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Interventions and Management

1. Med Sci (Paris). 2013 May;29(5):529-36. doi: 10.1051/medsci/2013295017. Epub 2013 May 28.

A technological platform for cerebral palsy - The ICT4Rehab project [Article in French]

Van Sint Jan S, Wermenbol V, Van Bogaert P, Desloovere K, Degelaen M, Dan B, Salvia P, Ortibus E, Bonnechère B, Le Borgne YA, Bontempi G, Vansummeren S, Sholukha V, Moiseev F, Rooze M.

Laboratoire d'anatomie, biomécanique et organogenèse, CP 619, faculté de médecine, Université libre de Bruxelles (ULB), 808 route de Lennik, 1070 Bruxelles, Belgique.

The musculoskeletal system (MSS) is essential to allow us performing every-day tasks, being able to have a professional life or developing social interactions with our entourage. MSS pathologies have a significant impact on our daily life. It is therefore not surprising to find MSS-related health problems at the top of global statistics on professional absenteeism or societal health costs. The MSS is also involved in central nervous conditions, such as cerebral palsy (CP). Such conditions show complex etiology that complicates the interpretation of the observable clinical signs and the establishment of a wide consensus on the best practices to adopt for clinical monitoring and patient follow-up. These elements justify the organization of fundamental and applied research projects aiming to develop new methods to help clinicians to cope with the complexity of some MSS disorders. The ICT4Rehab project (www.ict4rehab.org) developed an integrated platform providing tools that enable easier management and visualization of clinical information related to the MSS of CP patients. This platform is opened to every interested clinical centre.

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[PMID: 23732103](https://pubmed.ncbi.nlm.nih.gov/23732103/) [PubMed - in process]

2. Clin Orthop Relat Res. 2013 Jun 5. [Epub ahead of print]

Does Proximal Rectus Femoris Release Influence Kinematics In Patients With Cerebral Palsy and Stiff Knee Gait?

Végyvári D, Wolf SI, Heitzmann D, Klotz MC, Dreher T.

Department of Orthopaedics, Semmelweis University, Budapest, Hungary.

BACKGROUND: Stiff gait resulting from rectus femoris dysfunction in cerebral palsy commonly is treated by distal rectus femoris transfer (DRFT), but varying outcomes have been reported. Proximal rectus femoris release was found to be less effective compared with DRFT. No study to our knowledge has investigated the effects of the combination of both procedures on gait. **QUESTIONS/PURPOSES:** We sought to determine whether an additional proximal rectus release affects knee and pelvic kinematics when done in combination with DRFT; specifically, we sought to compare outcomes using the (1) range of knee flexion in swing phase, (2) knee flexion velocity and (3) peak knee flexion in swing phase, and (4) spatiotemporal parameters between patients treated with DRFT, with or without proximal rectus release. Furthermore the effects on (5) anterior pelvic tilt in both groups were compared. **METHODS:** Twenty patients with spastic bilateral cerebral palsy treated with DRFT and proximal rectus femoris release were matched with 20 patients in whom only DRFT was performed. Standardized three-dimensional gait analysis was done before surgery, at 1 year after surgery, and at a mean of 9 years after surgery. Basic statistics were done to compare the outcome of both groups. **RESULTS:** The peak knee flexion in swing was slightly increased in both groups 1 year after surgery, but was not different between groups. Although there was a slight but not significant decrease found the group with DRFT only, there was no significant difference at long-term followup between the groups. Timing of peak knee flexion, range of knee flexion, and knee flexion velocity improved significantly in both groups, and in both groups a slight deterioration was seen with time; there were no differences in these parameters between the groups at any point, however. There were no group differences in spatiotemporal parameters at any time. There were no significant differences in the long-term development of anterior pelvic tilt between the groups. **CONCLUSIONS:** The results of our study indicate that the short- and long-term influences of adding proximal rectus femoris release on the kinematic effects of DRFT and on pelvic tilt in children with cerebral palsy are negligible.

