

**Search question:** What can be done on Neonatal Units to develop immature brains?

**Date of search:** 6/4/2016

**Search performed by:** Mathew Stone

**Sources searched:** MEDLINE and EMBASE

**Search strategy:**

38. Medline; (brain\* ADJ2 (immatur\* OR develop\*)).ti,ab; 32585 results.
39. Medline; INTENSIVE CARE UNITS, NEONATAL/; 10661 results.
40. Medline; (neonatal ADJ2 unit\*).ti,ab; 14186 results.
41. Medline; NICU\*.ti,ab; 6745 results.
42. Medline; 39 OR 40 OR 41; 20996 results.
43. Medline; "randomized controlled trial".pt; 408068 results.
44. Medline; randomized.af; 654430 results.
45. Medline; placebo.af; 172184 results.
46. Medline; exp THERAPEUTICS/; 4924859 results.
47. Medline; therap\*.ti,ab; 2054455 results.
48. Medline; exp BREAST FEEDING/; 31020 results.
49. Medline; ("breast feed\*" OR breastfeed\*).ti,ab; 26209 results.
50. Medline; care.ti,ab; 986070 results.
51. Medline; MEDLINE.ti,ab; 70955 results.
52. Medline; (systematic AND review).ti,ab; 85490 results.
53. Medline; meta-analysis.pt; 62522 results.
54. Medline; cochrane.jw; 11882 results.
55. Medline; 43 OR 44 OR 45 OR 46 OR 47 OR 48 OR 49 OR 50 OR 51 OR 52 OR 53 OR 54; 7019493 results.
56. Medline; 38 AND 42 AND 55; 86 results.
57. Medline; 56 [Limit to: Humans]; 77 results.
58. EMBASE; (brain\* ADJ2 (immatur\* OR develop\*)).ti,ab; 33231 results.
59. EMBASE; INTENSIVE CARE UNITS, NEONATAL/; 19975 results.
60. EMBASE; (neonatal ADJ2 unit\*).ti,ab; 4294 results.
61. EMBASE; NICU\*.ti,ab; 11175 results.
62. EMBASE; 59 OR 60 OR 61; 29112 results.
63. EMBASE; 58 AND 62; 142 results.
64. EMBASE; 63 [Limit to: Human and (Clinical Queries Reviews best balance of sensitivity and specificity or Therapy maximizes sensitivity)]; 60 results.
- 65. Medline, EMBASE; Duplicate filtered: [56], [63]; 137 results (of which 32 were selected as potentially relevant to the search question).**

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**Title:** Effect of structured neonatal physiotherapy intervention on neurobehavior of moderate to late preterm infants-a randomized controlled trial

**Citation:** Physiotherapy (United Kingdom), May 2015, vol./is. 101/(eS745), 0031-9406 (May 2015)

**Author(s):** Khurana S., Rao B.K., Lewis L.E., Kumaran D.S., Kamath A.

**Language:** English

**Abstract:** Background: Moderate to late preterm births contribute approximately 85% to the global preterm births. Historically these infants were considered typically healthy as compared to very preterm. On contrary, recent studies have proved that they are at high risk of developing cerebral palsy, developmental coordination disorder, mental retardation and other intellectual disabilities. In the process of intrauterine development, last trimester plays a crucial phase for brain development and it depends on the complex interplay between genes and environmental experiences. Preterm infants are often deprived of this phase of development which could be provided in the extra uterine environment. Hence providing a developmental program in the form of structured neonatal physiotherapy intervention may ease their NICU stay and may help in preventing long term neurodevelopmental delays. Purpose: The purpose of this study was to evaluate the effect of structured neonatal physiotherapy intervention on neurobehavior of moderate to late preterm infants. Methods: Study was approved by institutional ethical committee (IEC), Manipal University. Thirty one infants born between 33 week 0/7 days to 36 week 6/7 days were screened and written informed consent was taken from parents. Based on inclusion criteria, 26 were included and recruited into the study. Infants with congenital heart disease (n = 2), inborn error of metabolism (n = 1) and parents who refused to give consent (n = 3) were excluded. A complete baseline assessment was performed using neurobehavioral assessment of preterm infant (NAPI) scale and infants were assigned to control and experimental group through block randomization. Control group continued to receive standard care (routine medical and nursing care) whereas experimental group underwent treatment based on American Physical Therapy recommendations (joint range of motion exercise, joint compressions, self-calming activities, visual stimulation using black and white cards, massage, vestibular stimulation, positioning, swaddling, Kangaroo mother care, music therapy) for a period of 15 sessions. Entire therapy sessions were made familiar to the infant's mother. Infants were reassessed at the time of discharge from the hospital using NAPI. Data was analyzed using Mann-Whitney U test. Results: 26 infants (13 intervention; 13 control) were analyzed for all the components of NAPI. Scarf sign (p = 0.011), motor development & vigor (p < 0.001), alertness & orientation (p = 0.001) components of NAPI showed statistically significant difference between groups. Other components such as popliteal angle, irritability and percent asleep did not show statistically significant difference though they were found to be clinically significant. Conclusion(s): This study suggests that structured neonatal physiotherapy intervention can help in promoting the behavioral stability and motor organization of moderate to late preterm infants in their neonatal period. Implications: Structured neonatal physiotherapy intervention should be made as a routine standard care in all NICU's to promote the better motor development of these infants.

**Publication Type:** Journal: Conference Abstract

**Source:** EMBASE

**Full Text:**

Available from *Elsevier* in [Physiotherapy](#)

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**Title:** Influence of Infant Aquatics on the neural development of premature infants

**Citation:** Journal of Molecular Neuroscience, August 2014, vol./is. 53/(S13), 0895-8696 (August 2014)

**Author(s):** Barmatz C., Lazitz-Dor A., Casher H., Mekadesh K., Morag I., Bar-Yosef O., Friedman H.

**Language:** English

**Abstract:** Background: Infant Aquatics have been found to benefit infant health, being based on the physical properties of water and their physiologic outcomes on the motor, cardio-vascular, and respiratory functions. Preterm infants, a continuously growing population, are at risk for neurodevelopment impairments ranging from Minor Neurological Deficits to Cerebral Palsy, mainly due to PeriVentricular Leucomalacia. Early detection and intervention for developmental impairments is crucial. Infant's spontaneous movements reflect neurodevelopment stages and abnormalities long before they are fully pronounced. Infant Aquatics adapted for young premature infants may strengthen function of autonomic nervous system, and advance brain development. The objective of this research is to examine the influence of Infant Aquatics on the neural development of preterm infants, as reflected by their spontaneous movements and extended developmental scales. Results: 50 premature infants are video recorded to assess their spontaneous random movements till they are 53 wPMA. Infant Aquatics is conducted in NICU and hydrotherapy pool (SMC Israel). Babies are placed in warm water in vertical and horizontal positions, supported by the buoyancy of water. Working technique employed exercises from "Halliwick", "Watsu" and "Jahara" approaches, modified for premature infants, including passive mobilization, combined rotations and more. Preliminary results show improved eye contact in vertical position and improved spontaneous movements' muscle tone and range of motion in supine float. Better feeding and improved sleep patterns were reported by the parents. Intervention and developmental tests will be extended till premature infants reach 12 months. Conclusions: Studies proved that early intervention may minimize developmental deficit for infants at risk. Our preliminary results show that early initiation of Infant Aquatics can improve motor and cognitive outcomes of preterm infants.

