

Lidocaine

Selected References:

- Abboud TK, et al. 1983. Lack of adverse neonatal neurobehavioral effects of lidocaine. *Anesth Analg*; 62:473-475.
- Abboud TK, et al. 1984. Continuous infusion epidural analgesia in parturients receiving bupivacaine, chloroprocaine, or lidocaine – maternal, fetal, and neonatal effects. *Anesth Analg*; 63:421-428.
- Actavis Pharma, Inc. 2019. Lidocaine and Prilocaine Cream Drug Label. Available at: <https://dailymed.nlm.nih.gov/dailymed/druginfo.cfm?setid=1972d657-2d5a-4697-bba9-80caffc2f2d7>. Accessed 29 July 2025.
- Baradari AG, et al. 2017. Bolus administration of intravenous lidocaine reduces pain after an elective caesarean section: Findings from a randomised, double-blind, placebo-controlled trial. *J Obstet Gynaecol*. 37(5):566-570.
- da Cunha YGM et al. 2025. The Use of Different Local Anesthetics in Pregnant Women in Dentistry: A Systematic Review. *Curr Rev Clin Exp Pharmacol*. Apr 21. doi: 10.2174/0127724328349965250407082245. Online ahead of print.
- Demeulemeester V, et al. 2018. Transplacental lidocaine intoxication. *J Neonatal-Perinatal Med*; 11:439-441.
- Dryden RM, Lo MW. 2000. Breast milk lidocaine levels in tumescent liposuction. *Plast Reconstr Surg*; 105:2267-2268.
- Favero V, et al. 2021. Pregnancy and Dentistry: A Literature Review on Risk Management during Dental Surgical Procedures. *Dent J (Basel)*. 9(4):46.
- Fujinaga M, Mazzeo RI. 1986. Reproductive and teratogenic effects of lidocaine in Sprague-Dawley rats. *Anesthesiology*. 65:626-632.
- Heinonen OP, et al. 1977. *Birth Defects and Drugs in Pregnancy*. Publishing Sci Group, Littleton, MA.
- Kuhnert BR, et al. 1984. Effects of maternal epidural anesthesia on neonatal behavior. *Anesth Analg*; 63:301-308.
- Kuhnert BR, et al. 1986. Lidocaine disposition in mother, fetus, and neonate after spinal anesthesia. *Anesth Analg* 65:139-144.
- Lebedevs TH, et al. 1993. Excretion of lignocaine and its metabolite monoethylglycinexylidide in breast milk following its use in a dental procedure. A case report. *J Clin Periodontol* 20: 606-608.
- Li JE, et al. 2019. Cutaneous Surgery in Patients Who Are Pregnant or Breastfeeding. *Dermatol Clin*. 37(3):307-317. Murzaku EC, et al. 2021. Surgical management and practices in pregnancy and lactation: A survey of United States dermatologic surgeons. *J Am Acad Dermatol*. 84(4):1134-1136.
- Ortega D, et al. 1999. Excretion of lidocaine and bupivacaine in breast milk following epidural anesthesia for cesarean delivery. *Acta Anaesthesiol Scand*; 43:394-397.
- Silveira MPT, et al. 2020. Breastfeeding and risk classification of medications used during hospitalization for delivery: 2015 Pelotas Birth Cohort. *Rev Bras Epidemiol*. 23:e200026.
- Watson PD, Ott MA. 1982. Lidocaine and mepivacaine in cord blood. *Ped Pharm*; 2:341-348.
- Wikland, M., Evers, H., Jakobsson, A.-H., Sandqvist, U., & Sjöblom, P. (1990). The concentration of lidocaine in follicular fluid when used for paracervical block in a human IVF-ET programme. *Human Reproduction*, 5(8), 920-923
- Zeisler JA, et al. 1986. Lidocaine excretion in breast milk. *Drug Intell Clin Pharm*; 20:691-693.

¿Preguntas? Llame al 866.626.6847 | Texto 855.999.3525 | Correo electrónico o chat en [MotherToBaby.org](https://www.MotherToBaby.org) .

Descargo de responsabilidad: las hojas informativas de MotherToBaby están destinadas a fines de información general y no deben reemplazar los consejos de su proveedor de atención médica. MotherToBaby es un servicio de la Organización sin fines de lucro de Especialistas en Información de Teratología (OTIS). Copyright de OTIS, 1 de agosto de 2025.