LEVEL OF EVIDENCE: Level III, therapeutic study. See the Guidelines for Authors for a complete description of levels of evidence.

[PMID: 23737262](#) [PubMed - as supplied by publisher]

3. *Dev Med Child Neurol.* 2013 Jun 6. doi: 10.1111/dmcn.12184. [Epub ahead of print]

Impact of gait analysis on correction of excessive hip internal rotation in ambulatory children with cerebral palsy: a randomized controlled trial.

Wren TA, Lening C, Rethlefsen SA, Kay RM.

Children's Orthopaedic Center, Children's Hospital Los Angeles, Los Angeles, CA, USA.

AIM: The aim of this study was to determine if gait analysis improves correction of excessive hip internal rotation in ambulatory children with spastic cerebral palsy (CP). **METHOD:** Children undergoing orthopedic surgery were randomized to receive or not receive a preoperative gait analysis report. This secondary analysis included all participants whose gait report recommended external femoral derotation osteotomy (FDRO). One-year postoperative, and pre- to postoperative change in femoral anteversion, mean hip rotation in stance, and mean foot progression in stance were compared between groups and in subgroups based on whether the recommendation for FDRO was followed. **RESULTS:** Outcomes did not differ between the group which received a gait report (n=39; 19 males, 20 females; mean age 10y 4mo [SD 3y]; hemiplegia, 3; di/triplegia, 28; quadriplegia, 8; Gross Motor Function Classification System [GMFCS]: level I, 5; level II, 12; level III 19; level IV, 3) and the control group (n=26; 14 males, 12 females; mean age 9y 5mo [SD 2y 10mo]; hemiplegia, 1; di/triplegia, 21; quadriplegia, 4; GMFCS: level I, 4; level II, 1; level III, 9; level IV, 2; all p values >0.29), but improved more in the gait report subgroup in which the FDRO recommendation was followed (seven limbs; change in anteversion -32.9°, hip rotation -25.5°, foot progression -36.2°) than in the control group (anteversion -12.2°, hip rotation -7.6°, foot progression -12.4°; all p values ≤0.02) and the gait report subgroup in which FDRO was not performed (32 limbs; anteversion -1.0°, hip rotation 0.5°, foot progression -8.0°; all p values ≤0.003). Postoperative measures became normal only in the gait report subgroup in which the recommended FDRO was performed. **INTERPRETATION:** Gait analysis can improve outcomes when its recommendations are incorporated in the treatment plan.

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4. Dev Med Child Neurol. 2013 Jun 4. doi: 10.1111/dmcn.12169. [Epub ahead of print]**Validity and reliability of radiological methods to assess proximal hip geometry in children with cerebral palsy: a systematic review.**

Pons C, Rémy-Néris O, Médée B, Brochard S.

Physical Medicine and Rehabilitation Department, University Hospital of Brest, Brest.

AIM: The aim of this systematic review was to assess the current validity and reliability of radiological methods used to measure proximal hip geometry in children with cerebral palsy. **METHOD:** A search was conducted using relevant keywords and inclusion/exclusion criteria of the MEDLINE, CINALH Plus, Embase, Web of Science, Academic Search Premier, The Cochrane Library, and PsychINFO databases. **RESULTS:** The migration percentage using X-rays showed excellent reliability and concurrent validity with three-dimensional (3D) measurements from computed tomography (CT) scans. The acetabular index, measured using X-rays had good reliability but moderate concurrent validity with 3D CT measurements; 3D CT scan indexes had greater reliability. The measurement of the neck shaft angle using X-rays showed excellent concurrent validity with measurements from 3D CT scans and excellent reliability. Regarding femoral anteversion, one study found an excellent correlation between two-dimensional CT and clinical assessment and excellent reliability. Two others showed less evidence for the use of CT ultrasounds. **INTERPRETATION:** Most of the X-ray-based measurements showed good to excellent metrological properties. More metrological evidence is needed for the assessment of femoral anteversion. Magnetic resonance imaging and ultrasound-based measurements have great potential although very little metrological evidence is available.