**Publication Type:** Journal: Conference Abstract

**Source:** EMBASE

**Full Text:**

Available from *ProQuest* in [Journal of Molecular Neuroscience; MN](#)

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**Title:** Effects of combined use of non-nutritive sucking, oral sucrose, and facilitated tucking on infant behavioural states across heel-stick procedures: a prospective, randomised controlled trial.

**Citation:** International journal of nursing studies, Jul 2013, vol. 50, no. 7, p. 883-894, 1873-491X (July 2013)

**Author(s):** Liaw, Jen-Jiuan, Yang, Luke, Lee, Chuen-Ming, Fan, Hueng-Chuen, Chang, Yue-Cune, Cheng, Li-Ping

**Abstract:** Pain and stress agitate preterm infants, interrupting their sleep. Frequent high arousal states may affect infants' brain development and illness recovery. Preserving infants' sleep and relieving their pain during painful procedures are both important for their health. To compare the effectiveness of different combinations of non-nutritive sucking (sucking), oral sucrose, and facilitated tucking (tucking) with routine care on infants' sleep-wake states before, during, and after heel-stick procedures. Prospective, randomised controlled trial. Level III Neonatal Intensive Care Unit in Taipei. A convenience sample of 110 infants (gestational age 26.4-37 weeks) needing heel sticks were randomly assigned to five combinations of non-pharmacological treatments: sucking-oral sucrose-tucking; sucking-oral sucrose; oral sucrose-tucking; sucking-tucking; and routine care. Infant states, measured by a state-coding scheme, included quiet sleep, active sleep, transition, quiet awake, active awake, and fussing or crying. All states were recorded at 1-min intervals during four phases: baseline, intervention, heel-stick procedures, and recovery. Infants receiving sucking-oral sucrose-tucking or sucking-oral sucrose experienced 52.8% ( $p=0.023$ ) and 42.6% ( $p=0.063$ ) more quiet-sleep occurrences than those receiving routine care after adjusting for phase, baseline states, non-treatment sucking during baseline and recovery, positioning, and infants' characteristics. Infants receiving oral sucrose-tucking, sucking-oral sucrose, sucking-oral sucrose-tucking, and sucking-tucking experienced 77.3% ( $p<0.001$ ), 72.1% ( $p=0.008$ ), 51.5% ( $p=0.017$ ), and 33.0% ( $p=0.105$ ) fewer occurrences of fussing or crying, respectively, than those receiving routine care after adjusting for related factors. The four treatment combinations differentially reduced infants' high arousal across heel-stick procedures. The combined use of oral sucrose-tucking, sucking-oral sucrose, and sucking-oral sucrose-tucking more effectively reduced occurrences of infant fussing or crying than routine care. Treatment combinations of sucking-oral sucrose-tucking and sucking-oral sucrose also better facilitated infants' sleep than routine care. To preserve infants' sleep, clinicians should use combinations of non-nutritive sucking, oral sucrose, and facilitated tucking to reduce agitation during painful procedures. Copyright © 2012 Elsevier Ltd. All rights reserved.

**Source:** Medline

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**Title:** Comforting touch in the very preterm hospitalized infant: an integrative review.

**Citation:** Advances in neonatal care : official journal of the National Association of Neonatal Nurses, Dec 2012, vol. 12, no. 6, p. 349-365, 1536-0911 (December 2012)

**Author(s):** Smith, Joan Renaud

**Abstract:** Infants born prematurely lose the protection of the uterus at a time of fetal development when the brain is growing and organizing exponentially. Environmental factors such as stress in the neonatal intensive care unit (NICU) may play a role in altered brain maturation and neurobehavioral outcomes. Strategies aimed at reducing stress and promoting infant well-being are essential to improve neurologic and behavioral outcomes. Infant massage is a developmentally supported strategy aimed at promoting relaxation. However, despite the well-documented benefits of infant massage, infants born very preterm ( $\leq 30$  weeks' gestation) are often excluded from these studies, leaving neonatal clinicians and families without guidance in how to provide a stress-reducing supplemental touch. Much of the touch in the NICU is a procedural touch, and infants born very preterm often miss out on comforting touch stimulation. A systematic review of the literature is presented with an aim to explore the research that examines the various comforting touch therapies used on hospitalized NICU infants born very preterm within the first few days of postnatal life. The purpose of this review was to identify appropriate stress-reducing comforting touch techniques for physiologically fragile very preterm infants in order to inform and provide guidance to neonatal clinicians and families.

**Source:** Medline

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**Title:** Closeness and separation in neonatal intensive care.

**Citation:** Acta paediatrica (Oslo, Norway : 1992), Oct 2012, vol. 101, no. 10, p. 1032-1037, 1651-2227 (October 2012)

**Author(s):** Flacking, Renée, Lehtonen, Liisa, Thomson, Gill, Axelin, Anna, Ahlqvist, Sari, Moran, Victoria Hall, Ewald, Uwe, Dykes, Fiona, Separation and Closeness Experiences in the Neonatal Environment (SCENE) group

**Abstract:** In this paper, we highlight the need for acknowledging the importance and impact of both physical and emotional closeness between the preterm infant and parent in the neonatal intensive care unit. Physical closeness refers to being spatially close and emotional closeness to parental feelings of being emotionally connected to the infant (experiencing feelings of love, warmth and affection). Through consideration of the literature in this area, we outline some of the reasons why physical closeness and emotional closeness are crucial to the physical, emotional and social well-being of both the infant and the parent. These include positive effects on infant brain development, parent psychological well-being and on the parent-infant relationship. The influence of the neonatal unit environment and culture on physical and emotional closeness is also discussed. Culturally sensitive care practices, procedures and the physical environment need to be considered to facilitate parent-infant closeness, such as through early and prolonged skin-to-skin contact, family-centred care, increased visiting hours, family rooms and optimization of the space on the units. Further research is required to explore factors that facilitate both physical and emotional closeness to ensure that parent-infant closeness is a priority within neonatal care. © 2012 The Author(s)/Acta Paediatrica © 2012 Foundation Acta Paediatrica.

