

Mpox (formerly known as Monkeypox)

Selected References:

- Allan-Blitz L.T, Klausner J.D. 2023. Current Evidence Demonstrates That Monkeypox Is a Sexually Transmitted Infection. *Sex Transm Dis.* 1;50(2):63-65.
- Centers for Disease Control and Prevention. 2024. Preventing Mpox. Accessed September 2024 <https://www.cdc.gov/mpox/prevention/index.html>.
- Centers for Disease Control and Prevention. 2024. Safer Sex. Accessed September 2024 <https://www.cdc.gov/mpox/prevention/safer-sex-social-gatherings-and-mpox.html>.
- García-Hernández L, et al. 2024. Case report: clinical presentation of Mpox in pregnancy. *Rev Clin Esp (Barc).* (4):245-247.
- Jamieson DJ, et al. 2004. The role of the obstetrician-gynecologist in emerging infectious diseases: mpox and pregnancy. *Obstetrics & Gynecology* 103(4):754-756.
- Khalil A, et al. 2022. Mpox and pregnancy: what do obstetricians need to know? *Ultrasound Obstet Gynecol;* 60(1):22-27.
- Kisalu NK and Mokili JL. 2017. Toward understanding the outcomes of mpox infection in human pregnancy. *J Infectious Diseases* 216(7):795–797.
- Mbala PK, et al. 2017. Maternal and fetal outcomes among pregnant women with human mpox infection in the Democratic Republic of Congo. *J Infectious Diseases* 216(7):824-828.
- Nishiura H. 2009. Maternal outcomes in pregnancy with smallpox: epidemiologic investigations of case fatality, miscarriage and premature birth based on previous outbreaks. In: Canfield RN, ed. *Infectious Pregnancy Complications*. Nova Science Publishers, Inc.; 2009:407-420.
- Ogoina D, et al. 2020. Clinical course and outcome of human mpox in Nigeria. *Clin Infect Dis.* 71:e210–e214.
- Rao AK, et al. 2023. Interim Clinical Treatment Considerations for Severe Manifestations of Mpox — United States, February 2023. *MMWR Morb Mortal Wkly Rep* 72:232–243.
- Sampson MM, et al. 2023. Mpox (Mpox) Infection During Pregnancy. *Obstet Gynecol.* 1;141(5):1007-1010.
- Schwartz DA. 2024. High Rates of Miscarriage and Stillbirth among Pregnant Women with Clade I Mpox (Mpox) Are Confirmed during 2023-2024 DR Congo Outbreak in South Kivu Province. *Viruses.* 13;16(7):1123.
- World Health Organization. 2022. WHO recommends new name for Monkeypox disease. Accessed September 2024 <https://www.who.int/news/item/28-11-2022-who-recommends-new-name-for-monkeypox-disease>.

Questions? Call 866.626.6847 | Text 855.999.3525 | Email or Chat at [MotherToBaby.org](https://www.MotherToBaby.org).

Disclaimer: MotherToBaby Fact Sheets are meant for general information purposes and should not replace the advice of your health care provider. MotherToBaby is a service of the non-profit Organization of Teratology Information Specialists (OTIS). Copyright by OTIS, September 1, 2024.

Mpox (formerly known as Monkeypox)

Selected References:

- Allan KM, et al. 2015. Maternal vitamin D and E intakes during pregnancy are associated with asthma in children. *Eur Respir J*. 2015 Apr;45(4):1027-1036.
- Ashraf M, et al. 2020. Changes in vitamin E levels as a marker of female infertility. *J Pak Med Assoc* 70(10): 1762-1766.
- Beers MH, et al. 1999. *Merck Manual Diagnosis & Therapy*, 17th ed., 2833.
- Boskovic R, et al. 2005. Pregnancy outcome following high doses of vitamin E supplementation. *Reprod Toxicol* 20:85-88.
- Gilboa SM, et al. 2014. National Birth Defects Prevention Study. Maternal intake of vitamin E and birth defects, national birth defects prevention study, 1997 to 2005. *Birth Defects Res A Clin Mol Teratol*. 100(9):647-657.
- Gross SJ, Gabriel E. 1985. Vitamin E status in preterm infants fed human milk or infant formula. *J Pediatr* 106:635-639.
- Gyorgy P, et al. 1952. Availability of vitamin E in the newborn infant. *Proc Soc Exp Biol Med* 81:536-538.
- Hook EB, et al. 1974. Vitamin E, Teratogen or anti-teratogen? *Lancet* 1:809.
- Kanno C, et al. 1989. Transfer of orally administered alpha-tocopherol into human milk. *J Nutr Sci Vitaminol (Tokyo)* 35:649-653.
- Martinez Fe, et al. 1984. Evaluation of plasma tocopherols in relation to hematological indices of Brazilian infants on human milk and cow's milk regime from birth to 1 year of age. *Am J Clin Nutr* 39:969-974.
- Maslova E, et al. 2014. 2014. Maternal intake of vitamins A, E and K in pregnancy and child allergic disease: a longitudinal study from the Danish National Birth Cohort. *British J Nutr* 111: 1096-1108.
- Mino M, Nishino H. 1973. Fetal and maternal relationship in serum vitamin E level. *J Nutr Sci Vitaminol* 19:475-482.
- National Institutes of Health Office of Dietary Supplements. 2021. Vitamin E: Fact Sheet for Health Professionals. Available at: <https://ods.od.nih.gov/factsheets/VitaminE-HealthProfessional/>. Accessed 3 July 2024.
- Scholl TO, et al. 2006. Vitamin E: maternal concentrations are associated with fetal growth. *Am J Clin Nutr* 84(6):1442-1448.
- Smedts HP, et al. 2009. High maternal vitamin E intake by diet or supplements is associated with congenital heart defects in the offspring. *BJOG*. 116(3):416-423.
- Ruder EH, et al. 2014. Female dietary antioxidant intake and time to pregnancy among couples treated for unexplained infertility. *Fertil Steril* 101(3): 759-766.
- Wu H, et al. 2018. Does vitamin E prevent asthma or wheeze in children: A systematic review and meta-analysis. *Paediatr Respir Rev*. 27:60-68.
- XI Y, et al. 2022. Vitamin E concentration in breast milk in different periods of lactation: meta-analysis. *Front Nutr* 9: 1050011.

Questions? Call 866.626.6847 | Text 855.999.3525 | Email or Chat at [MotherToBaby.org](https://www.MotherToBaby.org).

Disclaimer: MotherToBaby Fact Sheets are meant for general information purposes and should not replace the advice of your health care provider. MotherToBaby is a service of the non-profit Organization of Teratology Information Specialists (OTIS). Copyright by OTIS, September 1, 2024.

Mpox (formerly known as Monkeypox)

Selected References

- Bruckmaier R, et al. 1991. Effects of alpha- and beta-adrenergic agonists in intramammary pressure and milk flow in dairy cows. *J Dairy Res.* 58:411-419.
- Cottle MKW, et al. 1982. Effects of phenylephrine and sodium salicylate on maternal and fetal cardiovascular indices and blood oxygenation in sheep. *Am J Obstet Gynecol.* 143:170-176.
- Gilbert-Barness E, Drut RM. 2000. Association of sympathomimetic drugs with malformations. *Vet Hum Toxicol.* 42:168-171.
- Heinonen OP, et al. 1977. *Birth Defects and Drugs in Pregnancy*, Littleton, Publishing Sciences Group, pp 345-356, 439, 476, 491.
- Mohta M, et al. 2022. Neonatal outcomes following phenylephrine or norepinephrine for treatment of spinal anesthesia-induced hypotension at emergency cesarean section in women with fetal compromise: a randomised controlled study. *Int J of Obstet Anesthesia* 49:103247.
- Rothman KJ, et al. 1979. Exogenous hormones and other drug exposures of children with congenital heart disease. *Am J Epidemiol.* 109:433-439.
- Schatz M, et al. 1997. Asthma and allergy in pregnancy. *Clin Perinatol.* 24(2):407-432.
- Ugen KE, Scott WJ Jr. 1987. Reduction of uterine blood flow by phenylephrine, an alpha-adrenergic agonist, in the day 11 pregnant rat: relationship to potentiation of acetazolamide teratogenesis. *Teratology.* 36(1):133-141.
- Yau W-P, et al. 2013. Use of decongestants during pregnancy and the risk of birth defects. *Am J Epidemiol.* 178(2):198-208.
- Werler MM, et al. 2003. Association of vasoconstrictive exposures with risks of gastroschisis and small intestinal atresia. *Epidemiology.* 14(3):349-354.
- Werler MM, et al. 2002. Maternal medication use and risks of gastroschisis and small intestinal atresia. *Am J Epidemiol.* 155(1):26-31.
- Werler MM, et al. 2004. Vasoactive exposures, vascular events, and hemifacial microsomia. *Birth Defects Res A Clin Mol Teratol* 70(6):389-395.
- Zierler S, Rothman KJ. 1985. Congenital heart disease in relation to maternal use of Bendectin and other drugs in early pregnancy. *N Engl J Med.* 313:347-352

Questions? Call 866.626.6847 | Text 855.999.3525 | Email or Chat at [MotherToBaby.org](https://www.MotherToBaby.org).

