of the 20 infants were chosen at random and were exposed to white noises of increasing intensities to determine their auditory arousal thresholds. All infants were challenged with the face covered and with the face free during both rapid eye movement (REM) and non-REM (NREM) sleep. Seven infants were first challenged with the face covered, and 8 were challenged with the face free. The following variables were recorded simultaneously: electroencephalogram, breathing and heart rates, and rectal and pericephalic temperatures. In 5 infants who were not exposed to the auditory challenges, end tidal CO2 was recorded for 30 minutes while sleeping with the face covered. Results showed during REM sleep, arousals occurred for significantly more intense auditory stimuli when the infant's face was covered than when free. No significant difference was seen in NREM sleep. Compared with the face-free periods, the face-covered sleep periods were characterized by greater rectal and pericephalic temperatures, a greater density of body movements, and a decrease in NREM sleep. Respiratory frequency was increased during the face-covered periods in both REM and NREM sleep. No differences were seen in the frequency or duration of apnea. There was a tendency for heart rate to increase during both sleep stages when the face was covered, compared with the face-free periods, but the changes were not statistically significant. A positive correlation was found between pericephalic temperatures and arousal thresholds (r = 0.60) during REM sleep. End tidal CO2 values increased when the face was covered, reaching a maximum value during the first 5 minutes of the experiment. No fall in oxygen saturation was seen. In conclusion, covering the infant's face with a bed sheet was associated with a significant increase in auditory arousal threshold. The finding could be related to an elevation in temperatures within the infant's microenvironment.

Descriptors: SIDS. Arousal response. Bedding. Covers overhead. Auditory stimulation. Electroencephalography. Heart rate. Temperature. REM sleep.
ACCN: SIDS-06075

Buchino JJ, Corey TS, Montgomery V.
Sudden unexpected death in hospitalized children.
J Pediatr 2002 Apr;140(4):461–465.

The incidence of sudden, unexpected death in hospitalized children is unknown. This is due not only to the lack of a precise definition but also to a lack of a uniform manner for classifying and reporting hospital deaths. Based on the authors' collective experience in pathology, forensic pathology, pediatric critical care, and an informal survey of several pediatric pathologists the authors estimate that a children's hospital of 200 beds or greater would have 2 to 4 such deaths per year. The authors discuss the causes of sudden, unexpected death in hospitalized children and investigative procedures to consider when such an event occurs. In addition, possible preventative measures are discussed.

Descriptors: Sudden unexpected death. Hospitalization. Children. Infants. Death classification. Death investigations. Guidelines. Prevention.
ACCN: SIDS-06011

Cifuentes J, Bronstein J, et al.
Mortality in low birth weight infants according to level of neonatal care at hospital of birth.
Pediatrics 2002 May;109(5):745–751.

In 1976, the Committee on Perinatal Health recommended that hospitals with neontatal intensive care units (NICU) or intermediate NICUs transfer high-risk mothers and infants that weigh < 2000 g to a regional NICU. This standard was based on expert opinion and has not been validated carefully. This study evaluated the effect of NICU level and patient volume at the hospital of birth on neonatal mortality of infants with a birth weight (BW) of < 2000 g. Methods: birth certificates of 16,732 singleton infants who had a BW of < 2000 g and were born in nonfederal hospitals in California in 1992 and 1993 were linked to death certificates and to discharge abstracts. The hospitals were classified by the level of NICU: no NICU, no intensive care; intermediate NICU, intermediate intensive care; community NICU, expanded intermediate intensive care; and regional NICU, tertiary intensive care. A logistic regression model that controlled for demographic risks, diagnoses, transfer, average NICU census, and NICU level was estimated using death within the first 28 days or first year of life if continuously hospitalized as the main outcome measure. Results: compared with birth in a hospital with a regional NICU, risk-adjusted mortality of infants with BW of < 2000 g was higher when birth occurred in hospitals with no NICU (odds ratio [OR]: 2.38; 95% confidence interval [CI]: 1.81-3.13), an intermediate NICU (OR: 1.92; 95% CI: 1.44-2.54), or a small (average census < 15) community NICU (OR: 1.42; 95% CI: 1.14-1.76). Risk-adjusted mortality for infants who were born in hospitals with a large (average census greater than or equal to 15) community NICU was not statisically different compared with those with a regional NICU (OR: 1.11; 95% CI: 0.87-1.43). Except for large community NICUs, all of these ORs are larger when the data are restricted to infants with BW of < 1500 g or BW of < 1250 g and smaller for BW between 1250 g and 1999 g and 1500 g and 1999 g. For large community NICUs, the results are similar for the smaller BW intervals and significant only for the larger BW interval. Conclusions: these results support the recommendation that hospitals with no NICU or intermediate NICUs transfer high-risk mothers with estimated fetal weight of < 2000 g to a regional NICU. For infants with BW of < 2000 g, birth at a hospital with a regional NICU is associated with a lower risk-adjusted mortality than birth at a hospital with no NICU, intermediate NICU of any size, or small community NICU. Subsequent neonatal transfer to a regional NICU only mariginally decreases the disadvantage of birth at these hospitals. The evidence for the few hospitals with large community NICUs is mixed. Although the data point to higher mortality in large community NICUs, they are not conclusive and additional study is needed on the mortality effects of large community NICUs. Greater efforts should be made to deliver infants with expected BW of < 2000 g at hospitals with regional NICUs.