**Source:** Medline

**Full Text:**

Available from *EBSCOhost* in [Acta Paediatrica](#)

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**Title:** Comparison of effect of kangaroo care and mother holding on sleep and waking states of preterm neonates

**Citation:** Archives of Disease in Childhood, October 2012, vol./is. 97/(A18), 0003-9888 (October 2012)

**Author(s):** Rajai N., Bastani F., Amini E., Haghani H., Janmohammadi S.

**Language:** English

**Abstract:** Background and aim Sleep and waking disorders are the main problems of preterm neonates in Neonatal Intensive Care Unit (NICU) that occur influence by many stimuli and care activities of NICU and this may have irreversible effects on their brain development. So that the objective of this study is to assess the effect of two care methods on the sleep and waking states of preterm neonates. Method In a clinical trial study a total of 70 eligible preterm neonates with gestational age between 32-37 weeks and admitted to NICU were selected and randomly divided in two groups of kangaroo care and holding by mother without directly skin contact. Data collection process was carried out using the behavioral sleep and wake scale of Als. The researcher every two minutes observed and recorded the sleep and wake behavior of neonates of two groups, in 20 minutes pre intervention, during 70 minutes of intervention and during 20 minutes post intervention. The collected data were analyzed using variance analysis test via repetitive sizes and Independent T test. Result The kangaroo care group in compare to holding group significantly had more quiet sleep and alert awake and less drowsiness ( $P<0/001$ ), active awake, and crying states ( $P=0/002$ ). Conclusion Neonates had more beneficial and less undesirable states of sleep and waking during kangaroo care. So that kangaroo care may be helpful to improve sleep and waking states of preterm neonates in NICU.

**Publication Type:** Journal: Conference Abstract

**Source:** EMBASE

**Full Text:**

Available from *Highwire Press* in [Archives of disease in childhood](#)

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**Title:** Closeness and separation in neonatal intensive care

**Citation:** Acta Paediatrica, International Journal of Paediatrics, October 2012, vol./is. 101/10(1032-1037), 0803-5253;1651-2227 (October 2012)

**Author(s):** Flacking R., Lehtonen L., Thomson G., Axelin A., Ahlqvist S., Moran V.H., Ewald U., Dykes F.

**Language:** English

**Abstract:** In this paper, we highlight the need for acknowledging the importance and impact of both physical and emotional closeness between the preterm infant and parent in the neonatal intensive care unit. Physical closeness refers to being spatially close and emotional closeness to parental feelings of being emotionally connected to the infant (experiencing feelings of love, warmth and affection). Through consideration of the literature in this area, we outline some of the reasons why physical closeness and emotional closeness are crucial to the physical, emotional and social well-being of both the infant and the parent. These include positive effects on infant brain development, parent psychological well-being and on the parent-infant relationship. The influence of the neonatal unit environment and culture on physical and emotional closeness is also discussed. Conclusions: Culturally sensitive care practices, procedures and the physical environment need to be considered to facilitate parent-infant closeness, such as through early and prolonged skin-to-skin contact, family-centred care, increased visiting hours, family rooms and optimization of the space on the units. Further research is required to explore factors that facilitate both physical and emotional closeness to ensure that parent-infant closeness is a priority within neonatal care. &#xa9; 2012 Foundation Acta Paediatrica.

**Publication Type:** Journal: Review

**Source:** EMBASE

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**Title:** Exposure to biological maternal sounds improves cardiorespiratory regulation in extremely preterm infants.

**Citation:** The journal of maternal-fetal & neonatal medicine : the official journal of the European Association of Perinatal Medicine, the Federation of Asia and Oceania Perinatal Societies, the International Society of Perinatal Obstetricians, Sep 2012, vol. 25, no. 9, p. 1591-1594, 1476-4954 (September 2012)

**Author(s):** Doheny, Laura, Hurwitz, Shelley, Insoft, Robert, Ringer, Steven, Lahav, Amir

**Abstract:** Preterm infants experience frequent cardiorespiratory events (CREs) including multiple episodes of apnea and bradycardia per day. This physiological instability is due to their immature autonomic nervous system and limited capacity for self-regulation. This study examined whether systematic exposure to maternal sounds can reduce the frequency of CREs in NICU infants. Fourteen preterm infants (26-32 weeks gestation) served as their own controls as we measured the frequency of adverse CREs during exposure to either Maternal Sound Stimulation (MSS) or Routine Hospital Sounds (RHS). MSS consisted of maternal voice and heartbeat sounds recorded individually for each infant. MSS was provided four times per 24-h period via a micro audio system installed in the infant's bed. Frequency of adverse CREs was determined based on monitor data and bedside documentation. There was an overall decreasing trend in CREs with age. Lower frequency of CREs was observed during exposure to MSS versus RHS. This effect was significantly evident

in infants  $\geq$  33 weeks gestation ( $p=0.03$ ), suggesting an effective therapeutic window for MSS when the infant's auditory brain development is most intact. This study provides preliminary evidence for short-term improvements in the physiological stability of NICU infants using MSS. Future studies are needed to investigate the potential of this non-pharmacological approach and its clinical relevance to the treatment of apnea of prematurity.

**Source:** Medline

**Full Text:**

Available from *EBSCOhost* in [Journal of Maternal-Fetal & Neonatal Medicine](#)

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**Title:** Auditory brain development in premature infants: the importance of early experience.

**Citation:** Annals of the New York Academy of Sciences, Apr 2012, vol. 1252, p. 17-24, 1749-6632 (April 2012)

**Author(s):** McMahon, Erin, Wintermark, Pia, Lahav, Amir

**Abstract:** Preterm infants in the neonatal intensive care unit (NICU) often close their eyes in response to bright lights, but they cannot close their ears in response to loud sounds. The sudden transition from the womb to the overly noisy world of the NICU increases the vulnerability of these high-risk newborns. There is a growing concern that the excess noise typically experienced by NICU infants disrupts their growth and development, putting them at risk for hearing, language, and cognitive disabilities. Preterm neonates are especially sensitive to noise because their auditory system is at a critical period of neurodevelopment, and they are no longer shielded by maternal tissue. This paper discusses the developmental milestones of the auditory system and suggests ways to enhance the quality control and type of sounds delivered to NICU infants. We argue that positive auditory experience is essential for early brain maturation and may be a contributing factor for healthy neurodevelopment. Further research is needed to optimize the hospital environment for preterm newborns and to increase their potential to develop into healthy children. © 2012 New York Academy of Sciences.