Lidocaine

Selected References:

- Dentsply Pharmaceutical, Inc. 2021. Prilocaine injection drug label. Available at: <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=db23a56f-1e41-4843-9220-1b2e3059db41>. [Accessed 8/2025].
- Fougera & Co. 2024. Lidocaine and prilocaine cream drug label. Available at: <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=833cd52c-6470-49c4-937f-1393971f4db9>. [Accessed 8/2025].
- Erol S, et al. 2017. Transient methemoglobinemia in three neonates due to maternal pudendal anesthesia. *J Coll Physicians Surg Pak.* 27(12):783-784.
- Guay J. 2009. Methemoglobinemia related to local anesthetics: a summary of 242 episodes. *Anesth Analg.* 108(3):837-45.
- Kirschbaum M, et. al. 1991. [Fetal methemoglobinemia caused by prilocaine—is use of prilocaine for pudendal block still justified?]. *Geburtshilfe Frauenheilkd.* 51(3):228-30.
- Uslu S, Comert S. 2013. Transient neonatal methemoglobinemia caused by maternal pudendal anesthesia in delivery with prilocaine: report of two cases. *Minerva Pediatr.* 65(2):213-7.

¿Preguntas? Llame al 866.626.6847 | Texto 855.999.3525 | Correo electrónico o chat en [MotherToBaby.org](https://www.MotherToBaby.org) .

Descargo de responsabilidad: las hojas informativas de MotherToBaby están destinadas a fines de información general y no deben reemplazar los consejos de su proveedor de atención médica. MotherToBaby es un servicio de la Organización sin fines de lucro de Especialistas en Información de Teratología (OTIS). Copyright de OTIS, 1 de agosto de 2025.

Lidocaine

Selected References:

- Gilboa SM, et al. 2009. National Birth Defects Prevention Study: Use of antihistamine medications during early pregnancy and isolated major malformations. *Birth Defects Res A Clin Mol Teratol* 85(2):137-150.
- Gilboa SM, et al. 2014. Antihistamines and birth defects: a systematic review of the literature. *Expert opinion on drug safety*. 13.12: 1667-98.
- Hansen Craig, et al. 2020. Use of antihistamine medications during early pregnancy and selected birth defects: The National Birth Defects Prevention Study, 1997–2011. *Birth defects research*16: 1234-52.
- Ito S, et al. 1993. Prospective follow-up of adverse reactions in breast-fed infants exposed to maternal medication. *Am J Obstet Gynecol* 168:1393-9.
- Kallen B, Mottet I. 2003. Delivery outcome after the use of meclizine in early pregnancy. *Eur J Epidemiol*. 18:665-669.
- Katselou M, et al. 2018. A fully validated method for the simultaneous determination of 11 antihistamines in breast milk by gas chromatography-mass spectrometry. *Biomed Chromatogr* 32(8):e4260.
- Lenz W. 1966. Malformations caused by drugs in pregnancy. *Am J Dis Child* 112:99-106.
- Messinis IE, et al. 1985. Histamine H1 receptor participation in the control of prolactin secretion in postpartum. *J Endocrinol Investig* 8:143-6.
- Michaelis J, et al. 1983. Prospective study of suspected associations between certain drugs administered during early pregnancy and congenital malformations. *Teratology* 27:57-64.
- Mondillo C, et al. 2018. Potential negative effects of anti-histamines on male reproductive function. *Reproduction*. 155.5: R221-7.

¿Preguntas? Llame al 866.626.6847 | Texto 855.999.3525 | Correo electrónico o chat en MotherToBaby.org .

Descargo de responsabilidad: las hojas informativas de MotherToBaby están destinadas a fines de información general y no deben reemplazar los consejos de su proveedor de atención médica. MotherToBaby es un servicio de la Organización sin fines de lucro de Especialistas en Información de Teratología (OTIS). Copyright de OTIS, 1 de agosto de 2025.