Descriptors: Infants. Newborns. Low birth weight. Neonatal intensive care units. Hospitals. Quality of care.
ACCN: SIDS-06003

Malloy MH.
Trends in postneonatal aspiration deaths and reclassification of sudden infant death syndrome: Impact of the "Back to Sleep" program.
Pediatrics 2002 Apr;109(4):661–665.

The introduction of the "Back to Sleep" campaign for the prevention of sudden infant death syndrome (SIDS) brought with it concern that there might be an increase in the incidence of aspiration-related deaths. The objective of this analysis was to describe the trends in postneonatal mortality and proportionate mortality ratios for the United States for the years 1991 to 1996 for aspiration-related deaths and other causes to which a SIDS death could conceivably be reclassified. Linked birth and infant death vital statistic files for the United States were used for the years 1991, 1995, and 1996. US Vital Statistic mortality files for the years 1992, 1993, and 1994 were [not] used because of the absence of linked files for those years. Results showed the overall postneonatal mortality rate between 1991 and 1996 declined 21.9 percent, whereas the SIDS rate declined 38.9 percent. The proportion of the postneonatal mortality (PNPMR) contributed by SIDS declined from 37.1 percent in 1991 to 28.8 percent in 1996. There was no significant increase in the PNPMR for aspiration, asphyxia, or respiratory failure. There was, however, a significant increase in the PNPMR for suffocation in bed or cradle from 0.9 to 1.3. It was concluded that these data show no evidence of an increased risk of death from aspiration as a result of the "Back to Sleep" program. Although there has been an increase in the proportion of postneonatal mortality attributable to suffocation, this represents a very small proportion of postneonatal mortality and thus, potentially a very small number of SIDS deaths reclassified as suffocation.

Descriptors: SIDS. Back to Sleep Campaign. Supine position. Aspiration. Risk Factors. Asphyxia. Death classification.
ACCN: SIDS-06001

Grossman DC, Baldwin LM, et al.
Disparities in infant health among American Indians and Alaska Natives in US metropolitan areas.
Pediatrics 2002 Apr;109(4):627–633.

