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Interventions and Management

1. Including a Lower-Extremity Component during Hand-Arm Bimanual Intensive Training does not Attenuate Improvements of the Upper Extremities: A Retrospective Study of Randomized Trials.

Saussez G, Brandão MB, Gordon AM, Bleyenheuft Y.

Front Neurol. 2017 Sep 26;8:495. doi: 10.3389/fneur.2017.00495. eCollection 2017.

Hand-Arm Bimanual Intensive Therapy (HABIT) promotes hand function using intensive practice of bimanual functional and play tasks. This intervention has shown to be efficacious to improve upper-extremity (UE) function in children with unilateral spastic cerebral palsy (USCP). In addition to UE function deficits, lower-extremity (LE) function and UE-LE coordination are also impaired in children with USCP. Recently, a new intervention has been introduced in which the LE is simultaneously engaged during HABIT (Hand-Arm Bimanual Intensive Therapy Including Lower Extremities; HABIT-ILE). Positive effects of this therapy have been demonstrated for both the UE and LE function in children with USCP. However, it is unknown whether the addition of this constant LE component during a bimanual intensive therapy attenuates UE improvements observed in children with USCP. This retrospective study, based on multiple randomized protocols, aims to compare the UE function improvements in children with USCP after HABIT or HABIT-ILE. This study included 86 children with USCP who received 90 h of either HABIT (n = 42) or HABIT-ILE (n = 44) as participants in previous studies. Children were assessed before, after, and 4-6 months after intervention. Primary outcomes were the ABILHAND-Kids and the Assisting Hand Assessment. Secondary measures included the Jebsen-Taylor Test of Hand Function, the Pediatric Evaluation of Disability Inventory [(PEDI); only the self-care functional ability domain] and the Canadian Occupational Performance Measure (COPM). Data analysis was performed using two-way repeated-measures analysis of variance with repeated measures on test sessions. Both groups showed similar, significant improvements for all tests (test session effect $p < 0.001$; group \times test session interaction $p > 0.05$) except the PEDI and COPM. Larger improvements on these tests were found for the HABIT-ILE group (test session effect $p < 0.001$; group \times test session interaction $p < 0.05$). These larger improvements may be explained by the constant simultaneous UE-LE engagement observed during the HABIT-ILE intervention since many daily living activities included in the PEDI and the COPM goals involve the LE and, more specifically, UE-LE coordination. We conclude that UE improvements in children with USCP are not attenuated by simultaneous UE-LE engagement during intensive intervention. In addition, systematic LE engagement during bimanual intensive intervention (HABIT-ILE) leads to larger functional improvements in activities of daily living involving the LE.

[PMID: 29018400](#)

2. The Hand Assessment of Infants: a new tool to understand early hand function in children at high risk of unilateral cerebral palsy.

Spittle AJ.

Dev Med Child Neurol. 2017 Oct 10. doi: 10.1111/dmcn.13580. [Epub ahead of print]

[No abstract available]

[PMID: 29023650](#)

3. Ability-Based Balancing Using the Gross Motor Function Measure in Exergaming for Youth with Cerebral Palsy.

MacIntosh A, Switzer L, Hwang S, Schneider ALJ, Clarke D, Graham TCN, Fehlings DL.

Games Health J. 2017 Oct 10. doi: 10.1089/g4h.2017.0053. [Epub ahead of print]

OBJECTIVE: To test if the gross motor function measure (GMFM) could be used to improve game balancing allowing youth with cerebral palsy (CP) with different physical abilities to play a cycling-based exercise videogame together. Our secondary objective determined if exergaming with the GMFM Ability-Based algorithm was enjoyable. **MATERIALS AND METHODS:** Eight youth with CP, 8-14 years of age, GMFM scores between 25.2% and 87.4% (evenly distributed between Gross Motor Function Classification System levels II and III), competed against each other in head-to-head races, totaling 28 unique race dyads. Dyads raced three times, each with a different method of minimizing the distance between participants (three balancing algorithms). This was a prospective repeated measures intervention trial with randomized and blinded algorithm assignment. The GMFM Ability-Based algorithm was developed using a least squares linear regression between the players' GMFM score and cycling cadence. Our primary outcome was dyad spread or average distance between players. The GMFM Ability-based algorithm was compared with a control algorithm (No-Balancing), and an idealized algorithm (one-speed-for-all [OSFA]). After each race, participants were asked "Was that game fun?" and "Was that game fair?" using a five-point Likert scale. **RESULTS:** Participants pedaled quickly enough to elevate their heart rate to an average of 120 ± 8 beats per minute while playing. Dyad spread was lower when using GMFM Ability-Based balancing (4.6 ± 4.2) compared with No-Balancing (11.9 ± 6.8) ($P < 0.001$). When using OSFA balancing, dyad spread was (1.6 ± 0.9), lower than both GMFM Ability-Based ($P = 0.006$) and No-Balancing ($P < 0.001$). Cycling cadence positively correlated to GMFM, equal to 0.58 (GMFM) $+33.29$ ($R^2_{adj} = 0.662$, $P = 0.004$). Participants rated the games a median score 4/5 for both questions: "was that game fun?" and "was that game fair?." **CONCLUSION:** The GMFM Ability-Based balancing decreased dyad spread while requiring participants to pedal quickly, facilitating interaction and physical activity.