**Source:** Medline

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**Title:** Potential chronobiotic role of human milk in sleep regulation

**Citation:** Journal of Perinatal Medicine, January 2012, vol./is. 40/1(1-8), 0300-5577;1619-3997 (January 2012)

**Author(s):** Arslanoglu S., Bertino E., Nicocia M., Moro G.E.

**Language:** English

**Abstract:** Background: Organization of the sleep states and a normal sleep pattern in the neonatal period and early infancy is essential for brain development and

plasticity. The establishment of a consolidated circadian sleep-wake cycle occurs between 1 and 4 months of life in term infants. This period may be even longer for preterm infants who are exposed to relentless interventions in neonatal intensive care units. The sleep should be respected and protected. Objective and methods: Human milk (HM) contains bioactive sleep-promoting components, and recent evidence shows that some of these components show circadian oscillations. This article reviews the existing evidence regarding the role of these HM components on sleep. This topic is prefaced with a brief information about the basic concepts concerning sleep. Consecutively, chronobiotic and chrononutrition concepts are introduced. Results: Melatonin, tryptophan, nucleosides/nucleotides, and vitamin B12 are components of HM that have sleep-promoting characteristics. The sleep-inducing effects of these components are well-established in animal and adult human studies. Interestingly, melatonin, tryptophan, and 5'-adenosine monophosphate and 5'-guanosine monophosphate nucleotides in HM have been shown to exhibit also circadian oscillations. Although 5'-uridine monophosphate does not have a circadian rhythm, its levels increase during the night. Conclusion: HM has a potential to function as a "synchronizer," helping the infant to consolidate a circadian sleep-wake cycle, thanks to its several bioactive components with chronobiotic characteristics. Research is warranted to address gaps in this field, such as the association between the circadian oscillations of the sleep-promoting factors in HM and the quantity/quality of infant sleep. Copyright © by Walter de Gruyter.

**Publication Type:** Journal: Review

**Source:** EMBASE

**Full Text:**

Available from *De Gruyter Online* in [Journal of Perinatal Medicine](#); Note: ; Notes: Access via IP only at the Health Library and UHNS

Available from *EBSCOhost* in [Journal of Perinatal Medicine](#)

Available from *Journal of perinatal medicine* in [Health Library \(print holdings\)](#)

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**Title:** Developmental Care for High-Risk Newborns: Emerging Science, Clinical Application, and Continuity from Newborn Intensive Care Unit to Community

**Citation:** Clinics in Perinatology, December 2011, vol./is. 38/4(719-729), 0095-5108;1557-9840 (December 2011)

**Author(s):** Browne J.V.

**Language:** English

**Abstract:** Neonatology has optimized medical outcomes for high-risk newborns yet neurodevelopmental outcomes continue to be a concern. Basic science, clinical research, and environmental design perspectives have shown the impact of the caregiving environment on the developing brain and the role of professional caregivers in providing supportive intervention to both infants and their families. This recognition has prompted a focus on early developmentally supportive care (DSC) for high-risk newborns both in the hospital and in community follow up. DSC has

emerged as a recognized standard of care in most neonatal intensive care units. Still, many questions remain and much integrative research is needed. &#xa9; 2011 Elsevier Inc.

**Publication Type:** Journal: Review

**Source:** EMBASE

**Full Text:**

Available from *Elsevier* in [Clinics in Perinatology](#)

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**Title:** Neonatal intensive care unit stress is associated with brain development in preterm infants.

**Citation:** Annals of neurology, Oct 2011, vol. 70, no. 4, p. 541-549, 1531-8249 (October 2011)

**Author(s):** Smith, Gillian C, Gutovich, Jordan, Smyser, Christopher, Pineda, Roberta, Newnham, Carol, Tjoeng, Tiong H, Vavasseur, Claudine, Wallendorf, Michael, Neil, Jeffrey, Inder, Terrie

**Abstract:** Although many perinatal factors have been linked to adverse neurodevelopmental outcomes in very premature infants, much of the variation in outcome remains unexplained. The impact on brain development of 1 potential factor, exposure to stressors in the neonatal intensive care unit, has not yet been studied in a systematic, prospective manner. In this prospective cohort study of infants born at <30 weeks gestation, nurses were trained in recording procedures and cares. These recordings were used to derive Neonatal Infant Stressor Scale scores, which were employed to measure exposure to stressors. Magnetic resonance imaging (brain metrics, diffusion, and functional magnetic resonance imaging) and neurobehavioral examinations at term equivalent postmenstrual age were used to assess cerebral structure and function. Simple and partial correlations corrected for confounders, including immaturity and severity of illness, were used to explore these relations. Exposure to stressors was highly variable, both between infants and throughout a single infant's hospital course. Exposure to a greater number of stressors was associated with decreased frontal and parietal brain width, altered diffusion measures and functional connectivity in the temporal lobes, and abnormalities in motor behavior on neurobehavioral examination. Exposure to stressors in the Neonatal Intensive Care Unit is associated with regional alterations in brain structure and function. Further research into interventions that may decrease or mitigate exposure to stressors in the neonatal intensive care unit is warranted. Copyright © 2011 American Neurological Association.

**Source:** Medline

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**Title:** Strategies to protect sleep.

**Citation:** The journal of maternal-fetal & neonatal medicine : the official journal of the European Association of Perinatal Medicine, the Federation of Asia and Oceania

Perinatal Societies, the International Society of Perinatal Obstetricians, Oct 2011, vol. 24 Suppl 1, p. 30-31, 1476-4954 (October 2011)

**Author(s):** Colombo, Giovanna, De Bon, Giovanna

**Abstract:** Sleep is a very important element for the development of a premature newborn, because it helps in creating good clinical condition, good weight gain, mastering full oral feeding and improving parent-infant relationship as well. Moreover, the development of a correct sleeping-awaking pattern is a key factor for the development of the brain. To protect sleep is important to modify the environment, for example, reducing noise levels, creating period of semi darkness and protecting infant face from direct light. To obtain this, individualized care, based on infant behavioural cues, becomes fundamental, requiring a change in daily assistance that should become more relationship-oriented. It is also fundamental to foster the presence of parents because it helps the baby to feel more protected and allows him to relax.

**Source:** Medline

**Full Text:**

Available from *EBSCOhost* in [Journal of Maternal-Fetal & Neonatal Medicine](#)

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**Title:** Neonatal intensive care unit stress is associated with brain development in preterm infants

**Citation:** Annals of Neurology, October 2011, vol./is. 70/4(541-549), 0364-5134;1531-8249 (October 2011)

**Author(s):** Smith G.C., Gutovich J., Smyser C., Pineda R., Newnham C., Tjoeng T.H., Vavasseur C., Wallendorf M., Neil J., Inder T.