The objective of this study was to determine geographic variation in urban American Indian and Alaska Native (AI/AN) rates of infant mortality, low birth weight, prenatal care use, and maternal-child health care service availability. This was a retrospective cohort study using data from the 1989 to 1991 birth-death linked database from the National Center for Health Statistics. The authors examined births from metropolitan areas with a minimum of 300 AI/AN births during the study period. Key outcomes of interest included rates of low birth weight, neonatal mortality, postneonatal mortality, and women receiving inadequate prenatal care using the modified Kessner index. To determine the type of health services tailored to AI/AN mothers residing in these urban areas, we conducted a telephone survey of the 36 urban Indian health programs operating in 1997 using a semistructed survey. Items in the survey included questions about the availability of prenatal and infant health care. Results showed that during the 1989 to 1991 study period, there were 72,730 singleton births to AI/AN mothers and/or fathers residing in urban areas, representing 49 percent of all AI/AN births in the United States. Overall 14.4 percent of urban AI/AN births were to women who received inadequate care during pregnancy, 5.7 percent of pregnancies resulted in low birth weight infants, and 11.0 infants died per 1000 live births. Death rates for the neonatal period (5.5 per 1000 births) and postneonatal period (5.4 per 1000 births) were similar. Marked disparity in these indicators exists between pregnancies to AI/AN and white women. Among the 54 metropolitan areas, 46 had a rate ratio (AI/AN: white) for inadequate care of greater than or equal to 1.5 (range: 0.9-8.5). The mean rate ratios for neonatal and postneonatal mortality were 1.6 (range 0.3-4.0) and 2.0 (range: 0.5-5.5). There was also considerable geographic variation of AI/AN mortality rates between metropolitan areas in all of the outcomes studied. All of the 20 metropolitan areas with the highest birth counts had some type of direct medical care or outreach service available from an urban clinic targeted toward AI/AN patients. It was concluded that considerable variation also exists among rates of AI/ANs between metropolitan areas. Disparity exists in rates of perinatal outcomes between AI/ANs and whites living in the same metropolitan areas. Although AI/AN urban health programs exist in most cities with large birthcounts, it seems that many have inadequate resources to meet existing needs to improve perinatal outcomes and infant health.

Descriptors: Native Americans. Infant mortality. Mortality rates. Alaska. Alaska natives. Population-based study. Health services. Socioeconomic factors. Ethnic groups.
ACCN: SIDS-06000

O'Donnell J, Finer NN, et al.
Role of L-carnitine in apnea of prematurity: A randomized, controlled trial.
Pediatrics 2002 Apr;109(4):622–623.

Carnitine is thought to be a conditionally essential biological cofactor for premature infants. A preliminary study suggested that carnitine could significantly reduce apnea of prematurity. The objective of this study was to evaluate critically the role of carnitine in idiopathic apnea of prematurity and to determine whether the use of carnitine would facilitate discontinuation of mechanical ventilatory support, shorten the duration of ventilatory support, and reduce the amount of time that such infants are exposed to both mechanical ventilation and oxygen. The authors also wanted to determine the effects of supplemental carnitine on weight gain, time to regain birth weight, time to achieve full enteral feedings, and length of hospital stay. A prospective, randomized, blinded trial was conducted on 44 preterm infants who were from the same neonatal intensive care unit and who were less than or equal to 32 weeks' gestational age with a postnatal age <48 hours and a birth weight <1500 g and required total parenteral nutrition (TPN). Infants were randomized to receive carnitine supplementation or placebo without crossover. Carnitine-supplemented infants received 30 mg /kg/d carnitine in their TPN until they were tolerating 120 mL/kg/d enteral feedings, and then they received 30 mg/kg/d oral carnitine. The placebo group received TPN without supplemental carnitine; when they tolerated 120 mL/kg/d enteral feedings they received an oral placebo. The 2 groups continued on their respective supplemental

carnitine or placebo until 34 weeks' adjusted age, at which time the study period was completed. Twelve-hour cardiorespiratorygrams to record heart rate, respiratory impedance, and oxygen saturation, and a nasal thermistor to detect expiratory airflow were performed every 4 days on 3 occasions and at 30 and 34 weeks' adjusted age. Plasma carnitine levels were measured at day 14. Results indicate there were no significant differences between the 2 groups in the occurrence of apnea as detected by cardiorespiratorygram or nursing observation. There were no significant differences between the groups in regard to total days on ventilator, days of nasal continuous positive airway pressure, time to regain birth weight, time to reach enteral feedings of 120 mL/kg/d, discharge weight, adjusted age at discharge, need for oxygen at 28 days' and 36 weeks' adjusted age, or length of stay. The plasma carnitine level was a median of 15.5 umol/L (range: 7.6-30.5) for the placebo infant's compated with a median of 195.3 umol/L (range: 71.7-343.6) for the carnitine infants. In this blinded, randomized, placebo-controlled study, it was concluded that infants who received supplemental carnitine did not demonstrate any reduction in apnea of prematurity, ventilator or nasal continuous positive airway pressure days, or the need for supplemental oxygen therapy. Although carnitine may be of significant nutritional benefit for very low birth weight infants, this study did not support its use to reduce apnea of prematurity or decrease dependence on mechanical ventilation.