[PMID: 29016199](#)

4. Therapeutic Effect Evaluation of Neuromuscular Electrical Stimulation With or Without Strengthening Exercise on Spastic Cerebral Palsy.

Qi YC, Niu XL, Gao YR, Wang HB, Hu M, Dong LP, Li YZ.

Clin Pediatr (Phila). 2017 Oct 1:9922817732619. doi: 10.1177/0009922817732619. [Epub ahead of print]

The aims of this study were to investigate the effect of neuromuscular electrical stimulation (NMES) combined with strengthening exercise on movement in children with spastic cerebral palsy (CP). One hundred children with spastic CP were randomly divided into a treatment group (NMES and strengthening exercise, $n = 50$) and a control group (only NMES, $n = 50$). We compared the Comprehensive Spasticity Scale (CSS) score, Gross Motor Function Measure (GMFM) score, and walking speed before treatment and 6 weeks and 3 months after treatment between the 2 groups. There was no difference in CSS score between the treatment and control groups before the therapy (12.0 ± 3.4 vs 12.3 ± 3.6), which decreased much more in the treatment group after 6 weeks (7.6 ± 3.0 vs 9.5 ± 2.8) and 3 months (7.4 ± 2.4 vs 9.4 ± 2.6) with significant differences ($P < .05$). No difference in GMFM score was observed between the treatment and control groups before the therapy (44.5 ± 13.2 vs 44.0 ± 12.6), which increased much more in the treatment group after 6 weeks (70.6 ± 15.2 vs 56.7 ± 14.3) and 3 months (71.0 ± 16.4 vs 58.0 ± 15.6) with significant differences ($P < .05$). The walking speed improved over time, which was the same before the treatment (0.43 ± 0.13 m/s vs 0.45 ± 0.14 m/s), and was significantly greater in the treatment group than that in the control group (6 weeks: 0.69 ± 0.15 m/s vs 0.56 ± 0.12 m/s, $P < .05$; 3 months: 0.72 ± 0.17 m/s vs 0.57 ± 0.18 m/s, $P < .05$). NMES combined with strengthening exercise was more effective than NMES alone in the recovery of spastic CP.

[PMID: 28990434](#)

5. Body mass index and fitness in high-functioning children and adolescents with cerebral palsy: What happened over a decade?

Zwinkels M, Takken T, Ruyten T, Visser-Meily A, Verschuren O; Sport-2-Stay-Fit study group.

Res Dev Disabil. 2017 Oct 9;71:70-76. doi: 10.1016/j.ridd.2017.09.021. [Epub ahead of print]

BACKGROUND: In recent decades, improving fitness has become an important goal in rehabilitation medicine in children and adolescents with cerebral palsy (CP). **AIMS:** To compare body mass index (BMI), performance-related fitness, and cardiorespiratory fitness of children with CP measured in 2014 with a comparable sample from 2004. **METHODS AND PROCEDURES:** In total, 25 high-functioning children with CP (i.e., GMFCS I-II) measured in 2004 (13 boys; mean age 13.2 (2.6) years) were matched to 25 children measured in 2014. Outcomes included body mass and BMI, muscle power sprint test (MPST), 10×5m sprint test, and a shuttle run test (SRT). Data of 15 participants from 2004 (10 boys; mean age 12.6 (2.5) years) were matched and analysed for VO₂peak. **OUTCOMES AND RESULTS:** Body mass and BMI were higher (both: $p < 0.05$) in the 2014 cohort compared to the 2004 cohort. Further, performance-related fitness was better for the 2014 cohort on the MPST ($p = 0.004$), the 10×5m sprint test ($p = 0.001$), and the SRT ($p < 0.001$). However, there were no differences for VO₂peak. **CONCLUSIONS AND IMPLICATIONS:** In high-functioning children with CP, there are positive ecological time trends in performance-related fitness, but not in VO₂peak between 2004 and 2014. The substantial higher body mass and BMI is alarming and requires further investigation.

