

Postnatal Corticosteroids: Balancing Neurological Risks of Treatment vs. Disease

References

Barrington KJ. The adverse neuro-developmental effects of postnatal steroids in the preterm infant: a systematic review of RCTs. BMC Pediatr. 2001;1:1. doi: 10.1186/1471-2431-1-1. Epub 2001 Feb 27. PMID: 11248841; PMCID: PMC29104.

Baud O, Trousson C, Biran V, Leroy E, Mohamed D, et al; PREMILOC Trial Group. Association Between Early Low-Dose Hydrocortisone Therapy in Extremely Preterm Neonates and Neurodevelopmental Outcomes at 2 Years of Age. JAMA. 2017 Apr 4;317(13):1329-1337. doi: 10.1001/jama.2017.2692. PMID: 28384828.

Baud O, Maury L, Lebail F, Ramful D, El Moussawi F, et al; PREMILOC trial study group. Effect of early low-dose hydrocortisone on survival without bronchopulmonary dysplasia in extremely preterm infants (PREMILOC): a double-blind, placebo-controlled, multicentre, randomised trial. Lancet. 2016 Apr 30;387(10030):1827-36. doi: 10.1016/S0140-6736(16)00202-6. Epub 2016 Feb 23. PMID: 26916176.

Burnett AC, Cheong JLY, Doyle LW. Biological and Social Influences on the Neurodevelopmental Outcomes of Preterm Infants. Clin Perinatol. 2018 Sep;45(3):485-500. doi: 10.1016/j.clp.2018.05.005. PMID: 30144851.

Cummings JJ, Pramanik AK; COMMITTEE ON FETUS AND NEWBORN. Postnatal Corticosteroids to Prevent or Treat Chronic Lung Disease Following Preterm Birth. Pediatrics. 2022 Jun 1;149(6):e2022057530. doi: 10.1542/peds.2022-057530. PMID: 37917016.

Ding L, Wang H, Geng H, Cui N, Huang F, et al. Prediction of Bronchopulmonary Dysplasia in Preterm Infants Using Postnatal Risk Factors. Front Pediatr. 2020 Jun 26;8:349. doi: 10.3389/fped.2020.00349. PMID: 32676490; PMCID: PMC7333538.

Doyle LW, Mainzer RM, Cheong JLY. Further Considerations on Corticosteroid Use in Premature Infants-Reply. JAMA Pediatr. 2025 Apr 1;179(4):481. doi: 10.1001/jamapediatrics.2024.7124. PMID: 39992632.

Doyle LW, Carse E, Adams AM, Ranganathan S, Opie G, Cheong JLY; Victorian Infant Collaborative Study Group. Ventilation in Extremely Preterm Infants and Respiratory Function at 8 Years. N Engl J Med. 2017 Jul 27;377(4):329-337. doi: 10.1056/NEJMoa1700827. PMID: 28745986.

Doyle LW, Halliday HL, Ehrenkranz RA, Davis PG, Sinclair JC. An update on the impact of postnatal systemic corticosteroids on mortality and cerebral palsy in preterm infants: effect modification by risk of bronchopulmonary dysplasia. J Pediatr. 2014 Dec;165(6):1258-60. doi: 10.1016/j.jpeds.2014.07.049. Epub 2014 Sep 10. PMID: 25217197.

Doyle LW, Halliday HL, Ehrenkranz RA, Davis PG, Sinclair JC. Impact of postnatal systemic corticosteroids on mortality and cerebral palsy in preterm infants: effect modification by risk for chronic lung disease. Pediatrics. 2005 Mar;115(3):655-61. doi: 10.1542/peds.2004-1238. PMID: 15741368.

Gross SJ, Anbar RD, Mettelman BB. Follow-up at 15 years of preterm infants from a controlled trial of moderately early dexamethasone for the prevention of chronic lung disease. Pediatrics. 2005 Mar;115(3):681-7. doi: 10.1542/peds.2004-0956. PMID: 15741372.

Grunau RE, Haley DW, Whitfield MF, Weinberg J, Yu W, Thiessen P. Altered basal cortisol levels at 3, 6, 8 and 18 months in infants born at extremely low gestational age. *J Pediatr.* 2007 Feb;150(2):151-6. doi: 10.1016/j.jpeds.2006.10.053. PMID: 17236892; PMCID: PMC1851896.