Descriptors: Apnea. Infants. Premature infants. L-carnitine. Drug therapy. Diet therapy. Weight gain.
ACCN: SIDS-05999

Stiffman MN, Hnitzer PG, et al.
Household composition and risk of fatal child maltreatment.
Pediatrics 2002 Apr;109(4):615–21.

Approximately 2,000 children die annually in the United States from maltreatment. Although maternal and child risk factors for child abuse have been identified, the role of household composition has not been well established. The objective of this study was to evaluate household composition as a risk factor for fatal child maltreatment. *Methodology:* Population-based, case-control study using data from the Missouri Child Fatality Review Panel system, 1992–1994. Households were categorized based on adult residents' relationship to the deceased child. Cases were all maltreatment injury deaths among children <5 years old. Controls were randomly selected from natural-cause deaths during the same period and frequency-matched to cases on age. The main outcome measure was maltreatment death. *Results:* children residing in households with adults unrelated to them were 8 times more likely to die of maltreatment than children in households with 2 biological parents (adjusted odds ratio [aOR]: 8.8; 95 percent confidence interval [CI]: 3.6-21.5). Risk of maltreatment death also was elevated for children residing with step, foster, or adoptive parents (aOR: 4.7; 95 percent CI: 1.6-12.0), and in households with other adult relatives present (aOR: 2.2; 95 percent CI: 1.1-4.5). Risk of maltreatment death was not increased for children living with only 1 biological parent (aOR: 1.1; 95 percent CI: 0.8-2.0). It was concluded that children living in households with 1 or more male adults that are not related to them are at increased risk for maltreatment injury death. This risk is not elevated for children living with a single parent, as long as no other adults live in the home.

Descriptors: Child abuse. Risk Factors. Housing. Children. Adults. Homicide. Regression analysis.
ACCN: SIDS-05998

Pollack HA, Frohna, JG.
Infant sleep placement after the Back to Sleep Campaign.
Pediatrics 2002 Apr;109(4):608–14.

The Back to Sleep Campaign has been credited with recent declines in the incidence of sudden infant death syndrome. Using survey data for the 1996-1998 birth cohorts, this epidemiologic study examines infant sleep position in a large, population-based sample. Data concerning infant sleep position were drawn from the 1996-1998 Pregnancy Risk Assessment Monitoring System for 15 states. Weighted multiple logistic regression analysis was used to examine correlates of infant sleep position. The prevalence of prone infant sleeping significantly declined between 1996 and 1998 (adjusted odds ratio [AOR] = 0.70; 95 percent confidence interval [CI] = [0.63, 078]). African Americans were more likely than non-Hispanic whites to sleep prone, (AOR = 1.45; 95 percent CI = 1.33, 1.59), and were less likely to sleep supine (AOR = 0.52; 95 percent CI = 0.48, 0.57).

Hispanic/Latinos were less likely overall than non-Hispanic whites to sleep prone (AOR = 0.81; 95 percent CI = 0.69, 0.95), but were also less likely to sleep supine (AOR = 0.78: 95 percent CI = 0.69, 0.87). Adherence to sleep position recommended by the American Academy of Pediatrics increased sharply among Hispanic/Latino infants. Very low birth weight infants and infants in larger families were less likely to sleep in the recommended supine position. Infants born between 1001 and 1500 g (AOR = 0.57; 95 percent CI = 0.45, 0.72) were especially unlikely to sleep supine. Infants in households with more than 3 other children (AOR = 1.72; 95 percent CI = 1.08, 2.74) were more likely to sleep prone. Conclusions showed the prevalence of supine infant sleep increased between 1996 and 1998. Low adherence to sleep position recommendations of the American Academy of Pediatrics among African Americans, very low birth weight infants, and infants in large families remain public health concerns.

Descriptors: Infants. Sleep position. African Americans. Hispanic Americans. Hispanics. Very low birth weight. SIDS. Risk Factors. High risk families. Family size. Prone position. Supine position.
ACCN: SIDS-05997

Corinna P, Sprodowski N, Bohnhurst B, Silny J, Poets C.
Gastroesophageal reflux and apnea of prematurity: No temporal relationship.
Pediatrics 2002 Jan;109(1):8–11.