[PMID: 29024824](#)

6. The effect of asymmetrical limited hip flexion on seating posture, scoliosis and windswept hip distortion.

Ágústsson A, Sveinsson Þ, Rodby-Bousquet E.

Res Dev Disabil. 2017 Oct 5;71:18-23. doi: 10.1016/j.ridd.2017.09.019. [Epub ahead of print]

BACKGROUND: Postural asymmetries with seating problems are common in adults with cerebral palsy. **AIMS:** To analyse the prevalence of asymmetrical limited hip flexion ($< 90^\circ$) in adults with CP, and to evaluate the association between asymmetrical limited hip flexion and postural asymmetries in the sitting position. **METHODS AND PROCEDURES:** Cross-sectional data of 714 adults with CP, 16-73 years, GMFCS level I-V, reported to CPUP, the Swedish cerebral palsy national surveillance program and quality registry, from 2013 to 2015. Hip range of motion was analysed in relation to pelvic obliquity, trunk asymmetry, weight distribution, scoliosis and windswept hip distortion. **OUTCOMES AND RESULTS:** The prevalence of asymmetrical limited hip flexion increased as GMFCS level decreased. Of adults at GMFCS level V, 22% had asymmetrical limited hip flexion ($< 90^\circ$). The odds of having an oblique pelvis (OR 2.6, 95% CI:1.6-2.1), an asymmetrical trunk (OR 2.1, 95% CI:1.1-4.2), scoliosis (OR 3.7, 95% CI:1.3-9.7), and windswept hip distortion (OR 2.6, 95% CI:1.2-5.4) were higher for adults with asymmetrical limited hip flexion compared with those with bilateral hip flexion $> 90^\circ$. **CONCLUSIONS AND IMPLICATIONS:** Asymmetrical limited hip flexion affects the seating posture and is associated with scoliosis and windswept hip distortion.

[PMID: 28987968](#)

7. Best seating condition in children with spastic cerebral palsy: One type does not fit all.

Angsupaisal M, Dijkstra LJ, la Bastide-van Gemert S, van Hoorn JF, Burger K, Maathuis CGB, Hadders-Algra M.

Res Dev Disabil. 2017 Oct 5;71:42-52. doi: 10.1016/j.ridd.2017.09.016. [Epub ahead of print]

BACKGROUND: The effect of forward-tilting of the seat surface and foot-support in children with spastic cerebral palsy (CP) is debated. **AIM:** To assess the effect of forward-tilting of the seat surface and foot-support in children with CP on kinematic head stability and reaching. **METHODS:** Nineteen children functioning at Gross Motor Function Classification System levels I-III participated [range 6-12y; ten unilateral spastic CP (US-CP) and nine bilateral spastic CP (BS-CP)]. Kinematic data were recorded of head sway and reaching with the dominant arm in four sitting conditions: a horizontal and a 15° forward (FW) tilted seat surface, each with and without foot-support. **RESULTS:** Seating condition did not affect head stability during reaching, but did affect kinematic reaching quality. The major reaching parameters, i.e., the proportion of reaches with one movement unit (MU) and the size of the transport MU, were not affected by foot-support. Forward-tilting had a positive effect on these parameters in children with US-CP, whereas the horizontal condition had this effect in children with BS-CP.

IMPLICATIONS: A 15° forward-tilted seating and foot-support do not affect head stability. Reaching in children with US-CP profits from forward-tilting; in children with BS-CP forward-tilting worsens reaching - effects that are independent of foot-support.

[PMID: 28987971](#)

8. Effectiveness of cognitive orientation to (daily) occupational performance (CO-OP) on children with cerebral palsy: A mixed design.

Ghorbani N, Rassafiani M, Izadi-Najafabadi S, Yazdani F, Akbarfahimi N, Havaei N, Gharebaghy S.

Res Dev Disabil. 2017 Oct 5;71:24-34. doi: 10.1016/j.ridd.2017.09.007. [Epub ahead of print]