Lidocaine

Selected References:

- Ceyhan ST, et al. 2010. Serum vitamin B12 and homocysteine levels in pregnant women with neural tube defect. *Gynecol Endocrinol.* 26(8):578-581.
- Dror DK, Allen LH. 2018. Vitamin B-12 in human milk: A systematic review. *Adv Nutr* 9:358s-66s.
- Duggan C, et al. 2014. Vitamin B-12 supplementation during pregnancy and early lactation increases maternal, breast milk, and infant measures of vitamin B-12 status. *J Nutr.* 144(5):758-764.
- Groenen PMW, et al. 2004. Marginal maternal vitamin B12 status increases the risk of offspring with spina bifida. *Am J Obstet Gynecol* 191(1):11-17.
- Hampel D, Allen LH. 2016. Analyzing B-vitamins in human milk: Methodological approaches. *Crit Rev Food Sci Nutr* 56:494-511.
- Lai JS, et al. 2019. Maternal plasma vitamin B12 concentrations during pregnancy and infant cognitive outcomes at 2 years of age. *Br J Nutr.* 121(11):1303-1312.
- Munger RG, et al. 2021. Maternal vitamin B12 status and risk of cleft lip and cleft palate birth defects in Tamil Nadu State, India. *Cleft Palate Craniofac J* 58(5):567-576.
- National Institute of Health Office of Dietary Supplements. 2024. Vitamin B12: Fact Sheet for Health Professionals. Available at: <https://ods.od.nih.gov/factsheets/VitaminB12-HealthProfessional/>. Accessed 6 Jun 2024.
- Nelen WL, et al. 2000. Hyperhomocysteinemia and recurrent early pregnancy loss: a meta-analysis. *Fertil Steril.* 74(6):1196-1199.
- Ray JG, Blom HJ. 2003. Vitamin B12 insufficiency and the risk of fetal neural tube defects. *QJM.* 96(4):289-295.
- Ray JG, et al. 2007. Vitamin B12 and the risk of neural tube defects in a folic-acid-fortified population. *Epidemiology* 18(3):362-366.
- Reznikoff-Etievant MF, et al. 2002. Low Vitamin B(12) level as a risk factor for very early recurrent abortion. *Eur J Obstet Gynecol Reprod Biol.* 104(2):156-159.
- Senousy SM, et al. 2018. Association between biomarkers of vitamin B12 status and the risk of neural tube defects. *J Obstet Gynaecol Res.* 44(10):1902-1908.
- Suarez L, et al. 2003. Maternal serum B12 levels and risk for neural tube defects in a Texas-Mexico border population. *Ann Epidemiol* 13(2):81-88.
- Van Rooij IALM, et al. 2003. Vitamin and homocysteine status of mothers and infants and the risk of nonsyndromic orofacial clefts. *Am J Obstet Gynecol* 189(4):1155-1160.
- Wilson A, et al. 1999. A common variant in methionine synthase reductase combined with low cobalamin (vitamin B12) increases risk for spina bifida. *Mol Genet Metab.* 67(4):317-323.
- Zhang T, et al. 2009. Maternal serum vitamin B12, folate and homocysteine and the risk of neural tube defects in the offspring in a high-risk area of China. *Public Health Nutr.* 12(5):680-686.

¿Preguntas? Llame al 866.626.6847 | Texto 855.999.3525 | Correo electrónico o chat en [MotherToBaby.org](https://www.MotherToBaby.org) .

Descargo de responsabilidad: las hojas informativas de MotherToBaby están destinadas a fines de información general y no deben reemplazar los consejos de su proveedor de atención médica. MotherToBaby es un servicio de la Organización sin fines de lucro de Especialistas en Información de Teratología (OTIS). Copyright de OTIS, 1 de agosto de 2025.

Lidocaine

Selected References:

- Al-Saleh I, et al. 2020. Effects of early and recent mercury and lead exposure on the neurodevelopment of children with elevated mercury and/or developmental delays during lactation: A follow-up study. *Int J Hyg Environ Health* 230:113629.
- Ashrap P, et al. 2020. Maternal blood and metalloid concentrations in association with birth outcomes in Northern Puerto Rico. *Environ Int* 138:105606.
- Buck Louis GM, et al. 2017. Low-level environmental metals and metalloids and incident pregnancy loss. *Reprod Toxicol* 69:68-74.
- Byeong-Jin Y, et al. 2016. Evaluation of mercury exposure level, clinical diagnosis and treatment for mercury intoxication. *Ann Occup Environ Med* 28:5.
- Choy CMY, et al. 2002. Relationship between semen parameters and mercury concentration in blood and in seminal fluid from subfertile males in Hong Kong. *Fertil Steril* 78(2):426-428.
- Cox C, et al. 199. Prenatal and postnatal methyl mercury exposure and neurodevelopmental outcomes. *JAMA* 282:1333-1334.
- Crump KS, et al. 1998. Influence of prenatal mercury exposure upon scholastic and psychological test performance: Benchmark analysis of a New Zealand cohort. *Risk Anal* 18:701-713.
- Davidson PW, et al. 1998. Effects of prenatal and postnatal methyl mercury exposure from fish consumption on neurodevelopment. *JAMA* 280:701-707.
- Davidson PW, et al. 2006. Prenatal methylmercury exposure from fish consumption and child development: A review of evidence and perspectives from the Seychelles Child Development Study. *Neurotoxicology* 27:1106-1109.