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5. J Child Orthop. 2012 Jun;6(2):145-51. doi: 10.1007/s11832-012-0401-7. Epub 2012 Apr 26.**Unilateral varus osteotomy of the proximal femur in children with cerebral palsy: a five-year follow-up of the development of both hips.**

Larsson M, Hägglund G, Wagner P.

Department of Orthopaedics, University Hospital, Lund University, 221 85 Lund, Sweden.

BACKGROUND: Varus osteotomy of the proximal femur (VOPF) is one treatment option to prevent hip dislocation in children with cerebral palsy (CP). It is questioned whether the osteotomy should be performed in the displaced hip only, or if it should be performed bilaterally to prevent later displacement of the contralateral hip. CPUP is a register and healthcare programme for children with CP that was initiated in 1994 in southern Sweden. In the programme, range-of-motion and radiographic examination of the hips is performed regularly. These data have been analysed preoperatively and for 5 years postoperatively in children treated with unilateral VOPF. **METHODS:** Children with CP living in the counties of Skåne and Blekinge in the south of Sweden, who were treated with unilateral VOPF at least 5 years ago, were included in the study. The degree of hip displacement and the range of hip motion were analysed preoperatively and after 5 years. Repeat hip operations after the index operation were recorded. **RESULTS:** Twenty-four children fulfilled the inclusion criteria. Mean age at index operation was 7.6 (2.8-13.2) years. No child died within 5 years postoperatively, and no child was lost from follow-up. At follow-up after 5 years, 2 of the 24 children had been operated on with VOPF in the contralateral hip. The range of motion in both hips decreased, but the difference between the index hip and the contralateral hip did not change significantly. **CONCLUSION:** Children with CP and unilateral hip displacement have a low risk of later contralateral displacement after being operated on with unilateral VOPF. This supports healthcare programmes that advocate unilateral VOPF in children with unilateral hip displacement.

[PMID: 23730346](#) [PubMed] [PMCID: PMC3364350](#) [Free PMC Article](#)

6. Zh Nevrol Psikhiatr Im S S Korsakova. 2013;113(5 Vypusk 2 Detskaia nevrologiia i psikiatriia):53-60.**An electromyographic study on the development of optimal tactics of botulinum toxin type A injections in children with spastic forms of cerebral palsy [Article in Russian]**

Kurenkov AL, Kuzenkova LM, Bursagova BI, Petrova SA, Klochkova OA, Nikitin SS, Artemenko AR, Mamed'iarov AM.

FGBU "Nauchnyĭ tsentr zdorov'ia detei" RAMN.

We studied 67 children, aged 2-9 years, with cerebral palsy including 56 children with a spastic form. An electromyographic method was used for the development of optimal tactics of botulinum toxin type A injections in different clinical presentations of spasticity. The best clinical results were obtained in children with the following changes on EMG: 1) the tonic muscle activity in resting state was minimal (≤ 10 microvolts) and had local or regional distribution; 2) the pathological synkinetic activity during voluntary movements was minimal (synergetic activity coefficient for shin muscles was less than 0.45); 3) the disturbance of interactions between synergistic and antagonistic muscles was moderate (reciprocity coefficient was not less than 0.4); 4) EMG amplitude in voluntary muscle contraction should not be less than 150 microvolts. This approach to the treatment allowed to reach higher levels on The Gross Motor Function Classification System in part of children.

[PMID: 23739515](#) [PubMed - as supplied by publisher]

7. Dev Med Child Neurol. 2013 Jul;55(7):584-5. doi: 10.1111/dmcn.12175.**Deep brain stimulation in cerebral palsy: an opportunity for collaborative research.**

Rosenbaum P.

Paediatrics, CanChild, McMaster University, Hamilton, ON, Canada.

[PMID: 23738872](#) [PubMed - in process]

8. Am J Phys Med Rehabil. 2013 Jun 4. [Epub ahead of print]**Characteristics of Dysphagia in Children with Cerebral Palsy, Related to Gross Motor Function.**

Kim JS, Han ZA, Song DH, Oh HM, Chung ME.