BACKGROUND: Cerebral palsy (CP) is the most common cause of physical disabilities during childhood. Therapeutic interventions mainly focus on impairment reduction to address motor-based difficulties. In contrast, Cognitive Orientation to daily Occupational Performance (CO-OP) is a cognitive approach, providing intervention at the level of activity and participation. **AIMS:** This study aims to determine whether the CO-OP approach improves motor skills and achievement in motor-based occupational performance goals in children with CP. **METHODS AND PROCEDURES:** In this mixed design research (i.e., a multiple baseline single case experimental design and a one-group pretest-posttest design), five children with CP participated in 12 CO-OP intervention sessions. Repeated measures of motor skills for the multiple baseline single case experimental design were taken using the Bruininks-Oseretsky Test of Motor Proficiency (BOTMP); pre- and post-measures of parent/child perception of performance and satisfaction were identified using the Canadian Occupational Performance Measure (COPM); level of achievement was identified using Goal Attainment Scaling (GAS). **OUTCOMES AND RESULTS:** According to the BOTMP results, all children were able to engage in the CO-OP intervention to improve motor performance. Significant differences after treatment were found in both performance and performance satisfaction ratings using the COPM as rated by parents and children. The GAS results showed progress in achievement levels for all children; all goals were achieved or exceeded. **CONCLUSIONS AND IMPLICATIONS:** CO-OP intervention can be helpful in improving motor skills and achieving self-identified, motor-based goals in children with CP.

[PMID: 28987969](#)

9. How available to European children and young people with cerebral palsy are features of their environment that they need?

Espín-Tello SM, Colver A; SPARCLE group.

Res Dev Disabil. 2017 Oct 4;71:1-10. doi: 10.1016/j.ridd.2017.09.018. [Epub ahead of print]

BACKGROUND:The UN Convention on the Rights of Persons with Disabilities requires accessibility to the physical and social environments. However, individuals with cerebral palsy (CP) have many difficulties in accessing the environment they need for functional independence and social inclusion. **AIMS:** To examine the availability of environmental features which children with CP need for optimal participation, and whether availability changed for them between ages 8-12 and 13-17 years. **METHODS:** The sample is the 594 children with CP, born 31/07/1991-01/04/1997, who took part in the SPARCLE study at age 8-12 (SPARCLE 1) and again at 13-17 years (SPARCLE 2). Participants were randomly sampled from population registers of children with CP in eight European regions; one further region recruited from multiple sources. Data about environment were captured with the European Child Environment Questionnaire (60 items). Differences in availability of environmental features between childhood and adolescence were assessed using McNemar's test; differences between regions were assessed by ranking regions. Differences in availability between regions were assessed by ranking regions. **RESULTS:** For seven environmental features significantly ($p < 0.01$) fewer individuals needed the feature in SPARCLE 2 than in SPARCLE 1, whilst for two features more individuals needed the feature. Nine features in SPARCLE 1 and six features in SPARCLE 2 were available to less than half the participants who needed them. Eight features showed significantly ($p < 0.01$) higher availability in SPARCLE 2 than in SPARCLE 1 (enlarged rooms, adapted toilet, modified kitchen and hoists at home, adapted toilets and lifts at school, an adequate vehicle, grants for home modifications) while none showed significantly lower availability. The relative rankings of the better and less good regions persisted from the age 8-12year age group to the 13-17year age group. **CONCLUSIONS:** Needed environmental features are unavailable to many children at ages 8-12 and 13-17 years. This lack of availability is more pronounced in some regions than others, which probably results from their policy, legislative and statutory frameworks.

[PMID: 28987966](#)

10. Pulmonary Rehabilitation in a Patient with Bronchiectasis and Underlying Cerebral Palsy: A Case Report.

Yoon SY, Kim YW, Choi JY.

PM R. 2017 Oct 5. pii: S1934-1482(17)31357-6. doi: 10.1016/j.pmrj.2017.09.009. [Epub ahead of print]

Bronchiectasis is a chronic pulmonary disease characterized by the permanent dilatation of the airways, with recurrent infections. As the disease progresses, extrapulmonary symptoms manifest. If the patient with bronchiectasis has an underlying central nervous system disease such as cerebral palsy (CP), extrapulmonary functions decline faster. The co-occurrence of these two diseases may make care more complex, and there have been no reports about pulmonary rehabilitation (PR) in this class of patients. Here, we present a patient with bronchiectasis and underlying CP who showed marked improvement of pulmonary function and clinical symptoms after 6 weeks of a patient-specific intensive PR program.

[PMID: 28988977](#)

11. Decoding spoken phonemes from sensorimotor cortex with high-density ECoG grids.

Ramsey NF, Salari E, Aarnoutse EJ, Vansteensel MJ, Bleichner MB, Freudenburg ZV.