Disclaimer: MotherToBaby Fact Sheets are meant for general information purposes and should not replace the advice of your health care provider. MotherToBaby is a service of the non-profit Organization of Teratology Information Specialists (OTIS). Copyright by OTIS, September 1, 2024.

Mpox (formerly known as Monkeypox)

Selected References:

- Achkar M, et al. 2015. Vitamin D status in early pregnancy and risk of preeclampsia. *Am J Obstet Gynecol* 212:511.e1-7.
- Adrien N, et al. 2023. Early pregnancy vitamin D status and risk of select congenital anomalies in the National Birth Defects Prevention Study. *Birth Defects Res* 115:290-301.
- Allan KM, et al. 2015. Maternal vitamin D and E intakes during pregnancy are associated with asthma in children. *Eur Respir J*. 45(4):1027-1036.
- American College of Obstetricians and Gynecologists (ACOG). 2024. Committee Opinion No. 495: Vitamin D: screening and supplementation during pregnancy. Committee on Obstetric Practice.
- Andersen LB, et al. 2015. Vitamin D insufficiency is associated with increased risk of first-trimester miscarriage in the Odense Child Cohort. *Am J Clin Nutr*. 102(3):633-638.
- Bodnar LM, et al. 2007. Maternal vitamin D deficiency increases the risk of preeclampsia. *J Clin Endocrinol Metab* 92(9):3517-3522.
- Bodnar LM, et al. 2014. Maternal vitamin D status and spontaneous preterm birth by placental histology in the US Collaborative Perinatal Project. *Am J Epidemiol* 179(2): 168-176.
- Brooke OG, et al. 1980. Vitamin D supplements in pregnant Asian women: effects on calcium status and fetal growth. *Br Med J* 280:751-754.
- Camargo CA Jr, et al. 2007. Maternal intake of vitamin D during pregnancy and risk of recurrent wheeze in children at 3 y of age. *Am J Clin Nutr*; 85:788-795.
- Caplan RH & Beguin EA. 1990. Hypercalcemia in a calcitriol-treated hypoparathyroid woman during lactation. *Obstet Gynecol* 76:485-489.
- Caretta N, et al. 2016. Hypovitaminosis D is associated with erectile dysfunction in type 2 diabetes. *Endocrine*. 53(3):831-838.
- Chen C, et al. 2022. Association between serum vitamin D level during pregnancy and recurrent spontaneous abortion: a systematic review and meta-analysis. *Am J Reprod Immunol* 88(3):e13582.
- Chen YH, et al. 2015. Maternal vitamin D deficiency during pregnancy elevates the risks of small for gestational age and low birth weight infants in Chinese population. *J Clin Endocrinol Metab*. 100(5):1912-1919.
- Cockburn F, et al. 1980. Maternal vitamin D intake and mineral metabolism in mothers and newborn infants. *Br*

Med J 281:11-13.