**Language:** English

**Abstract:** Although many perinatal factors have been linked to adverse neurodevelopmental outcomes in very premature infants, much of the variation in outcome remains unexplained. The impact on brain development of 1 potential factor, exposure to stressors in the neonatal intensive care unit, has not yet been studied in a systematic, prospective manner. Methods: In this prospective cohort study of infants born at <30 weeks gestation, nurses were trained in recording procedures and cares. These recordings were used to derive Neonatal Infant Stressor Scale scores, which were employed to measure exposure to stressors. Magnetic resonance imaging (brain metrics, diffusion, and functional magnetic resonance imaging) and neurobehavioral examinations at term equivalent postmenstrual age were used to assess cerebral structure and function. Simple and partial correlations corrected for confounders, including immaturity and severity of illness, were used to explore these relations. Results: Exposure to stressors was highly variable, both between infants and throughout a single infant's hospital course. Exposure to a greater number of stressors was associated with decreased frontal and parietal brain width, altered diffusion measures and functional connectivity in the temporal lobes, and abnormalities in motor behavior on neurobehavioral

examination. Interpretation: Exposure to stressors in the Neonatal Intensive Care Unit is associated with regional alterations in brain structure and function. Further research into interventions that may decrease or mitigate exposure to stressors in the neonatal intensive care unit is warranted. &#xa9; 2011 American Neurological Association.

**Publication Type:** Journal: Review

**Source:** EMBASE

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**Title:** A new neurological focus in neonatal intensive care

**Citation:** Nature Reviews Neurology, September 2011, vol./is. 7/9(485-494), 1759-4758;1759-4766 (September 2011)

**Author(s):** Bonifacio S.L., Glass H.C., Peloquin S., Ferriero D.M.

**Language:** English

**Abstract:** Advances in the care of high-risk newborn babies have contributed to reduced mortality rates for premature and term births, but the surviving neonates often have increased neurological morbidity. Therapies aimed at reducing the neurological sequelae of birth asphyxia at term have brought hypothermia treatment into the realm of standard care. However, this therapy does not provide complete protection from neurological complications and a need to develop adjunctive therapies for improved neurological outcomes remains. In addition, the care of neurologically impaired neonates, regardless of their gestational age, clearly requires a focused approach to avoid further injury to the brain and to optimize the neurodevelopmental status of the newborn baby at discharge from hospital. This focused approach includes, but is not limited to, monitoring of the patient's brain with amplitude-integrated and continuous video EEG, prevention of infection, developmentally appropriate care, and family support. Provision of dedicated neurocritical care to newborn babies requires a collaborative effort between neonatologists and neurologists, training in neonatal neurology for nurses and future generations of care providers, and the recognition that common neonatal medical problems and intensive care have an effect on the developing brain. &#xa9; 2011 Macmillan Publishers Limited. All rights reserved.

**Publication Type:** Journal: Review

**Source:** EMBASE

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**Title:** The newborn individualized developmental care and assessment program (NIDCAP) with kangaroo mother care (KMC): Comprehensive care for preterm infants

**Citation:** Current Women's Health Reviews, August 2011, vol./is. 7/3(288-301), 1573-4048;1875-6581 (August 2011)

**Author(s):** Als H., Mcanulty G.B.

**Language:** English

**Abstract:** State-of-the-art Newborn Intensive Care Units (NICUs), instrumental in the survival of high-risk and ever earlier-born preterm infants, often have costly human repercussions. The developmental sequelae of newborn intensive care are largely misunderstood. Developed countries eager to export their technologies must also transfer the knowledgebase that encompasses all high-risk and preterm infants' personhood as well as the neuro-essential importance of their parents. Without such understanding, the best medical care, while assuring survival jeopardizes infants' long-term potential and deprives parents of their critical role. Exchanging the womb for the NICU environment at a time of rapid brain growth compromises preterm infants' early development, which results in long-term physical and mental health problems and developmental disabilities. The Newborn Individualized Developmental Care and Assessment Program (NIDCAP) aims to prevent the iatrogenic sequelae of intensive care and to maintain the intimate connection between parent and infant, one expression of which is Kangaroo Mother Care. NIDCAP embeds the infant in the natural parent niche, avoids over-stimulation, stress, pain, and isolation while it supports self-regulation, competence, and goal orientation. Research demonstrates that NIDCAP improves brain development, functional competence, health, and life quality. It is cost effective, humane, and ethical, and promises to become the standard for all NICU care. © 2011 Bentham Science Publishers Ltd.

**Publication Type:** Journal: Article

**Source:** EMBASE

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**Title:** Neonatal intensive care practices harmful to the developing brain.

**Citation:** Indian pediatrics, Jun 2011, vol. 48, no. 6, p. 437-440, 0974-7559 (June 2011)

**Author(s):** Chaudhari, Sudha

**Abstract:** There has been a marked increase in the survival of extremely low birth weight (ELBW) infants, but these babies have a long stay in the NICU. Strategies to decrease their neurodevelopmental impairment become very important. The maximum development of the brain occurs between 29-41 weeks. From the warm, dark, aquatic niche, where the baby hears pleasant sounds like the mother's heart beat, the baby suddenly finds itself in the dry, cold, excessively bright, noisy, environment of the NICU. Noise, bright light, painful procedures, and ill-timed caregiving activities, adversely affect the infant's development. Excessive radiation from X-rays of babies on the ventilator and CT scans also affect the brain. Medications like steroids for chronic lung disease also cause damage to the brain. Aminoglycosides and furosemide are known to cause hearing impairment. Hence a developmentally supportive, humanized care will go a long way in enhancing the developmental outcome of these babies.

**Source:** Medline

**Full Text:**

Available from *EBSCOhost* in [Indian Pediatrics](#)

Available from *Directory of Open Access Journals* in [Indian Pediatrics](#)

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**Title:** Early sensitivity training for parents of preterm infants: impact on the developing brain.