A relationship between gastroesophageal reflux (GER) and apnea of prematurity (APO) has long been suspected but is difficult to prove because most GER in this age group is nonacidic and thus undetectable by pH monitoring, the current standard for GER detection. The new multiple intraluminal impedance (MII) technique allows pH-independent relfux detection via changes in impedance caused by liquid bolus inside the esophagus. We used this technique to investigate whether there is a temporal relationship between GER and AOP and whether GER occurs predominatly before a cardiorespiratory (CR) event. Nineteen infants with AOP (median gestational age at birth: 30 weeks; range: 24-34; age at study: 26 days [13-93]) underwent 20 6-hr recordings of MII, breathing movements, nasal airflow, electrocardiogram, pulse oximeter saturation, and pulse waveforms. MII signals were analyzed, indepedent of CR signals, for reflux episodes (RE), defined as a fall in impedance in at least 2 most distal channels. CR signals were analyzed for CR events, i.e., apneas of greater than or equal to 4-second duration, desaturations of less than or equal to 80 percent, and falls in heart rate to less than or equal to 100 beats per min. A temporal relationship between an RE and a CR event was considered present if both commenced within 20 seconds of each other. Results showed there were 2039 apneas (median: 67; range: 10-346), 188 desaturations (6; 0-25), 44 bradycardias (0;0-24), and 524 RE (25;8-62). The frequency of apnea occurring within ± 20 seconds of an RE was not significantly different from that during reflux-free epochs (0.19/min [0.00-0.85] vs 0.25/min [0.00-1.15]; the same was true for desaturations and bradycardias. Also, RE occurred similarly often within 20 seconds before as after an apnea (2;0-14 vs 1;0-17). A minority of apneas (3.5%) was associated with an RE reaching the pharyngeal level; of these, significantly more (45 vs 26; median 1; 0-10 vs 1;0-7) occurred after rather than before an RE. In conclusion, both CR events and GER were common in these infants but, with few exceptions, did not seem to be temporally related.

Descriptors: Infants. Premature infants. Apnea. Gastroesophageal reflux. Gestational age. Bradycardia. Oxygen desaturation.
ACCN: SIDS-05975

Overpeck MD, Brenner RA, et al.
National under ascertainment of sudden unexpected infant deaths associated with deaths of unknown cause.
Pediatrics 2002 Feb109(2, Part 1):274–283.

The aim of this study was to investigate under ascertainment of unexpected infant deaths at the national level as a result of probable classification as attributable to unknown cause. Using linked birth and death certificates for all US birth cohorts from 1983-1991 and 1995-1996, the authors identified 53,470 sudden infant death syndrome (SIDS) fatalities, 9,071 unintentional injury deaths, 3,473 injury deaths classified with intentional or suspicious intent, and 8,097 deaths with unknown underlying cause. For these deaths, they compared relative

risks (RRs) for maternal and infant variables available on birth certificates known to be predictive of SIDS, unintentional injury, and homicides. Variables available on death certificates were compared for unlinked and linked records. Factors related to state and national management of cases pending final cause determination were reviewed. Results show that for deaths from unknown cause, rates were consistently high among the same risk groups that have been shown to be at increased risk for SIDS, unintentional injury, and homicides. For most risk factors, RRs for deaths attributable to unknown causes were somewhat lower than for RRs for intentional/suspicious injury deaths but higher than for SIDS or unintentional injury, indicating combined contributions from all causes. For example, age at death from unknown cause includes RRs that more strongly resemble patterns of intentional/suspicious injuries than SIDS or unintentional injury. Deaths from unknown cause were more likely to occur during the first week of life for unattended births occurring outside clinical settings or when birth certificates were not found, similar to intentional/suspicious injury deaths. It was concluded that risk profiles indicate that deaths of unknown cause are likely to represent a mixture of unexpected deaths. The process for determination of cause of unexpected death affects national under ascertainment of SIDS and injury deaths. Better coordination among child fatality review teams and local, state, and national officials should reduce under ascertainment and improve documentation of circumstances surrounding deaths for prevention efforts.

Descriptors: SIDS. Cause of death. Infants. Homicide. Risk factors. Child death review. Infanticide. Injuries. Infant death. Death investigations. Death certification. Birth certificates. Death certificates. Autopsy results.
ACCN: SIDS-05962

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