- Cundy T, et al. 1987. Remission of hypoparathyroidism during lactation: evidence for a physiological role for prolactin in the regulation of vitamin D metabolism. *Clin Endocrinol (Oxf)*. 26:667-674.
- Daglar K, et al. 2016. Maternal serum vitamin D levels in pregnancies complicated by neural tube defects. *J Matern Fetal Neonatal Med*. 29(2):298-302.
- De-Regil LM, et al. 2016. Vitamin D supplementation for women during pregnancy. *Cochrane Database of Systematic Reviews*. Issue 1. Art. No.: CD008873.
- Delvin EE, et al. 1986. Vitamin D supplementation during pregnancy: effect on neonatal calcium homeostasis. *J Pediatr* 109:328-334.
- Demay MB, et al. 2024. Vitamin D for the prevention of disease: an endocrine society clinical practice guideline. *J Clin Endocrinol Metab* 109:1907-1947.
- Devereux G, et al. 2007. Maternal vitamin D intake during pregnancy and early childhood wheezing. *Am J Clin Nutr* 85:853-859.
- Dror DK. 2011. Vitamin D status during pregnancy: maternal, fetal, and postnatal outcomes. *Curr Opin Obstet Gynecol* 23:422-426.
- Goodenay LS & Gordan GS. 1971. Fetal safety of vitamin D during pregnancy. *Clin Res* 19:200.
- Goodenay LS & Gordan GS. 1971. No risk from vitamin D during pregnancy. *Ann Intern Med* 75:807-808.
- Fung JL, et al. 2017. Association of vitamin D intake and serum levels with fertility: Results from the Lifestyle and Fertility Study. *Fertil Steril* 108(2):L302-311.
- Handel MN, et al. 2017. Prenatal exposure to vitamin D from fortified margarine and risk of fractures in late childhood: period and cohort results from 222 000 subjects in the D-tect observational study. *Br J Nutr*. 117(6):872-881.
- Hansen S, et al. 2015. The long-term programming effect of maternal 25-hydroxyvitamin D in pregnancy on allergic airway disease and lung function in offspring after 20 to 25 years of follow-up. *J Allergy Clin Immunol*. 136(1):169-176.e2.
- Harvey NC, et al. 2014. Vitamin D supplementation in pregnancy: a systematic review. *Health Technol Assess*. 18(45):1-190.
- Haugen M, et al. 2009. Vitamin D supplementation and reduced risk of preeclampsia in nulliparous women. *Epidemiology* 20(5):720-726.
- Haussler MR & McCain TA. 1977. Basic and clinical concepts related to vitamin D metabolism and action. *N Engl J Med* 297:1041-1050.
- Heckmatt JZ, et al. 1979. Plasma 25-hydroxyvitamin D in pregnant Asian women and their babies. *Lancet* 2:546-548.
- Holick MF, et al. 2012. Guidelines for preventing and treating vitamin D deficiency and insufficiency revisited. *The Journal of Clinical Endocrinology & Metabolism*, 97(4): 1153-1158.
- Hollis BW. 2005. Circulating 25-hydroxyvitamin D levels indicative of vitamin D sufficiency: implications for establishing a new effective dietary intake recommendation for vitamin D. *J Nutr* 135(2):317-322.
- Hollis BW & Wagner CL. 2004. Assessment of dietary vitamin D requirements during pregnancy and lactation. *Am J Clin Nutr* 79(5):717-726.
- Hollis BW, et al. 2015. Maternal versus infant vitamin D supplementation during lactation: A randomized controlled trial. *Pediatrics*, 136(4): 625-634.
- Institute of Medicine, 2011. *Dietary Reference Intakes for Calcium and Vitamin D*. Washington, DC: The National Academies Press.
- Institute of Medicine, Food and Nutrition Board. 1997. *Dietary Reference Intakes: Calcium, Phosphorus, Magnesium, Vitamin D and Fluoride*. National Academy Press, Washington, DC.
- Jensen MB. 2014. Vitamin D and male reproduction. *Nature Reviews Endocrinology* 10: 175-186.
- Krysiak R, et al. 2011. Hypoparathyroidism in pregnancy. *Gynecol Endocrinol*. 27:529-32.
- Lawlor DA, et al. 2013. Association of maternal vitamin D status during pregnancy with bone-mineral content in offspring: a prospective cohort study. *Lancet*. 381(9884):2176-2183.