- Debes F, et al. 2016. Cognitive deficits at age 22 years associated with prenatal exposure to methylmercury. *Cortex* 74:358-69.
- Dorea JG, 2004. Mercury and Lead during breast-feeding. *British J of Nutr* 92(1):21-40.
- Dorea JG. 2021. Exposure to environmental neurotoxic substances and neurodevelopment in children from Latin America and the Caribbean. *Environ Res* 192:110199.
- Food and Drug Administration (FDA). 2017. Mercury levels in commercial fish and shellfish (1990–2012). Available at: <https://www.fda.gov/food/foodborneillnesscontaminants/metals/ucm115644.htm>
- Golding J, et al. 2017. Maternal prenatal blood mercury is not adversely associated with offspring IQ at 8 years provided the mother eats fish: A British prebirth cohort study. *Int J Hyg Environ Health* 220(7): 1161-1167.
- Golding J, et al. 2022. The benefits of fish intake: Results concerning prenatal mercury exposure and child outcomes from the ALSPAC prebirth cohort. *Neurotoxicology* 91:22-30.
- Gokoel AR, et al. 2020. Influence of prenatal exposure to mercury, perceived stress and depression on birth outcomes in Suriname: Results from the MeKiTamara Study. *Int J Environ Res Public Health* 17(12):4444.
- Grandjean P, et al. 1997. Cognitive deficit in 7-year-old children with prenatal exposure to methyl mercury. *Neurotoxicol Teratol* 19:417-428.
- Grandjean P, et al. 1999. Methylmercury exposure biomarkers as indicators of neurotoxicity in children aged 7 years. *Am J Epidemiol* 149:301-305.
- Grandjean P, et al. 2003. Attenuated growth of breast-fed children exposed to increased concentrations of methylmercury and polychlorinated biphenyls. *FASEB J* 17(6):699-701.
- Hibbeln J, et al. 2018. Total mercury exposure in early pregnancy has no adverse association with scholastic ability of the offspring particularly if the mother eats fish. *Environ Int* 116:108-115.
- Hibbeln JR, et al. 2019. Relationship between seafood consumption during pregnancy and childhood neurocognitive development: Two systematic reviews. *Prostaglandins Leuko Essent Fatty Acids* 151:14-36.
- Howe CG, et al. 2021. Prenatal metal mixtures and birth weight for gestational age in a predominately lower-income Hispanic pregnancy cohort in Los Angeles. *Environ Health Perspect* 128(11):117001.
- Hsi HC, et al. 2014. The neurological effects of prenatal and postnatal mercury/methylmercury exposure on three-year-old children in Taiwan. *Chemosphere* 100:71-76.
- Hu Y, et al. 2016. Prenatal low-level mercury exposure and infant neurodevelopment at 12 months in rural northern China. *Environ Sci Pollut Res Int* 23(12): 12050-12059.
- Iwai-Shimada M, et al. 2015. Methylmercury in the breast milk of Japanese mothers and lactational exposure of their infants. *Chemosphere*. 126:67-72.
- Jensen TK, et al. 2005. Effects of breast feeding on neuropsychological development in a community with methylmercury exposure from seafood. *J Expo Anal Environ Epidemiol* Sep;15(5):423-430.
- Kim B, et al. 2020. Adverse effects of prenatal mercury exposure on neurodevelopment during first 3 years of life modified by early growth velocity and prenatal maternal folate level. *Environ Res* 191:109909.
- Klus JK, et al. 2023. Postnatal methylmercury exposure and neurodevelopmental outcomes at 7 years of age in the Seychelles Child Development Study Nutrition Cohort 2, *NeuroToxicology*, 99: 115-119,
- Koos BJ & Longo LD. 1976. Mercury toxicity in the pregnant woman, fetus, and newborn infant. *Am J Obstet Gynecol* 390(5):390-409.
- Lamoureux-Tremblay V, et al. 2021. Altered functional activations of prefrontal brain areas during emotional processing of fear in Inuit adolescents exposed to environmental contaminants. *Nurotoxicol Teratol* 85:106973.
- Myers GJ, et al. 2003. Prenatal methyl mercury exposure from ocean fish consumption in the Seychelles child development study. *Lancet* 361:1686-1692.
- Myers, et al. 2009. Postnatal exposure to methyl mercury from fish consumption: a review and new data from the Seychelles Child Development Study. *Neurotoxicology*, 30(3):338-349
- Myers GJ, et al. 2007. Nutrient and methyl mercury exposure from consuming fish. *J Nutr* 137(12):2805-2808.
- Minguez-Alarcon L, et al; Earth Study Team. 2017. Hair mercury (Hg) levels, fish consumption and semen parameters among men attending a fertility center. *Int J Hyg Environ Health* pii:S1438-4639(17)30315-2.
- Nišević RJ, et al. 2019. Combined prenatal exposure to mercury and LCUPUFA on newborn's brain measures and