Neuroimage. 2017 Oct 6. pii: S1053-8119(17)30824-8. doi: 10.1016/j.neuroimage.2017.10.011. [Epub ahead of print]

For people who cannot communicate due to severe paralysis or involuntary movements, technology that decodes intended speech from the brain may offer an alternative means of communication. If decoding proves to be feasible, intracranial Brain-Computer Interface systems can be developed which are designed to translate decoded speech into computer generated speech or to instructions for controlling assistive devices. Recent advances suggest that such decoding may be feasible from sensorimotor cortex, but it is not clear how this challenge can be approached best. One approach is to identify and discriminate elements of spoken language, such as phonemes. We investigated feasibility of decoding four spoken phonemes from the sensorimotor face area, using electrocorticographic signals obtained with high-density electrode grids. Several decoding algorithms including spatiotemporal matched filters, spatial matched filters and support vector machines were compared. Phonemes could be classified correctly at a level of over 75% with spatiotemporal matched filters. Support Vector machine analysis reached a similar level, but spatial matched filters yielded significantly lower scores. The most informative electrodes were clustered along the central sulcus. Highest scores were achieved from time windows centered around voice onset time, but a 500 ms window before onset time could also be classified significantly. The results suggest that phoneme production involves a sequence of robust and reproducible activity patterns on the cortical surface. Importantly, decoding requires inclusion of temporal information to capture the rapid shifts of robust patterns associated with articulator muscle group contraction during production of a phoneme. The high classification scores are likely to be enabled by the use of high density grids, and by the use of discrete phonemes. Implications for use in Brain-Computer Interfaces are discussed.

[PMID: 28993231](#)

12. Nutritional intervention and neurodevelopmental outcome in infants with suspected cerebral palsy: the Dolphin infant double-blind randomized controlled trial.

Andrew MJ, Parr JR, Montague-Johnson C, Laler K, Qi C, Baker B, Sullivan PB.

Dev Med Child Neurol. 2017 Oct 12. doi: 10.1111/dmcn.13586. [Epub ahead of print]

AIM: To investigate whether docosahexaenoic acid (DHA), choline, and uridine-5-monophosphate (UMP) supplementation improves neurodevelopmental outcome in infants with suspected cerebral palsy (CP) versus a comparison group of children. **METHOD:** Infants aged 1 to 18 months with suspected CP were recruited from UK child development centres. Participants received daily treatment or control supplementation for 2 years (double-blind randomized control design). Stratification was by age, sex, predominant pattern of motor involvement (four limbs or other), and visual impairment (or not). The primary outcome was the cognitive composite score of the Bayley Scales of Infant and Toddler Development, Third Edition (CCS-Bayley-III). Secondary outcomes included language composite and motor composite scores of the Bayley Scales of Infant and Toddler Development, Third Edition (Bayley-III). **RESULTS:** Forty infants were recruited; 35 began supplementation, 29 completed 1 to 2 years' supplementation. The treatment group CCS-Bayley-III was non-significantly higher than the comparison group (mean 77.7 [SD 19.2] and 72.2 [SD 19.8] respectively, mean modelled difference 4.4 [-2.8, 11.6]). The treatment group language scores, but not motor scores, were non-significantly higher than for the comparison group. **INTERPRETATION:** Most families found supplementation feasible. No statistically significant differences in neurodevelopmental outcome between

the treatment and comparison groups were identified. Further investigation of neurodevelopmental outcome after supplementation with DHA, choline, and UMP of infants with suspected CP is warranted. **WHAT THIS PAPER ADDS:** This was the first trial of phosphatidylcholine precursor supplementation in infants with suspected cerebral palsy (CP). Families of infants with suspected CP found 2-year nutritional supplementation feasible. There was no statistically significant neurodevelopmental advantage for the treatment group versus the comparison group. However, treatment group cognitive and language advantage were of clinically meaningful magnitude.

[PMID: 29023666](#)

13. Subjective Global Nutritional Assessment: A Reliable Screening Tool for Nutritional Assessment in Cerebral Palsy Children.

Minocha P, Sitaraman S, Choudhary A, Yadav R.

Indian J Pediatr. 2017 Oct 12. doi: 10.1007/s12098-017-2501-3. [Epub ahead of print]