Halbmeijer NM, Onland W, Cools F, Swarte R, van der Heide-Jalving M, et al; STOP-BPD Trial Collaborators. Effect of Systemic Hydrocortisone Initiated 7 to 14 Days After Birth in Ventilated Preterm Infants on Mortality and Neurodevelopment at 2 Years' Corrected Age: Follow-up of a Randomized Clinical Trial. *JAMA.* 2021 Jul 27;326(4):355-357. doi: 10.1001/jama.2021.9380. PMID: 34313697; PMCID: PMC8317011.

Halliday HL, Ehrenkranz RA, Doyle LW. Early (< 8 days) postnatal corticosteroids for preventing chronic lung disease in preterm infants. *Cochrane Database Syst Rev.* 2009 Jan 21;(1):CD001146. doi: 10.1002/14651858.CD001146.pub2. PMID: 19160190.

Harris C, Bisquera A, Zivanovic S, Lunt A, Calvert S, et al. Postnatal dexamethasone exposure and lung function in adolescents born very prematurely. *PLoS One.* 2020 Aug 7;15(8):e0237080. doi: 10.1371/journal.pone.0237080. PMID: 32764779; PMCID: PMC7413559.

Hay S, Ovelman C, Zupancic JA, Doyle LW, Onland W, et al. Systemic corticosteroids for the prevention of bronchopulmonary dysplasia, a network meta-analysis. *Cochrane Database Syst Rev.* 2023 Aug 31;8(8):CD013730. doi: 10.1002/14651858.CD013730.pub2. PMID: 37650547; PMCID: PMC10468918.

Jensen EA, Watterberg KL. Postnatal Corticosteroids To Prevent Bronchopulmonary Dysplasia. *Neoreviews.* 2023 Nov 1;24(11):e691-e703. doi: 10.1542/neo.24-11-e691. PMID: 37907402.

Jensen EA, Dysart K, Gantz MG, McDonald S, Bamat NA, et al. The Diagnosis of Bronchopulmonary Dysplasia in Very Preterm Infants. An Evidence-based Approach. *Am J Respir Crit Care Med.* 2019 Sep 15;200(6):751-759. doi: 10.1164/rccm.201812-2348OC. PMID: 30995069; PMCID: PMC6775872.

Jensen EA, Wiener LE, Rysavy MA, Dysart KC, Gantz MG, et al; Eunice Kennedy Shriver National Institute of Child Health and Human Development Neonatal Research Network. Assessment of Corticosteroid Therapy and Death or Disability According to Pretreatment Risk of Death or Bronchopulmonary Dysplasia in Extremely Preterm Infants. *JAMA Netw Open.* 2023 May 1;6(5):e2312277. doi: 10.1001/jamanetworkopen.2023.12277. PMID: 37155165; PMCID: PMC10167571.

Jobe AH. The new bronchopulmonary dysplasia. *Curr Opin Pediatr.* 2011 Apr;23(2):167-72. doi: 10.1097/MOP.0b013e3283423e6b. PMID: 21169836; PMCID: PMC3265791.

Kaempf JW, Guillen U, Litt JS, Zupancic JAF, Kirpalani H. Change in neurodevelopmental outcomes for extremely premature infants over time: a systematic review and meta-analysis. *Arch Dis Child Fetal Neonatal Ed.* 2023 Sep;108(5):458-463. doi: 10.1136/archdischild-2022-324457. Epub 2022 Oct 21. PMID: 36270779.

Kline JE, Illapani VSP, He L, Altaye M, Parikh NA. Retinopathy of Prematurity and Bronchopulmonary Dysplasia are Independent Antecedents of Cortical Maturational Abnormalities in Very Preterm Infants. *Sci Rep.* 2019 Dec 23;9(1):19679. doi: 10.1038/s41598-019-56298-x. Erratum in: *Sci Rep.* 2021 Mar 23;11(1):7055. doi: 10.1038/s41598-021-86025-4. PMID: 31873183; PMCID: PMC6928014.

Laughon MM, Langer JC, Bose CL, Smith PB, Ambalavanan N, et al; Eunice Kennedy Shriver National Institute of Child Health and Human Development Neonatal Research Network. Prediction of bronchopulmonary dysplasia by postnatal age in extremely premature infants. *Am J Respir Crit Care Med.* 2011 Jun 15;183(12):1715-22. doi: 10.1164/rccm.201101-0055OC. Epub 2011 Mar 4. PMID: 21471086; PMCID: PMC3136997.