- Lerchbaum E & Rabe T. 2014. Vitamin D and female fertility. *Curr Opin Obstet Gynecol* 26: 145-150.
- Lu M, et al. 2021. Effect of early and late prenatal vitamin D and maternal asthma status on offspring asthma or recurrent wheeze. *J Allergy Clin Immunol.* 147(4):1234-1241.e3.
- Mather KJ, et al. 1999. Maintenance of serum calcium by parathyroid hormone-related peptide during lactation in a hypoparathyroid patient. *J Clin Endocrinol Metab.* 84:424-427.
- Maxwell JD, et al. 1981. Vitamin D supplements enhance weight gain and nutritional status in pregnant Asians. *Br J Obstet Gynecol* 88:987-991.
- Meek JY, et al. 2022. Policy Statement: Breastfeeding and the Use of Human Milk. *Pediatrics*, 150(1).
- Melough MM, et al. 2021. Maternal plasma 25-hydroxyvitamin D during gestation is positively associated with neurocognitive development in offspring at age 4-6 years. *J Nutr.* 151(1):132-139.
- Mirzaei F, et al. 2011. Gestational vitamin D and the risk of multiple sclerosis in offspring. *Ann Neurol.* 70(1):30-40.
- Mohaghegh Z, et al. 2015. The relation of preeclampsia and serum level of 25-hydroxyvitamin D in mothers and their neonates: a case control study in Iran. *Horm Metab Res.* 47(4):284-288.
- Morales E, et al. 2012. Maternal Vitamin D Status in Pregnancy and Risk of Lower Respiratory Tract Infections, Wheezing, and Asthma in Offspring. *Epidemiology.* 23(1):64-71.
- Mulligan ML, et al. 2010. Implications of vitamin D deficiency in pregnancy and lactation. *Am J Obstet Gynecol* 202:429.e1-9.
- Mumford SL, et al. 2018. Association of preconception serum 25-hydroxyvitamin D concentrations with livebirth and pregnancy loss: A prospective cohort study. *Lancet Diabetes Endocrinol.* 6(9):725-732.
- Murphy PK, et al. 2010. An exploratory study of postpartum depression and vitamin D. *J Am Psychiatr Nurses Assoc* 16(3): 170-177.
- Nasri K, et al. 2016. Maternal 25-hydroxyvitamin D level and the occurrence of neural tube defects in Tunisia. *Int J Gynaecol Obstet.* 134(2):131-134.
- Oken E, et al. 2007. Diet during pregnancy and risk of preeclampsia or gestational hypertension. *Ann Epidemiol.* 17:663-668.
- Paffoni A, et al. 2014. Vitamin D deficiency and infertility: insights from in vitro fertilization cycles. *J Clin Endocrinol Metab.* 99(11):E2372-2376.
- Palacios C, et al. 2019. Vitamin D supplementation for women during pregnancy. *Cochrane Database of Systematic Reviews.* Issue 7. Art. No.: CD008873.
- Perez- Lopez F, et al. 2015. Effect of vitamin D supplementation during pregnancy on maternal and neonatal outcomes: a systematic review and meta-analysis of randomized controlled trials. *Fertil Steril* 103(5): 1278-1288e4.
- Raia-Barjat T, et al. 2021. Vitamin D deficiency during late pregnancy mediates placenta-associated complications. *Sci Rep.* 11(1):20708.
- Ramagopalan SV, et al. 2011. Relationship of UV exposure to prevalence of multiple sclerosis in England. *Neurology.* 76(16):1410-1414.
- Ribamar A, et al. 2020. Relationship between vitamin D deficiency and both gestational and postpartum depression. *Nutr Hosp* 37(6):1238-1245.
- Robinson M, et al. 2014. Low maternal serum vitamin D during pregnancy and the risk for postpartum depression symptoms. *Arch Womens Ment Health* 17(3): 213-219.
- Rude RK, et al. 1984. Postpartum resolution of hypocalcemia in a lactating hypoparathyroid patient. *Endocrinol Jpn.* 31:227-233.
- Sadegi-Nejad A, et al. 1980. Hypoparathyroidism and pregnancy: treatment with calcitriol. *JAMA* 243:254-255.
- Schneuer FJ, et al. 2014. Effects of maternal serum 25-hydroxyvitamin D concentrations in the first trimester on subsequent pregnancy outcomes in an Australian population. *Am J Clin Nutr* 99: 287-295.
- Singla R, et al. 2015. Vitamin-D deficiency is associated with gallbladder stasis among pregnant women. *Dig Dis Sci.* 60(9):2793-2799.
- Singla R, et al. 2015. Relationship between preeclampsia and vitamin D deficiency: a case control study. *Arch*

Gynecol Obstet. 291(6):1247-1251.