From the Department of Rehabilitation Medicine, St. Vincent Hospital, College of Medicine, The Catholic University of Korea, Suwon, Republic of Korea (J-SK, H-MO); Department of Rehabilitation Medicine, National Health Insurance Corporation Ilsan Hospital, Ilsan, Republic of Korea (Z-AH); and Department of Rehabilitation Medicine, St. Paul's Hospital, College of Medicine, The Catholic University of Korea, Seoul, Republic of Korea (DHS, MEC).

OBJECTIVE: The aim of this study was to report the characteristics of dysphagia in children with cerebral palsy (CP), related to gross motor function. **DESIGN:** Videofluoroscopic swallow study was performed in 29 children with CP, according to the manual of Logemann. Five questions about oromotor dysfunction were answered. Gross motor function level was classified by the Gross Motor Function Classification System Expanded and Revised. **RESULTS:** The results of the videofluoroscopic swallowing studies showed that reduced lip closure, inadequate bolus formation, residue in the oral cavity, delayed triggering of pharyngeal swallow, reduced larynx elevation, coating on the pharyngeal wall, delayed pharyngeal transit time, multiple swallow, and aspiration were significantly more common in the severe group (Gross Motor Function Classification System Expanded and Revised IV or V). As for aspiration, 50% of the children with severe CP had problems, but only 14.3% of them with moderate (Gross Motor Function Classification System Expanded and Revised III) CP and none of them with mild CP had abnormalities. In addition, five of the seven aspiration cases occurred silently. **CONCLUSIONS:** This study shows that dysphagia is closely related to gross motor function in children with CP. Silent aspiration was observed in the moderate to severe CP groups. Aspiration is an important cause of medical problems such as acute and chronic lung disease, and associated respiratory complications contribute significantly in increasing morbidity and mortality in these patient groups. Therefore, the authors suggest that early dysphagia evaluation including videofluoroscopic

swallow study is necessary in managing feeding problems and may prevent chronic aspiration, malnutrition, and infections.

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9. Dev Med Child Neurol. 2013 Jun 5. doi: 10.1111/dmcn.12170. [Epub ahead of print]

Surgical intervention for feeding and nutrition difficulties in cerebral palsy: a systematic review.

Ferluga ED, Sathe NA, Krishnaswami S, McPheeters ML.

The Vanderbilt Clinic, Nashville, USA.

AIM: The aim of the study was to systematically review surgical intervention for feeding difficulties in cerebral palsy. **METHOD:** We searched databases including MEDLINE from 1980 to July 2012. Two reviewers independently assessed studies and rated the overall quality and strength of the evidence. **RESULTS:** Thirteen publications (11 unique studies) met the inclusion criteria and addressed gastrostomy outcomes or treatment of reflux via fundoplication. In nine studies, gastrostomy-fed children gained weight. Relative to typically developing populations, baseline weight z-scores ranged from -3.56 to -0.39 and follow-up z-scores ranged from -2.63 to -0.33. Other growth measures were mixed. Two studies assessed fundoplication: in one, both Nissen fundoplication and vertical gastric plication reduced reflux (by 57% and 43% respectively), while in one case series, reflux recurred within 12 months in 30% of children. The highest rates of adverse events across studies were site infection (59%), granulation tissue (42%), and recurrent reflux (30%). Death rates ranged from 7 to 29%; however, the underlying cause was probably not surgery. **INTERPRETATION:** Evidence for the effectiveness of surgical interventions is insufficient to low. Studies of gastrostomy typically demonstrated significant weight gain. Results for other measures were mixed. Many children remained underweight, although, given a lack of appropriate reference standards, these results should be interpreted cautiously.

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10. Child Care Health Dev. 2013 Jun 4. doi: 10.1111/cch.12077. [Epub ahead of print]

Social support provided to caregivers of children with cerebral palsy.

Pfeifer LI, Silva DB, Lopes PB, Matsukura TS, Santos JL, Pinto MP.