**Citation:** *Pediatric research*, Mar 2010, vol. 67, no. 3, p. 330-335, 1530-0447 (March 2010)

**Author(s):** Milgrom, Jeannette, Newnham, Carol, Anderson, Peter J, Doyle, Lex W, Gemmill, Alan W, Lee, Katherine, Hunt, Rod W, Bear, Marilyn, Inder, Terrie

**Abstract:** After birth, preterm infants face a stressful environment, which may negatively impact early brain development and subsequent neurobehavioral outcomes. This randomized controlled trial involving 45 women with infants <30-wk gestation, assessed the effectiveness of training parents in reducing stressful experiences. Intervention consisted of 10 sessions in the Neonatal Intensive Care Unit (NICU). Postintervention, at term-equivalent (40-wk postmenstrual age), magnetic resonance imaging (MRI) was performed to evaluate brain structure and development. Quantitative volumetric techniques were used to estimate overall and regional brain volumes for different tissue types including CSF, CGM, DNGM, UWM, and MWM. DTI was used to evaluate the integrity and maturation of white matter by ADC and FA. Maturation and connectivity of white matter, characterized by diffusion MR measures of ADC and FA, were significantly enhanced in the intervention group, who displayed greater restriction in ADC and increase in FA. There were no significant effects on either brain volumes or on short-term medical outcomes. Thus, sensitivity training for parents in the NICU is associated with improved cerebral white matter micro-structural development in preterm infants.

**Source:** Medline

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**Title:** The effect of listening to lullaby music on physiologic response and weight gain of premature infants

**Citation:** *Journal of Neonatal-Perinatal Medicine*, 2010, vol./is. 3/2(103-107), 1934-5798;1878-4429 (2010)

**Author(s):** Farhat A., Amiri R., Karbandi S., Esmaily H., Mohammadzadeh A.

**Language:** English

**Abstract:** Objectives: The environment plays a key role in survival and brain development for premature infants. Recent interest lends consideration to non pharmacological interventions as a beneficial alternative. This study seeks to investigate the effect of lullaby music on the physiological response and weight gain of premature infants in Mashhad, Iran. Method: In this study, 44 very low birth weight

infants < 34 weeks of gestational age that were admitted to the Neonatal Intensive Care Unit (NICU) of Imamreza Hospital in Mashhad, Iran were enrolled. Infants were randomly assigned to one of two groups: the Music group and the Control group. Lullaby music was played through earphones for the Music group. This continued for 8 days at 20 minutes per day. The Control group received routine auditory stimulation. Neonates in the two groups were in stable condition and kept in their isolettes. Infants were monitored for 40 minutes; 10 minutes baseline, 20 minutes into the intervention and 10 minutes post intervention. Data measures were heart rate, respiration rate, oxygen saturation and body weight. Result: The two groups differed significantly in the respiratory rate ( $p= 0.01$ ) and oxygen saturation ( $p= 0.001$ ). There were no significant differences in the heart rate ( $p= 0.24$ ) and weight gain ( $p= 0.093$ ) between the two groups. Conclusion: Preterm infants respond to lullaby music as evidenced by the changes in their respiratory rates and oxygen saturations. Although this study did not demonstrate an improvement in weight gain, further studies are recommended to examine the effect of music on other growth and developmental aspects. © 2010 IOS Press and the authors.

**Publication Type:** Journal: Article

**Source:** EMBASE

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**Title:** Touch and massage in the newborn period: effects on biomarkers and brain development.

**Citation:** The Journal of perinatal & neonatal nursing, Oct 2009, vol. 23, no. 4, p. 304-306, 1550-5073 (2009 Oct-Dec)

**Author(s):** McGrath, Jacqueline M

**Source:** Medline

**Full Text:**

Available from *Journal of perinatal and neonatal nursing* in [Health Library \(print holdings\)](#)

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**Title:** NICU noise and the preterm infant.

**Citation:** Neonatal network : NN, May 2009, vol. 28, no. 3, p. 165-173, 1539-2880 (2009 May-Jun)

**Author(s):** Brown, Gemma

**Abstract:** Premature infants in the NICU are often exposed to continuous loud noise despite research documenting the presence and damaging effects of noise on the preterm infant's development. Excessive auditory stimulation creates negative physiologic responses such as apnea and fluctuations in heart rate, blood pressure, and oxygen saturation. Preterm infants exposed to prolonged excessive noise are also at increased risk for hearing loss, abnormal brain and sensory development, and speech and language problems. Reducing noise levels in the NICU can improve

the physiologic stability of sick neonates and therefore enlarge the potential for infant brain development. Recommendations include covering incubators with blankets, removing noisy equipment from the incubator environment, implementing a quiet hour, educating staff to raise awareness, and encouraging staff to limit conversation near infants.

**Source:** Medline

**Full Text:**

Available from *EBSCOhost* in [Neonatal Network](#)

Available from *Neonatal network: the journal of neonatal nursing* in [Health Library \(print holdings\)](#)

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**Title:** New approaches to optimizing early diets.

**Citation:** Nestlé Nutrition workshop series. Paediatric programme, Jan 2009, vol. 63, p. 195, 1661-6677 (2009)

**Author(s):** Polberger, Staffan

**Abstract:** Most extremely low birthweight (ELBW; <1,000 g) infants will survive if cared for at a tertiary neonatal intensive care unit, and should be given optimal nutrition for brain development. Human milk confers nutritional and non-nutritional advantages over infant formula, and is started during the first hours of life. In Sweden, most ELBW infants are fed individually with mother's own milk (preferred) and banked milk, with supplementary parenteral nutrition. There is an enormous variation particularly in the fat and protein content of milk between mothers, during the day and the course of lactation. Infrared macronutrient analyses on 24-hour collections of mother's milk are performed once a week allowing for optimal protein and energy intakes. All banked milk is analyzed, and the most protein-rich milk is given to a newborn ELBW infant. After 2 weeks, the milk may be fortified if the protein or energy intakes need to be further increased, and fortification is continued throughout the tube-feeding period. Parenteral nutrition is continued until the enteral intake constitutes 75-80% of the total volume intake. Protein markers, e.g. serum urea and transthyretin, are assessed, and growth is monitored by measurements of weight, crown-heel length and head circumference. Copyright (c) 2009 S. Karger AG, Basel.

**Source:** Medline

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**Title:** Evaluation of early stimulation programs for enhancing brain development.

**Citation:** *Acta paediatrica* (Oslo, Norway : 1992), Jul 2008, vol. 97, no. 7, p. 853-858, 0803-5253 (July 2008)

**Author(s):** Bonnier, Christine

**Abstract:** The term 'early intervention' designates educational and neuroprotection strategies aimed at enhancing brain development. Early educational strategies seek

to take advantage of cerebral plasticity. Neuroprotection, a term initially used to characterize substances capable of preventing cell death, now encompasses all interventions that promote normal development and prevent disabilities, including organisational, therapeutic and environment-modifying measures, such as early stimulation programs. Early stimulation programs were first devised in the United States for vulnerable children in low-income families; positive effects were recorded regarding school failure rates and social problems. Programs have also been implemented in several countries for premature infants and low-birth-weight infants, who are at high risk for neurodevelopmental abnormalities. The programs target the child, the parents or both. The best evaluated programs are the NIDCAP (Newborn Individualized Developmental Care and Assessment Program) in Sweden for babies <1500 g in neonatal intensive care units and the longitudinal multisite program IHDP (Infant Health and Development Program) created in the United States for infants <37 weeks or <2500 g. Although the NIDCAP and the IHDP targeted different populations, they produced similar effects in several regards: efficacy was greatest with programs involving both the parents and the child; long-term stimulation improved cognitive outcomes and child-parent interactions; cognition showed greater improvements than motor skills and larger benefits were obtained in families that combined several risk factors including low education attainment by the mothers.