Marr BL, Mettelman BB, Bode MM, Gross SJ. Randomized Trial of 42-Day Compared with 9-Day Courses of Dexamethasone for the Treatment of Evolving Bronchopulmonary Dysplasia in Extremely Preterm Infants. *J Pediatr*. 2019 Aug;211:20-26.e1. doi: 10.1016/j.jpeds.2019.04.047. PMID: 31349916.

Mieskonen S, Eronen M, Malmberg LP, Turpeinen M, Kari MA, et al. Controlled trial of dexamethasone in neonatal chronic lung disease: an 8-year follow-up of cardiopulmonary function and growth. *Acta Paediatr*. 2003 Aug;92(8):896-904. PMID: 12948063.

Nakashima T, Inoue H, Sakemi Y, Ochiai M, Yamashita H, Ohga S; Neonatal Research Network of Japan. Trends in Bronchopulmonary Dysplasia Among Extremely Preterm Infants in Japan, 2003-2016. *J Pediatr*. 2021 Mar;230:119-125.e7. doi: 10.1016/j.jpeds.2020.11.041. Epub 2020 Nov 24. PMID: 33246013.

Nixon PA, Washburn LK, Schechter MS, O'Shea TM. Follow-up study of a randomized controlled trial of postnatal dexamethasone therapy in very low birth weight infants: effects on pulmonary outcomes at age 8 to 11 years. *J Pediatr*. 2007 Apr;150(4):345-50. doi: 10.1016/j.jpeds.2006.12.013. PMID: 17382108; PMCID: PMC2897232.

Onland W, Offringa M, De Jaegere AP, van Kaam AH. Finding the optimal postnatal dexamethasone regimen for preterm infants at risk of bronchopulmonary dysplasia: a systematic review of placebo-controlled trials. *Pediatrics*. 2009 Jan;123(1):367-77. doi: 10.1542/peds.2008-0016. PMID: 19117904.

Onland W, Cools F, Kroon A, Rademaker K, Merkus MP, et al; STOP-BPD Study Group. Effect of Hydrocortisone Therapy Initiated 7 to 14 Days After Birth on Mortality or Bronchopulmonary Dysplasia Among Very Preterm Infants Receiving Mechanical Ventilation: A Randomized Clinical Trial. *JAMA*. 2019 Jan 29;321(4):354-363. doi: 10.1001/jama.2018.21443. PMID: 30694322; PMCID: PMC6439762.

Parikh NA. The Swinging Pendulum of Postnatal Corticosteroid Use. *JAMA Pediatr*. 2021 Jun 1;175(6):e206842. doi: 10.1001/jamapediatrics.2020.6842. Epub 2021 Jun 7. PMID: 33720286.

Parikh NA, Kennedy KA, Lasky RE, Tyson JE. Neurodevelopmental Outcomes of Extremely Preterm Infants Randomized to Stress Dose Hydrocortisone. *PLoS One*. 2015 Sep 16;10(9):e0137051. doi: 10.1371/journal.pone.0137051. PMID: 26376074; PMCID: PMC4573756.

Parikh NA, Kennedy KA, Lasky RE, McDavid GE, Tyson JE. Pilot randomized trial of hydrocortisone in ventilator-dependent extremely preterm infants: effects on regional brain volumes. *J Pediatr*. 2013 Apr;162(4):685-690.e1. doi: 10.1016/j.jpeds.2012.09.054. Epub 2012 Nov 8. PMID: 23140612; PMCID: PMC3609889.

Parikh NA, Lasky RE, Kennedy KA, Moya FR, Hochhauser L, et al. Postnatal dexamethasone therapy and cerebral tissue volumes in extremely low birth weight infants. *Pediatrics*. 2007 Feb;119(2):265-72. doi: 10.1542/peds.2006-1354. PMID: 17272615.

Ramaswamy VV, Bandyopadhyay T, Nanda D, Bandiya P, Ahmed J, et al. Assessment of Postnatal Corticosteroids for the Prevention of Bronchopulmonary Dysplasia in Preterm Neonates: A Systematic Review and Network Meta-analysis. *JAMA Pediatr*. 2021 Jun 1;175(6):e206826. doi: 10.1001/jamapediatrics.2020.6826. Epub 2021 Jun 7. PMID: 33720274; PMCID: PMC7961472.