Department of Neurosciences and Behavioral Sciences, Division of Occupational Therapy, Ribeirão Preto Medical School, University of São Paulo, Ribeirão Preto, S.P., Brazil.

OBJECTIVE: To describe the perception of caregivers of children with cerebral palsy (CP) concerning social support received and to verify how the characteristics of the children (i.e. type of CP and severity of motor impairment) and those of their caregivers (i.e. age, level of education, occupation, income and number of children) are significantly related to this perception. **METHOD:** A total of 50 children with CP aged between 3 and 12 years and their respective caregivers participated in this study. Children were grouped in terms of type of CP and according to the severity of motor impairment through the Gross Motor Function Classification System (GMFCS). The Social Support Questionnaire (SSQ) was used to evaluate the perception of caregivers concerning the social support they receive (number of people offering support - SSQ-N index, and level of satisfaction concerning such support - SSQ-S index). **RESULTS:** The caregivers reported receiving support from a mean of 1.67 people. Core and extended family members (i.e. husband, mother, siblings) and friends are the most common providers of support. In regard to level of satisfaction, caregivers considered the support they received to be positive, obtaining a mean of 5.52 out of a total of six points. Children's and caregivers' characteristics were not significantly related to the SSQ-N and SSQ-S indexes. **CONCLUSION:** Family members are the caregivers' primary source of social support and caregivers reported being satisfied with the support they received.

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11. *Int J Nurs Pract.* 2013 Jun;19(3):288-94. doi: 10.1111/ijn.12075.

Quality of life and anticipatory grieving among parents living with a child with cerebral palsy.

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Community Health Nursing Department, Faculty of Nursing, The University of Jordan, Amman, Jordan.

The purpose of this study was to describe the quality of life and anticipatory grieving among Jordanian parents living with a child with cerebral palsy. A cross-sectional, descriptive, correlational design was used with 204 Jordanian parents. Both mothers and fathers were recruited from health-care centres that provided comprehensive care for children with cerebral palsy in Jordan and from schools for special education. Structured interviews were conducted using the Marwit and Meuser Caregiver Grief Inventory Cerebral Palsy and Quality of Life Index. The majority of the parents reported that providing care for a child with cerebral palsy is requiring more emotional energy and determination than ever expected. There was a significant negative correlation between total anticipatory grief score and total quality of life score and all subscales. This indicates that parents with high level of intensity of anticipatory grief had lower quality of life. No statistically significant differences were found in anticipatory grief and quality of life responses between mothers and fathers. The outcomes of this study have important implications for encouraging family-centred care and inform policy to improve the lives of children with cerebral palsy and their parents.

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Prevention and Cure

12. *Cochrane Database Syst Rev.* 2013 May 31;5:CD006066. doi: 10.1002/14651858.CD006066.pub2.

Continuous cardiotocography (CTG) as a form of electronic fetal monitoring (EFM) for fetal assessment during labour.

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BACKGROUND: Cardiotocography (known also as electronic fetal monitoring), records changes in the fetal heart rate and their temporal relationship to uterine contractions. The aim is to identify babies who may be short of oxygen (hypoxic), so additional assessments of fetal well-being may be used, or the baby delivered by caesarean section or instrumental vaginal birth. **OBJECTIVES:** To evaluate the effectiveness of continuous cardiotocography during labour. **SEARCH METHODS:** We searched the Cochrane Pregnancy and Childbirth Group Trials Register (31 December 2012) and reference lists of retrieved studies. **SELECTION CRITERIA:** Randomised and quasi-randomised controlled trials involving a comparison of continuous cardiotocography (with and without fetal blood sampling) with (a) no fetal monitoring, (b) intermittent auscultation (c) intermittent cardiotocography. **DATA COLLECTION AND ANALYSIS:** Two review authors independently assessed study eligibility, quality and extracted data from included studies. **MAIN RESULTS:** Thirteen trials were included with over 37,000 women; only two were judged to be of high quality. Compared with intermittent auscultation, continuous cardiotocography showed no significant improvement in overall perinatal death rate (risk ratio (RR) 0.86, 95% confidence interval (CI) 0.59 to 1.23, n = 33,513, 11 trials), but was associated with a halving of neonatal seizures (RR 0.50, 95% CI 0.31 to 0.80, n = 32,386, nine trials). There was no significant difference in cerebral palsy rates (RR 1.75, 95% CI 0.84 to 3.63, n = 13,252, two trials). There was a significant increase in caesarean sections associated with continuous cardiotocography (RR 1.63, 95% CI 1.29 to 2.07, n = 18,861, 11 trials). Women were also more likely to have an instrumental vaginal birth (RR 1.15, 95% CI 1.01 to 1.33, n = 18,615, 10 trials). Data for subgroups of low-risk, high-risk, preterm pregnancies and high-quality trials were consistent with overall results. Access to fetal blood sampling did not appear to influence the difference in neonatal seizures nor any other prespecified outcome. **AUTHORS' CONCLUSIONS:** Continuous cardiotocography during labour is associated with a reduction in neonatal seizures,