**Source:** Medline

**Full Text:**

Available from *Wiley* in [Acta Paediatrica](#)

Available from *Wiley* in [Acta Paediatrica](#); Note: ; Collection notes: Do NOT use - OLD Collection; use the 2016 version

Available from *EBSCOhost* in [Acta Paediatrica](#)

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**Title:** The universe of developmental care: a new conceptual model for application in the neonatal intensive care unit.

**Citation:** *Advances in neonatal care* : official journal of the National Association of Neonatal Nurses, Jun 2008, vol. 8, no. 3, p. 141-147, 1536-0903 (June 2008)

**Author(s):** Gibbins, Sharyn, Hoath, Steven B, Coughlin, Mary, Gibbins, Alan, Franck, Linda

**Abstract:** Developmental care for high-risk infants is practiced in most neonatal units around the world. Despite its wide acceptance, inconsistency in its definition and application has resulted in criticism regarding its scientific merit. The universe of developmental care model proposed in this article is the first major reformulation of neonatal developmental care theory since Als' synactive theory. Neither the developing brain nor the environment exists in isolation, and therefore are dependent on each other for all caregiving activities. Central to this model is the concept of a shared surface, manifested most obviously by the skin that forms the critical link between the body/organism and environment and becomes the focal point for human interactions. The components of the model and its theoretical underpinnings, its practical application and direction for future clinical practice, education, and research are presented.

**Source:** Medline

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**Title:** The development of potentially better practices to support the neurodevelopment of infants in the NICU.

**Citation:** Journal of perinatology : official journal of the California Perinatal Association, Dec 2007, vol. 27 Suppl 2, p. S48., 0743-8346 (December 2007)

**Author(s):** Liu, W F, Laudert, S, Perkins, B, Macmillan-York, E, Martin, S, Graven, S, NIC/Q 2005 Physical Environment Exploratory Group

**Abstract:** To review the existing evidence used to identify potentially better care practices that support newborn brain development. Literature review. Sixteen potentially better practices are identified and grouped into two operational clinical bundles based upon timing for recommended implementation. Existing evidence supports the implementation of selected care practices that potentially may support newborn brain development.

**Source:** Medline

**Full Text:**

Available from *ProQuest* in [Journal of Perinatology](#)

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**Title:** Individualized developmental care for high risk newborns in the NICU: a practice guideline.

**Citation:** Early human development, Jul 2007, vol. 83, no. 7, p. 433-442, 0378-3782 (July 2007)

**Author(s):** Vandenberg, Kathleen A

**Abstract:** The newborn infant in the neonatal intensive care unit (NICU) is cared for with highly advanced medical technology, but the incidence of disability and neurodevelopmental problems among survivors remains high and problematic. Preterm birth disrupts the developmental progression of brain structures and affects development of the sensory systems. The Synactive Theory of Development provides a framework to conceptualize the organization of the neurobehavioral capabilities in the early development of the fetus, newborn and young infant. The infant's ability to regulate and control behavior emerges through continued interaction with the environment and is expressed through five systems: autonomic/physiology, motor, state, attention/interaction and self-regulation. In the healthy full term newborn the five subsystems are mature, integrated, synchronized and managed smoothly. The less mature, healthy or sick preterm newborn may be unable or partially able to manage environmental inputs, demonstrating over-reactive responses and poor tolerance from even minimal input. Loss of control and stress responses become frequent unless the environment and caregivers work to read the infants' messages and thresholds for sensitivity and adjust care and handling and the environment based on the infant's behavioral communications. The Newborn Individualized Developmental Care and Assessment Program (NIDCAP) is a

comprehensive program which includes a behavioral observation methodology and creation of individual family centered developmental caregiving support of the infant's own developmental goals. The NIDCAP approach seeks to support the infant's stabilization and organization of the autonomic, motor, and state systems at each level of maturation, while minimizing stressful events.

**Source:** Medline

**Full Text:**

Available from *Elsevier* in [Early Human Development](#)

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**Title:** Sleep in the neonatal intensive care unit.

**Citation:** The Journal of perinatal & neonatal nursing, Apr 2007, vol. 21, no. 2, p. 140, 0893-2190 (2007 Apr-Jun)

**Author(s):** Bertelle, V, Sevestre, A, Laou-Hap, K, Nagahapitiye, M C, Sizun, J

**Abstract:** Recent experimental data suggest a strong role for sleep in brain development. As sleep is the predominant behavioral state in the term and especially the preterm newborn, these data underline the importance of respecting sleep duration and organization within the different sleep states. Polysomnography is the preferred technique used for identification of sleep state; however, behavioral observations-under the condition that the observer is well trained-may prove as efficient. Newborns hospitalized in the neonatal intensive care unit are exposed to many stimuli and care activities that disrupt their sleep organization and may have irreversible effects on their brain development. In order to improve the long-term neurobehavioral outcome of these high-risk subjects, a consistent care approach is proposed. Application of the Neonatal Individualized Developmental Care and Assessment Program decreases environmental stressful events and promotes harmonious well-being behaviors, based on an individual approach. This strategy has encouraging results, showing an increase in sleep duration under Neonatal Individualized Developmental Care and Assessment Program conditions, but further studies are needed to assess its long-term neurobehavioral impact.

**Source:** Medline

**Full Text:**

Available from *Journal of perinatal and neonatal nursing* in [Health Library \(print holdings\)](#)

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**Title:** Recognizing the potential effect of stress and trauma on premature infants in the NICU: How are outcomes affected?

**Citation:** Journal of Perinatology, December 2003, vol./is. 23/8(679-683), 0743-8346 (December 2003)

**Author(s):** Maroney D.I.

**Language:** English

**Abstract:** Extensive research of the long-term outcomes of premature infants has shown significant risk for emotional, behavioral, and psychological problems. Chronic stress and trauma have not been researched specifically in this population, however, studies of the neurobiological impact of traumatic stress on infants and children in the general population show noteworthy parallels in symptomatology. Careful consideration should be given to practitioner caregiving, parent education, future research, assessment, and interventions while being mindful of the impact that chronic stress and trauma may have on the developing brain of the premature infant.