Schmidt B, Asztalos EV, Roberts RS, Robertson CM, Sauve RS, et al; Trial of Indomethacin Prophylaxis in Preterms (TIPP) Investigators. Impact of bronchopulmonary dysplasia, brain injury, and severe retinopathy on the outcome of extremely low-birth-weight infants at 18 months: results from the trial of indomethacin prophylaxis in preterms. *JAMA*. 2003 Mar 5;289(9):1124-9. doi: 10.1001/jama.289.9.1124. PMID: 12622582.

Simpson SJ, Du Berry C, Evans DJ, Gibbons JTD, Vollsæter M, et al; PELICAN. Unravelling the respiratory health path across the lifespan for survivors of preterm birth. *Lancet Respir Med*. 2024 Feb;12(2):167-180. doi: 10.1016/S2213-2600(23)00272-2. Epub 2023 Nov 14. PMID: 37972623.

Simpson SJ, Turkovic L, Wilson AC, Verheggen M, Logie KM, et al. Lung function trajectories throughout childhood in survivors of very preterm birth: a longitudinal cohort study. *Lancet Child Adolesc Health*. 2018 May;2(5):350-359. doi: 10.1016/S2352-4642(18)30064-6. Epub 2018 Mar 22. PMID: 30169268.

Skidmore MD, Rivers A, Hack M. Increased risk of cerebral palsy among very low-birthweight infants with chronic lung disease. *Dev Med Child Neurol*. 1990 Apr;32(4):325-32. doi: 10.1111/j.1469-8749.1990.tb16944.x. PMID: 2332123.

Soll RF, Edwards EM, Badger GJ, Kenny MJ, Morrow KA, et al. Obstetric and neonatal care practices for infants 501 to 1500 g from 2000 to 2009. *Pediatrics*. 2013 Aug;132(2):222-8. doi: 10.1542/peds.2013-0501. Epub 2013 Jul 15. PMID: 23858426.

Stark AR, Carlo WA, Tyson JE, Papile LA, Wright LL, et al; National Institute of Child Health and Human Development Neonatal Research Network. Adverse effects of early dexamethasone treatment in extremely-low-birth-weight infants. National Institute of Child Health and Human Development Neonatal Research Network. *N Engl J Med*. 2001 Jan 11;344(2):95-101. doi: 10.1056/NEJM200101113440203. PMID: 11150359.

Thompson DK, Warfield SK, Carlin JB, Pavlovic M, Wang HX, et al. Perinatal risk factors altering regional brain structure in the preterm infant. *Brain*. 2007 Mar;130(Pt 3):667-77. doi: 10.1093/brain/awl277. Epub 2006 Sep 28. PMID: 17008333.

Walsh MC, Yao Q, Horbar JD, Carpenter JH, Lee SK, et al. Changes in the use of postnatal steroids for bronchopulmonary dysplasia in 3 large neonatal networks. *Pediatrics*. 2006 Nov;118(5):e1328-35. doi: 10.1542/peds.2006-0359. PMID: 17079534.

Watterberg KL, Walsh MC, Li L, Chawla S, D'Angio CT, et al; Eunice Kennedy Shriver NICHD Neonatal Research Network. Hydrocortisone to Improve Survival without Bronchopulmonary Dysplasia. *N Engl J Med*. 2022 Mar 24;386(12):1121-1131. doi: 10.1056/NEJMoa2114897. PMID: 35320643; PMCID: PMC9107291.

Yeh TF, Lin YJ, Hsieh WS, Lin HC, Lin CH, et al. Early postnatal dexamethasone therapy for the prevention of chronic lung disease in preterm infants with respiratory distress syndrome: a multicenter clinical trial. *Pediatrics*. 1997 Oct;100(4):E3. doi: 10.1542/peds.100.4.e3. PMID: 9310536.

Yeh TF, Lin YJ, Huang CC, Chen YJ, Lin CH, et al. Early dexamethasone therapy in preterm infants: a follow-up study. *Pediatrics*. 1998 May;101(5):E7. doi: 10.1542/peds.101.5.e7. PMID: 9565440.

Yoder BA, Harrison M, Clark RH. Time-related changes in steroid use and bronchopulmonary dysplasia in preterm infants. *Pediatrics*. 2009 Aug;124(2):673-9. doi: 10.1542/peds.2008-2793. Epub 2009 Jul 20. PMID: 19620192.

Yu VY, Orgill AA, Lim SB, Bajuk B, Astbury J. Growth and development of very low birthweight infants recovering from bronchopulmonary dysplasia. *Arch Dis Child*. 1983 Oct;58(10):791-4. doi: 10.1136/adc.58.10.791. PMID: 6639126; PMCID: PMC1628281.