OBJECTIVE: To determine the prevalence of undernutrition in children with cerebral palsy and to compare subjective and objective methods of nutritional assessment. **METHODS:** This was a hospital based analytical observational study in which 180 children of cerebral palsy, aged 1-12 y, attending tertiary level hospital, Jaipur from March, 2012 through March, 2013 were included. Subjective assessment was done by questionnaire (Subjective Global Nutritional Assessment; SGNA) in which questions related to nutrition history and physical examination, signs of fat, muscle wasting and edema was done while objective assessment was done by weight, height and triceps skinfold thickness (TSFT) measurements. **RESULTS:** In this study prevalence of undernutrition by subjective method (SGNA) was 76.67% while by objective measurement (weight, height, TSFT) was 48.89%, 77.78% 35.18% respectively. There was fair to moderate agreement between the SGNA and objective assessments including weight and height ($k = 0.341$, $p = 0.000$; $k = 0.337$, $p = 0.000$ respectively) while for TSFT agreement between both methods was poor ($k = 0.092$, $p = 0.190$). In the index study, sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of SGNA was for weight was 95%, 37%, 56%, 90%; for height 84%, 50%, 85%, 47%; for TSFT 81%, 30%, 38%, 75% respectively. **CONCLUSIONS:** The prevalence of undernutrition is high in cerebral palsy children. SGNA can be a reliable tool for assessing nutritional status in children with cerebral palsy and is a simple, comprehensive, noninvasive, and cost-effective tool for screening undernutrition in children of cerebral palsy.

[PMID: 29022211](#)

14. Management of pneumatosis intestinalis in children over the age of 6 months: a conservative approach.

Nellihela L, Mutalib M, Thompson D, Jochen K, Upadhyaya M.

Arch Dis Child. 2017 Oct 7. pii: archdischild-2017-313201. doi: 10.1136/archdischild-2017-313201. [Epub ahead of print]

BACKGROUND: Pneumatosis intestinalis (PI) is an uncommon and poorly understood condition. Although it can be an incidental finding in asymptomatic individuals, it can also be secondary to life-threatening bowel ischaemia and sepsis. In premature infants, it is a pathognomonic sign of necrotising enterocolitis. There is no consensus regarding management and long-term outcome of children with PI. **AIM:** Review of our experience of PI in children beyond the early infantile period. **METHODS:** Retrospective review of patient's records and radiological images from 2013 to 2015. **RESULTS:** Eighteen patients (three girls) had radiologically confirmed PI. The median age was 4.5 years (range 8 months-13 years). Background medical conditions (number): short bowel syndrome (one), congenital heart disease (two), sickle cell disease (one), epilepsy (three), cerebral palsy (six), myotonic dystrophy (four) and peroxisomal biogenesis defect (one). Six children (33%) presented with abdominal distension, four (22%) with abdominal pain, three (17%) with bilious vomiting, two (11%) with diarrhoea and one (6%) with rectal bleeding. Two (11%) were asymptomatic. One had air in portal vein and two had pneumoperitoneum. All patients with symptomatic PI were treated conservatively with successful outcome and complete resolution of PI. None required surgical intervention. **CONCLUSION:** PI in children who are not on chemotherapy or immunosuppressant appears to follow a benign course and is responsive to conservative management. In contrast to adults, portal venous gas and pneumoperitoneum do not predict the need for surgical intervention.

[PMID: 28988213](#)

15. Disparities in Life Course Outcomes for Transition-Aged Youth with Disabilities.

Acharya K, Meza R, Msall ME.

Pediatr Ann. 2017 Oct 1;46(10):e371-e376. doi: 10.3928/19382359-20170918-01.

Close to 750,000 youth with special health care needs transition to adult health care in the United States every year; however, less than one-half receive transition-planning services. Using the "F-words" organizing framework, this article explores life course outcomes and disparities in transition-aged youth with disabilities, with a special focus on youth with autism, Down syndrome, and cerebral palsy. Despite the importance of transition, a review of the available literature revealed that (1) youth with disabilities continue to have poor outcomes in all six "F-words" domains (ie, function, family, fitness, fun, friends, and future) and (2) transition outcomes vary by race/ethnicity and disability. Professionals need to adopt a holistic framework to examine transition outcomes within a broader social-ecological context, as well as implement evidence-based transition practices to help improve postsecondary outcomes of youth with disabilities. [Pediatr Ann. 2017;46(10):e371-e376.].

[PMID: 29019631](#)

Prevention and Cure

16. Health Disparities and Child Development After Prematurity.

Carter FA, Msall ME.

Pediatr Ann. 2017 Oct 1;46(10):e360-e364. doi: 10.3928/19382359-20170919-02.

There is increased recognition that preterm neonates require sequential surveillance to capture the spectrum of coordination, communication, learning, and behavior regulation disorders that may occur in the first 5 years of life and beyond. In particular, the framework of follow-up needs to go beyond the detection of cerebral palsy, blindness, and deafness in the first 2 years of life for only those at highest preterm risk (ie, <28 weeks gestation, with combinations of severe cranial sonographic abnormalities, bronchopulmonary dysplasia, and retinopathy of prematurity). In addition, there are numerous barriers for diverse families in accessing quality, comprehensive early intervention and early child education supports. This article highlights recent research on the long-term impact of preterm birth with a focus on disparities in resource access and in outcomes at entry to kindergarten and early educational trajectories. Across all degrees of prematurity, children from disadvantaged backgrounds face significant disparities both in access to comprehensive and continuous supports and in long-term academic outcomes. Ten key recommendations are provided for ensuring proactive management strategies for the long-term academic, behavioral, and social success of these at-risk children. [Pediatr Ann. 2017;46(10):e360-e364.].