but no significant differences in cerebral palsy, infant mortality or other standard measures of neonatal well-being. However, continuous cardiotocography was associated with an increase in caesarean sections and instrumental vaginal births. The challenge is how best to convey these results to women to enable them to make an informed choice without compromising the normality of labour.

Update of Cochrane Database Syst Rev. 2006;(3):CD006066.

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13. Neuropsychiatr Dis Treat. 2013;9:767-71. doi: 10.2147/NDT.S36956. Epub 2013 May 27.

Door-to-door survey of major neurological disorders (project) in Al Quseir City, Red Sea Governorate, Egypt.

Tallawy HN, Farghaly WM, Rageh TA, Shehata GA, Badry R, Metwally NA, Moselhy EA, Hassan M, Sayed MA, Waris AA, Hamed Y, Shaaban I, Hamed MA, Kandil MR.

Department of Neurology, Faculty of Medicine, Assiut University, Assiut, Egypt.

A door-to-door survey, including every household, was conducted for all inhabitants of Al Quseir City (33,283), Red Sea Governorate, Egypt by three specialists of neurology as well as nine senior staff members of neurology and 15 female social workers to assess the epidemiology of major neurological disorders. Over six phases, from July 1, 2009 to January 31, 2012, screening of all eligible people in the population was carried out, by which case ascertainment of all major neurological disorders included in the study was done according to the accepted definitions and diagnostic criteria of the World Health Organization. The order of frequency of prevalence of the studied neurological disorders was dementia (3.83% for those aged > 60 years), migraine (2.8% for those aged > 8 years), stroke (6.2/1000 for those aged > 20 years), epilepsy (5.5/1000), Parkinson's disease (452.1/100,000 for those aged > 40 years), cerebral palsy (3.6/1000 among children < 18 years), spinal cord disorders (63/100,000) dystonia (39.11/100,000), cerebellar ataxia (30.01/100,000), trigeminal neuralgia (28/100,000 for those aged > 37 years), chorea (21.03/100,000), athetosis (15/100,000), and multiple sclerosis (13.74/100,000). The incidence rates of stroke, epilepsy, and Bell's palsy were 181/100,000, 48/100,000, and 98.9/100,000 per year, respectively.

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14. Obstet Gynecol. 2013 Jun 5. [Epub ahead of print]

Cerebral Palsy and Perinatal Infection in Children Born at Term.

Ahlin K, Himmelmann K, Hagberg G, Kacerovsky M, Cobo T, Wennerholm UB, Jacobsson B.

Perinatal Center, Department of Obstetrics and Gynaecology, Institute for Clinical Sciences, Sahlgrenska Academy, Sahlgrenska University Hospital/Östra, and the Department of Paediatrics, Institute for Clinical Sciences, Sahlgrenska Academy, Gothenburg, Sweden; the Department of Obstetrics and Gynaecology, Charles University in Prague, Medical Faculty Hradec Kralove, Prague, Czech Republic; the Maternal Fetal Medicine Department, Hospital Clinic, Institut d'Investigacions Biomèdiques August Pi i Sunyer (IDIBAPS), Universitat de Barcelona, Barcelona, Spain; and the Department of Genes and Environment, Division of Epidemiology, Institute of Public Health, Oslo, Norway.