**Publication Type:** Journal: Article

**Source:** EMBASE

**Full Text:**

Available from *ProQuest* in [Journal of Perinatology](#)

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**Title:** Facilitating infant adaptation: the nursery environment.

**Citation:** Seminars in neonatology : SN, Dec 2002, vol. 7, no. 6, p. 459-467, 1084-2756 (December 2002)

**Author(s):** Warren, Inga

**Abstract:** The physical and social environment of the nursery is a direct and indirect influence on the development of premature infants. Qualities in the environment affect physiological stability and provide sensory experience that is relevant to brain development. Adaptation of the prematurely born infant to the unexpected surroundings of the neonatal intensive care unit can be facilitated when the infant's developmental needs are understood and characteristics of the environment are adapted accordingly. The need for environmental change is revealed by the infant's behaviour, that is, his interactions with the environment. The environment also affects the behaviour of caregivers, who like the baby need to be able to do their best in this challenging situation.

**Source:** Medline

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**Title:** Vulnerability of the developing brain: Neuronal mechanisms

**Citation:** Clinics in Perinatology, September 2002, vol./is. 29/3(357-372), 0095-5108 (September 2002)

**Author(s):** Bhutta A.T., Anand K.J.S.

**Language:** English

**Abstract:** Despite the improved survival of tiny preterm neonates, their neurodevelopmental outcomes remain a cause for grave concern. The authors propose two primary mechanisms leading to enhanced neuronal cell death in the

immature brain: (1) NMDA-mediated excitotoxicity resulting from repetitive or prolonged pain, and (2) enhanced naturally occurring neuronal apoptosis during early development due to multiple metabolic stresses or lack of social stimulation. The pattern and magnitude of abnormalities will depend on genetic variability as well as the timing, intensity, and duration of adverse environmental experiences. Thus, cumulative brain damage during infancy will finally lead to reductions in brain volume, abnormal behavioral and neuroendocrine regulation, and poor cognitive outcomes during childhood and adolescence. The public health and economic importance of preventing or ameliorating the subtle brain damage caused by these mechanisms cannot be overestimated. This certainly justifies concerted efforts by neuroscientists and clinicians to investigate the mechanisms underlying early neuronal injury, to minimize the impact of adverse experiences and environmental factors in neonates, and to develop novel therapeutic strategies for improving the cognitive and behavioral outcomes of ex-preterm neonates.

**Publication Type:** Journal: Review

**Source:** EMBASE

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**Title:** The impact of neonatal intensive care practices on the developing brain

**Citation:** Journal of Pediatrics, 2002, vol./is. 140/6(646-653), 0022-3476 (2002)

**Author(s):** Gressens P., Rogido M., Paindaveine B., Sola A.

**Language:** English

**Abstract:** We reviewed some characteristics of the developing brain and its susceptibility to several frequently used neonatal practices. The combination of some practices, used simultaneously or consecutively in the NICU, could lead to an adverse effect on the developing brain in ELBW infants and may be one of the multiple factors associated with abnormal neurodevelopmental outcome, particularly so if predisposing conditions existed during prenatal life. Several confounding factors need to be considered when trying to understand the role of neonatal practices on the developing brain. Our review found differences in PVL and CP rates for different centers and countries. Although intercenter variability could be partly because of the combination of different practices in NICUs, geographic factors, genetic predisposition, socioeconomic level, obstetric follow-up, and delivery circumstances must also be taken into account before concluding that a specific practice should be modified. However, the past has taught us that careful comparison of outcomes and practices between different centers can lead to substantial benefits for the health of premature infants. The results obtained from experimental animal models are not a sufficient basis for making changes in clinical practice. However, together with the already available human studies, they raise concerns and questions for clinical practice. We believe that changing some clinical practices, such as the use of postnatal steroids and midazolam for example, will improve outcomes. Other practices, like HFV, hypercarbia, analgesia, and the administration of dopamine and xanthines should be carefully evaluated for each individual infant, balancing the possible benefits with the potential for adverse long-term outcomes. Possible

potentiating effects of other associated therapies or predisposing events need to be considered. Other practices that may have undesirable consequences, such as transient but repeated exposure to wide variations in oxygen and carbon dioxide levels, are not easily documented in NICU care. Their effect on the developing brain is therefore difficult to evaluate. It seems prudent to avoid these events. Some of the unsolved questions could be addressed by future studies that include long-term follow-up of neurologic outcome. Until that time, it seems that what we do not know is more important than what we currently know.

**Publication Type:** Journal: Review

**Source:** EMBASE

**Full Text:**

Available from *Ovid* in [Journal of Pediatrics](#); Note: ; Collection notes: Limited numbers of concurrent users on Ovid titles

Available from *Journal of pediatrics* in [Health Library \(print holdings\)](#)

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**Title:** Dietary supplementation of long-chain polyunsaturated fatty acids in preterm infants: effects on cerebral maturation.

**Citation:** Acta paediatrica (Oslo, Norway : 1992), Jan 2002, vol. 91, no. 9, p. 942-950, 0803-5253 (2002)

**Author(s):** van Wezel-Meijler, G, van der Knaap, M S, Huisman, J, Jonkman, E J, Valk, J, Lafeber, H N

**Abstract:** To study the influence of dietary-supplied long-chain polyunsaturated fatty acids on structural brain maturation in preterm infants and to investigate parameters of functional brain development, relating them to structural maturation. Other studies have suggested that dietary supplementation of long-chain polyunsaturated fatty acids in preterm infants may enhance their visual development. The influence on structural brain development has never been evaluated. In a prospective, double-blind study, 42 formula-fed premature infants were randomized to be fed either a standard preterm formula without long-chain polyunsaturated fatty acids or an identical formula supplemented with docosahexaenoic acid (0.015 g/100 ml) and arachidonic acid (0.031 g/100 ml). Infants with significant cerebral damage, retinopathy, chronic disease or feeding problems were excluded. Follow-up was focused on assessment of cerebral myelination by MRI. Psychomotor, mental and visual development was analysed and flash-visual evoked potentials were recorded. It was found that progress of myelination, mental and motor development and latencies of visual evoked potentials were not positively influenced by supplementation of long-chain polyunsaturated fatty acids. At each test age, visual acuity was slightly better in the supplemented infants than in the non-supplemented infants, but the difference never reached significance level. Supplementation of long-chain polyunsaturated fatty acids did not have a demonstrable positive influence on structural brain maturation. Related to this finding, in this small cohort of preterm infants without significant neurological damage, sample size being restricted by strict inclusion criteria and MRI procedures, no significant positive effects were found on psychomotor, mental and visual development.

**Source:** Medline

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