[PMID: 29019629](#)**17. Maternal Cigarette Smoke Exposure Worsens Neurological Outcomes in Adolescent Offspring with Hypoxic-Ischemic Injury.**

Chan YL, Saad S, Machaalani R, Oliver BG, Vissel B, Pollock C, Jones NM, Chen H.

Front Mol Neurosci. 2017 Sep 26;10:306. doi: 10.3389/fnmol.2017.00306. eCollection 2017.

Hypoxic-ischemic (HI) encephalopathy occurs in approximately 6 per 1000 term newborns leading to devastating neurological consequences, such as cerebral palsy and seizures. Maternal smoking is one of the prominent risk factors contributing to HI injury. Mitochondrial integrity plays a critical role in neural injury and repair during HI. We previously showed that maternal cigarette smoke exposure (SE) can reduce brain mitochondrial fission and autophagosome markers in male offspring. This was accompanied by increased brain cell apoptosis (active caspase-3) and DNA fragmentation (TUNEL staining). Here, we aimed to investigate whether maternal SE leads to more severe neurological damage after HI brain injury in male offspring. Female BALB/c mice (8 weeks) were exposed to cigarette smoke prior to mating, during gestation, and lactation. At postnatal day 10, half of the pups from each litter underwent left carotid artery occlusion, followed by exposure to 8% oxygen (92% nitrogen).

At postnatal day 40–44, maternal SE reduced grip strength in grip traction and foot fault tests, which were also reduced by HI injury to similar levels regardless of the maternal group. Limb coordination was impaired by maternal SE which was not worsened by HI injury. Maternal SE increased anxiety level in the offspring, which was normalized by HI injury. Apoptosis markers were increased in different brain regions by maternal SE, with the cortex having further increased TUNEL by HI injury, along with increased markers of inflammation and mitophagy. We conclude that maternal SE can worsen HI-induced cellular damage in male offspring well into adolescence.

[PMID: 29018327](#)

18. Neuronal SIRT1 (Silent Information Regulator 2 Homologue 1) Regulates Glycolysis and Mediates Resveratrol-Induced Ischemic Tolerance.

Koronowski KB, Khoury N, Saul I, Loris ZB, Cohan CH, Stradecki-Cohan HM, Dave KR, Young JI, Perez-Pinzon MA.

Stroke. 2017 Oct 10. pii: STROKEAHA.117.018562. doi: 10.1161/STROKEAHA.117.018562. [Epub ahead of print]

BACKGROUND AND PURPOSE: Resveratrol, at least in part via SIRT1 (silent information regulator 2 homologue 1) activation, protects against cerebral ischemia when administered 2 days before injury. However, it remains unclear if SIRT1 activation must occur, and in which brain cell types, for the induction of neuroprotection. We hypothesized that neuronal SIRT1 is essential for resveratrol-induced ischemic tolerance and sought to characterize the metabolic pathways regulated by neuronal Sirt1 at the cellular level in the brain. **METHODS:** We assessed infarct size and functional outcome after transient 60 minute middle cerebral artery occlusion in control and inducible, neuronal-specific SIRT1 knockout mice. Nontargeted primary metabolomics analysis identified putative SIRT1-regulated pathways in brain. Glycolytic function was evaluated in acute brain slices from adult mice and primary neuronal-enriched cultures under ischemic penumbra-like conditions. **RESULTS:** Resveratrol-induced neuroprotection from stroke was lost in neuronal Sirt1 knockout mice. Metabolomics analysis revealed alterations in glucose metabolism on deletion of neuronal Sirt1, accompanied by transcriptional changes in glucose metabolism machinery. Furthermore, glycolytic ATP production was impaired in acute brain slices from neuronal Sirt1 knockout mice. Conversely, resveratrol increased glycolytic rate in a SIRT1-dependent manner and under ischemic penumbra-like conditions in vitro. **CONCLUSIONS:** Our data demonstrate that resveratrol requires neuronal SIRT1 to elicit ischemic tolerance and identify a novel role for SIRT1 in the regulation of glycolytic function in brain. Identification of robust neuroprotective mechanisms that underlie ischemia tolerance and the metabolic adaptations mediated by SIRT1 in brain are crucial for the translation of therapies in cerebral ischemia and other neurological disorders.