OBJECTIVE: To investigate the link between infection-related risk factors for cerebral palsy subtypes in children born at term. **METHODS:** A case-control study was performed in a population-based series of children with cerebral palsy born at term (n=309) matched with a control group (n=618). The cases were divided into cerebral palsy subtypes: spastic hemiplegia, spastic diplegia, spastic tetraplegia, and dyskinetic cerebral palsy. All forms of spastic cerebral palsy were also analyzed together. All records were examined for maternal and neonatal signs of infection. Univariate and adjusted analyses were performed. **RESULTS:** Infection-related risk factors were shown to be independent risk factors for spastic cerebral palsy in the adjusted analyses. This was especially pronounced in the subgroup with spastic hemiplegia in which bacterial growth in urine during pregnancy (n=11 [7.5%], odds ratio [OR] 4.7, 95% confidence interval [CI] 1.5-15.2), any infectious disease during pregnancy (n=57 [39.0%], OR 2.9, 95% CI 1.7-4.8), severe infection during pregnancy (n=12 [8.2%], OR 15.4, 95% CI 3.0-78.1), antibiotic therapy once during

pregnancy (n=33 [22.6%], OR 6.3, 95% CI 3.0-15.2) as well as several times during pregnancy (n=9 [6.2%], OR 15.6, 95% CI 1.8-134.2) constituted strong independent risk factors. However, only neonatal infection (n=11 [9.1%], OR 14.7, 95% CI 1.7-126.5) was independently significantly associated with an increased risk of spastic diplegia and tetraplegia. **CONCLUSIONS:** Infection-related factors are strong independent risk factors for the subgroup with spastic hemiplegia in children with cerebral palsy born at term. The finding is less pronounced in the subgroups with spastic diplegia or tetraplegia.

LEVEL OF EVIDENCE: II.

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15. Pediatrics. 2013 Jun 3. [Epub ahead of print]

Outcomes of Infants Born at 22 and 23 Weeks' Gestation.

Ishii N, Kono Y, Yonemoto N, Kusuda S, Fujimura M; for the Neonatal Research Network, Japan.

Department of Pediatrics, Aiku Hospital, Minato, Tokyo, Japan;

OBJECTIVE: To provide instructive information on death and neurodevelopmental outcomes of infants born at 22 and 23 weeks' gestational age. **METHODS:** The study cohort consisted of 1057 infants born at 22 to 25 weeks in the Neonatal Research Network, Japan. Neurodevelopmental impairment (NDI) at 36 to 42 months' chronological age was defined as any of the following: cerebral palsy, hearing impairment, visual impairment, and a developmental quotient <70. A systematic review was performed by using databases of publications of cohort studies with neonatal and neurodevelopmental outcomes at 22 and 23 weeks. **RESULTS:** Numbers and incidences (%) of infants with death or NDI were 60 (80%) at 22 weeks and 156 (64%) at 23 weeks. In logistic regression analysis, gestational ages of 22 weeks (odds ratio [OR]: 5.40; 95% confidence interval [CI]: 2.48-11.76) and 23 weeks (OR: 2.14; 95% CI: 1.38-3.32) were associated with increased risk of death or NDI compared with 24 weeks, but a gestational age of 25 weeks (OR: 0.65; 95% CI: 0.45-0.95) was associated with decreased risk of death or NDI. In the systematic review, the medians (range) of the incidence of death or NDI in 8 cohorts were 99% (90%-100%) at 22 weeks and 98% (67%-100%) at 23 weeks. **CONCLUSIONS:** Infants born at 22 and 23 weeks' gestation were at higher risk of death or NDI than infants at born at 24 weeks. However, outcomes were improved compared with those in previous studies. There is a need for additional discussions on interventions for infants born at 22 or 23 weeks' gestation.

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