- Sourander A, et al. 2021. Maternal vitamin D levels during pregnancy and offspring autism spectrum disorder. *Biol Psychiatry*. 90(11):790-797.
- Stafne, SN. 2020. Vitamin D and stress urinary incontinence in pregnancy: a cross-sectional study. *BJOG* 127(13):1704-1711.
- Staples J, et al. 2010. Low maternal exposure to ultraviolet radiation in pregnancy, month of birth, and risk of multiple sclerosis in offspring: longitudinal analysis. *BMJ*. 340:c1640.
- Sucksdorff M, et al. 2021. Maternal vitamin D levels and the risk of offspring attention-deficit/hyperactivity disorder. *J Am Acad Child Adolesc Psychiatry*. 2021 Jan;60(1):142-151.e2.
- Sweeney LL, et al. 2010. Decreased calcitriol requirements during pregnancy and lactation, with a window of increased requirements immediately postpartum. *Endocr Pract*. 1-11.
- US Department of Health and Human Services National Institutes of Health. 2024. Vitamin D. Office of Dietary Supplements Dietary Supplement Fact Sheets. <https://ods.od.nih.gov/factsheets/VitaminD-HealthProfessional/>. Accessed July 2024.
- Veena SR, et al. 2017. Association between maternal vitamin D status during pregnancy and offspring cognitive function during childhood and adolescence. *Asia Pac J Clin Nutr* 26(3): 438-449.
- Vieth R & Holick MF. 2018. Chapter 57B - The IOM—Endocrine Society Controversy on Recommended Vitamin D Targets: In Support of the Endocrine Society Position. *Vitamin D (Fourth Edition)*. D. Feldman, Academic Press: 1091-1107.
- Vinkhuyzen AAE, et al. 2017. Gestational vitamin D deficiency and autism spectrum disorder. *BJPsych Open* 3(2): 85-90.
- Visness CM, et al. 2015. Cord blood vitamin D concentrations are unrelated to atopy and wheeze in 2 diverse birth cohort studies. *J Allergy Clin Immunol*. 136(4):1108-10.e2.
- Voltas N, et al. 2020. Effect of vitamin D status during pregnancy on infant neurodevelopment: The ECLIPSES Study. *Nutrients*. 12(10):3196.
- Wagner CL, et al. 2013. A randomized trial of vitamin D supplementation in 2 community health center networks in South Carolina. *Am J Obstet Gynecol* 208(2):137.e1-13.
- Whitehouse AJ, et al. 2012. Maternal Serum Vitamin D Levels During Pregnancy and Offspring Neurocognitive Development. *Pediatrics* 129:485-493.
- World Health Organization. 2023. Vitamin D supplementation during pregnancy. E-library of evidence for nutrition actions (eLENA). <https://www.who.int/tools/elena/interventions/vitamind-supp-pregnancy>. Accessed June 6 2024.

Questions? Call 866.626.6847 | Text 855.999.3525 | Email or Chat at [MotherToBaby.org](https://www.mothertobaby.org).

Disclaimer: MotherToBaby Fact Sheets are meant for general information purposes and should not replace the advice of your health care provider. MotherToBaby is a service of the non-profit Organization of Teratology Information Specialists (OTIS). Copyright by OTIS, September 1, 2024.

Mpox (formerly known as Monkeypox)

Selected References:

- Adams J, et al. 2022. Neuropsychological effects in children exposed to anticonvulsant monotherapy during gestation: Phenobarbital, carbamazepine, and phenytoin. *Epilepsy Behav.* 127:108533.
- Antonucci R, et al. 2018. Maternal carbamazepine therapy and unusual adverse effects in a breastfed infant. *Breastfeed Med* 13(2):155-157.
- Baker GA, et al. 2015. IQ at 6 years after in utero exposure to antiepileptic drugs: a controlled cohort study. *Neurology* 84(4):382-390.
- Battino D, et al. 2024. Risk of major congenital malformations and exposure to antiseizure medication monotherapy. *JAMA Neurol.* 1;81(5):481-489.
- Bech BH, et al. 2014. Use of antiepileptic drugs during pregnancy and risk of spontaneous abortion and stillbirth: population based cohort study. *BMJ* 349:g5159.
- Birnbaum AK, et al. 2020. Antiepileptic Drug Exposure in Infants of Breastfeeding Mothers With Epilepsy. *JAMA Neurol* 77(4):441-450.
- Bjork M-H, et al. 2022. Association of prenatal exposure to antiseizure medication with risk of autism and intellectual disability. *JAMA Neurol.* 79(7):672-681.
- Blotiere PO, et al. 2020. Risk of early neurodevelopmental outcomes associated with prenatal exposure to the antiepileptic drugs most commonly used during pregnancy: a French nationwide population-based cohort study. *BMJ Open.* 7;10(6):e034829.
- Bromley RL, et al. 2013. The prevalence of neurodevelopmental disorders in children prenatally exposed to antiepileptic drugs. *J Neurol Neurosurg Psychiatry.* 84(6):637-643.
- Bromley R, et al. 2023. Monotherapy treatment of epilepsy in pregnancy: congenital malformation outcomes in the child. *Cochrane Database Syst Rev.* 29;8(8):CD010224.
- Campbell E, et al. 2014. Malformation risks of antiepileptic drug monotherapies in pregnancy: updated results from the UK and Ireland Epilepsy and Pregnancy Registers. *J Neurol Neurosurg Psychiatry Sep*;85(9):1029-1034.
- Canger R, et al. 1999. Malformations in offspring of women with epilepsy: a prospective study. *Epilepsia* 40(9):1231-1236.
- Daugaard CA, et al. 2020. Association of prenatal exposure to valproate and other antiepileptic drugs with intellectual disability and delayed childhood milestones. *JAMA Netw Open* 3(11):e2025570.
- Cohen JM, et al. 2023. Comparative safety of antiseizure medication monotherapy for major malformations. *Ann Neurol.* 93(3):551-562.
- Cummings C, et al. 2011. Neurodevelopment of children exposed in utero to lamotrigine, sodium valproate and carbamazepine. *Arch Dis Child.* 96(7):643-647.
- Davanzo R, et al. 2013. *Italian Journal of Pediatrics* 39:50-61.
- Deshmukh U, et al. 2016. Behavioral outcomes in children exposed prenatally to lamotrigine, valproate, or carbamazepine. *Neurotoxicol Teratol* 54:5-14.
- Fried S, et al. 2004. Malformation rates in children of women with untreated epilepsy: a meta-analysis. *Drug Saf* 27(3):197-202.
- Gaily E, et al. 2004. Normal intelligence in children with prenatal exposure to carbamazepine. *Neurology* 62:28-32.
- Gladstone DJ, et al. 1992. Course of pregnancy and fetal outcome following maternal exposure to carbamazepine and phenytoin: a prospective study. *Reprod Toxicol* 6:257-261.

- Harden CL. 2008. Antiepileptic drug teratogenesis: what are the risks for congenital malformations and adverse cognitive outcomes? *Int Rev Neurobiol* 83:205-213.
- Hernandez-Diaz S, et al. 2000. Folic acid antagonists during pregnancy and the risk of birth defects. *N Engl J Med* 343(22):1608-1614.
- Holmes LB, et al. 2024. Facial dysmorphism in children exposed in pregnancy to anticonvulsant medications correlates with deficits in IQ. *Am J Med Genet.* 2024;194A:e63511.
- Huber-Mollema Y, et al. 2020. Neurocognition after prenatal levetiracetam, lamotrigine, carbamazepine, or valproate exposure. *J Neurol.* 267(6):1724-1736.
- Husebye E, et al. 2020. Language impairment in children aged 5 and 8 years after antiepileptic drug exposure in utero – the Norwegian Mother and Child Cohort Study. *European Journal of Neurology* 27.3:667-675.
- Jones KL, et al. 1989. Patterns of malformations in the children treated with carbamazepine during pregnancy. *N Engl J Med* 320(25):1661-1666.
- Kacirova I, et al. 2021. Therapeutic monitoring of carbamazepine and its active metabolite during the 1st postnatal month: Influence of drug interactions. *Biomed Pharmacother* 137:111412.
- Kacirova I, et al. 2022. Carbamazepine and carbamazepine-epoxide concentrations in mothers, colostrum, and breastfed newborns: Comparison with concentrations determined during delivery and in the mature milk period. *Biomedicine & Pharmacotherapy* 151:113176.
- Kallen AJB. 1994. Maternal carbamazepine and infant spina bifida. *Reprod Toxicol* 8(3):203-205.
- Kaplan YC, et al. 2021. Use of phenytoin, phenobarbital carbamazepine, levetiracetam lamotrigine and valproate in pregnancy and breastfeeding: risk of major malformations, dose-dependency, monotherapy vs polytherapy, pharmacokinetics and clinical implications. *Curr Neuropharmacol* 19(11):1805-1824.
- Leite ML, et al. 2024. Obstetric and neonatal outcomes, antiseizure medication profile, and seizure types in pregnant women in a vulnerability state from Brazil. *PLoS One.* 1;19(4):e0291190.
- Meador KJ, et al. 2009. Cognitive function at 3 years of age after fetal exposure to antiepileptic drugs. *N Engl J Med* 360(16):1597-1605.
- Margulis A, et al. 2019. Relation of in-utero exposure to antiepileptic drugs to pregnancy during and size at birth. *PLoS One.* 5;14(8):e0214180.
- Mazzone PP, et al. 2023. Comparison of perinatal outcomes for women with and without epilepsy: a systematic review and meta-analysis. *JAMA Neurol.* 1;80(5):484-494.
- Meador KJ, et al. 2014. Breastfeeding in children of women taking antiepileptic drugs cognitive outcomes at age 6 years. *JAMA Pediatr* 168(8):729-736.
- Morrell M. 1996. The new antiepileptic drugs and women: efficacy, reproductive health, pregnancy and fetal outcome. *Epilepsia* 37(Suppl. 6):S34-S44.
- (n.d.). Tegretol – Food and Drug Administration. https://www.accessdata.fda.gov/drugsatfda_docs/label/2018/016608s115_018281_s058_018927s055_020234_s047.pdf Accessed September 2024.
- Nulman I, et al. 1997. Findings in children exposed in utero to phenytoin and carbamazepine monotherapy: independent effects of epilepsy and medications. *Am J Med Genet* 68:18-24.
- O'Brien MD and Gilmour-White SK. 2005. Management of epilepsy in women treated with carbamazepine during pregnancy. *Postgrad Med J* 81(955):278-285.
- Ornoy A and Cohen E. 1996. Outcome of children born to epileptic mothers treated with carbamazepine during pregnancy. *Arc Dis Child* 75:517-520
- Patel N, et al. 2018. Mood-stabilizing anticonvulsants, spina bifida, and folate supplementation: commentary. *J Clin Psychopharmacol* 38(1):7-10.
- Rosa FW. 1991. Spina bifida in infants of women treated with carbamazepine during pregnancy. *N Engl J Med* 324(10):674-677.
- Samren EB, et al. 1999. Antiepileptic drug regimens and major congenital abnormalities in the offspring. *Ann Neurol* 46(5):739-746.
- Scolnik D, et al. 1994. Neurodevelopment if children exposed in utero to phenytoin and carbamazepine