[PMID: 29018134](#)

19. Maternal Glucose Supplementation in a Murine Model of Chorioamnionitis Alleviates Dysregulation of Autophagy in Fetal Brain.

Lei J, Zhong W, Almalki A, Zhao H, Arif H, Rozzah R, Al Yousif G, Alhejaily N, Wu D, McLane M, Burd I.

Reprod Sci. 2017 Jan 1:1933719117734321. doi: 10.1177/1933719117734321. [Epub ahead of print]

Fetal brain injury induced by intrauterine inflammation is a major risk factor for adverse neurological outcomes, including cerebral palsy, cognitive dysfunction, and behavioral disabilities. There are no adequate therapies for neuronal protection to reduce fetal brain injury, especially new strategies that may apply promptly and conveniently. In this study, we explored the effect of maternal glucose administration in a mouse model of intrauterine inflammation at term. Our results demonstrated that maternal glucose supplementation significantly increased survival birth rate and improved the neurobehavioral performance of pups exposed to intrauterine inflammation. Furthermore, we demonstrated that maternal glucose administration improved myelination and oligodendrocyte development in offspring exposed to intrauterine inflammation. Though the maternal blood glucose concentration was temporally prevented from decrease induced by intrauterine inflammation, the glucose concentration in fetal brain was not recovered by maternal glucose supplementation. The adenosine triphosphate (ATP) level and autophagy in fetal brain were regulated by maternal glucose supplementation, which may prevent dysregulation of cellular metabolism. Our study is the first to provide evidence for the role of maternal glucose supplementation in the cell survival of fetal brain during intrauterine inflammation and further support the possible medication with maternal glucose treatment

[PMID: 29017418](#)

20. Future perspectives of cell therapy for neonatal hypoxic-ischemic encephalopathy.

Nabetani M, Shintaku H, Hamazaki T.

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Neonatal ischemic brain injury causes permanent motor-deficit cerebral palsy. Hypoxic-ischemic encephalopathy (HIE) is a very serious condition that can result in death and disability. In 1997, we reported that irreversible neuronal cell damage is induced by the elevation of intracellular Ca ion concentration that has occurred in sequence after excess accumulation of the excitatory neurotransmitter glutamate during ischemia. We also reported that hypothermia was effective in treating ischemic brain damage in rats by suppressing energy loss and raising intracellular Ca ion concentration. Following the 2010 revised International Liaison Committee on Resuscitation guideline, our group developed the Guideline for the treatment of Hypothermia in Japan, and we started online case registry in January 2012. However, therapeutic hypothermia must be initiated within the first 6 h after birth. By contrast, cell therapy may have a much longer therapeutic time window because it might reduce apoptosis/oxidative stress and enhance the regenerative process. In 2014, we administered autologous umbilical cord blood stem cell (UCBC) therapy for neonatal HIE, for the first time in Japan. We enrolled five full-term newborns with moderate to severe HIE. Our autologous UCBC therapy is leading to new protocols for prevention of ischemic brain damage. *Pediatric Research* accepted article preview online, 10 October 2017. doi:10.1038/pr.2017.260.

[PMID: 29016557](#)

21. Use of progesterone supplement therapy for prevention of preterm birth: review of literatures.

Choi SJ.

Obstet Gynecol Sci. 2017 Sep;60(5):405-420. doi: 10.5468/ogs.2017.60.5.405. Epub 2017 Sep 18.

Preterm birth (PTB) is one of the most common complications during pregnancy and it primarily accounts for neonatal mortality and numerous morbidities including long-term sequelae including cerebral palsy and developmental disability. The most effective treatment of PTB is prediction and prevention of its risks. Risk factors of PTB include history of PTB, short cervical length (CL), multiple pregnancies, ethnicity, smoking, uterine anomaly and history of curettage or cervical conization. Among these risk factors, history of PTB, and short CL are the most important predictive factors. Progesterone supplement therapy is one of the few proven effective methods to prevent PTB in women with history of spontaneous PTB and in women with short CL. There are 2 types of progesterone therapy currently used for prevention of PTB: weekly intramuscular injection of 17-alpha hydroxyprogesterone caproate and daily administration of natural micronized progesterone vaginal gel, vaginal suppository, or oral capsule. However, the efficacy of progesterone therapy to prevent PTB may vary depending on the administration route, form, dose of progesterone and indications for the treatment. This review aims to summarize the efficacy and safety of progesterone supplement therapy on prevention of PTB according to different indication, type, route, and dose of progesterone, based on the results of recent randomized trials and meta-analysis.

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