monotherapy. JAMA 271(10):767-770.

- Tomson T and Barrino D. 2008. Teratogenic effects of antiepileptic drugs. Seizure 17(2):166-171.
- Tomson T and Klein P. 2015. Fine-tuning risk assessment with antiepileptic drug use in pregnancy. Neurology. 84(4):339-340.
- Tomson T, et al. 2015. Antiepileptic drugs and intrauterine death: A prospective observational study from EURAP. Neurology Aug 18;85(7):580-588.
- Tomson T, et al. 2018. Comparative risk of major congenital malformations with eight different antiepileptic drugs: a prospective cohort study of the EURAP registry. Lancet Neurol 17(6):530-538.
- S. Centers for Disease Control and Prevention. 2020. Data and statistics on Spina Bifida. <https://www.cdc.gov/spina-bifida/data/> Accessed September 2024.
- Vajda F. 2014. Epilepsy: Effects of exposure to antiepileptic drugs during development. Nat Rev Neurol.10:11-12.
- Vajda F, et al. 2018. Anti-epileptic drug exposure and risk of foetal death in utero. Acta Neurol Scand Jan;137(1):20-23.
- Wallace H, et al. 1998. Age-specific incidence and prevalence rates of treated epilepsy in an unselected population of 2,052,922 and age-specific fertility rates of women with epilepsy. Lancet 352:1970-1973.
- Weston J, et al. 2016. Monotherapy treatment of epilepsy in pregnancy: congenital malformation outcomes in the child. Cochrane Database Syst Rev.11:Cd010224.
- Wide K, et al. 2000. Psychomotor development and minor anomalies in children exposed to antiepileptic drugs in utero: A prospective population-based study. Dev Med Child Neurol 42:87-92.
- Wiggs K, et al. 2020. Anti-seizure medication use during pregnancy and risk of ASD and ADHD in children. Neurology. 95(24):e3232-e3240.

Questions? Call 866.626.6847 | Text 855.999.3525 | Email or Chat at [MotherToBaby.org](https://www.MotherToBaby.org).

Disclaimer: MotherToBaby Fact Sheets are meant for general information purposes and should not replace the advice of your health care provider. MotherToBaby is a service of the non-profit Organization of Teratology Information Specialists (OTIS). Copyright by OTIS, September 1, 2024.