neurodevelopment at the age of 18 months. *Environ Res* 178:108682.

- Oken E and Bellinger DC. 2008. Fish consumption, methylmercury and child neurodevelopment. *Curr Opin Pediatr* 20(2):178-183.
- Papadopoulou E, et al. 2021. Maternal seafood intake during pregnancy, prenatal mercury exposure and child body mass index trajectories up to 8 years. *Int J Epidemiol* 1-13. Online ahead of print.
- Polevoy C, et al. 2020. Prenatal exposure to legacy contaminants and visual acuity in Canadian infants: a maternal-infant research on environmental chemicals study. *Environ Health* 19(1):14.
- Rothenberg SE, et al. 2021. Maternal methylmercury exposure through rice ingestion and child neurodevelopment in the first three years; a prospective cohort study in rural China. *Environ Health* 20(1):50.
- Saavedra S, et al. 2021. Impact of dietary mercury intake during pregnancy on the health of neonates and children: a systematic review. *Nut Rev* nuab029
- Saito, H. 2020 (Reproduction from 2004). Congenital Minamata disease: a description of two cases in Niigata. *Neurotoxicology* 81:360-363.
- Schaefer C, et al 2007. Industrial Chemicals and environmental contaminants: Mercury ***In Drugs During Pregnancy and Lactation***, pgs 816-817. Amsterdam
- Shamlaye C, et al. 2020. The Seychelles Child Development Study: Two decades of collaboration. *Reproduction in Neurotoxicology*. 81:315-322.
- Skerfving & Copplestone. 1976. Poisoning caused by the consumption of organomercury-dressed seed in Iraq. *Bull World Health Organ* 1976;54(1):101-112.
- Sloane-Reeves J, et al. 2020. Scholastic achievement among children enrolled in the Seychelles Child Development Study. *Neurotoxicology* 81:347-352.
- Smith JC, et al. 1997. Hair methylmercury levels in U.S. women. *Arch Environ Health*. 52(6):476-80.
- Spiller P, et al. 2019. An abundance of seafood consumption studies presents new opportunities to evaluate effects on neurocognitive development. *Prostaglandins Leukot Essent Fatty Acids* 151:8-13.
- Strain J. 2014. Eating fish for two. *Nutr Bull* 39(2):181-186.
- Strain JJ, et al. 2015. Prenatal exposure to methyl mercury from fish consumption and polyunsaturated fatty acids: associations with child development at 20 mo of age in an observational study in the Republic of Seychelles. *Am J Clin Nutr* 101(3):530-537.
- Strain JJ, et al. 2021. Associations of prenatal methylmercury exposure and maternal polyunsaturated fatty acid status with neurodevelopmental outcomes at 7 years of age: results from the Seychelles Child Development Study Nutrition Cohort 2. *Am J Clin Nutr* 113(2):304-313.
- Tian T, et al. 2021. Single and mixed effects of metallic elements in maternal serum during pregnancy on risk for fetal neural tube defects: A Bayesian kernel regression approach. *Environ Pollut* 285:117203.
- Tong M, et al. 2021. Total mercury concentration in placental tissue, a good biomarker of prenatal mercury exposure, is associated with risk for neural tube defects in offspring. *Environ Int* 150:106425.
- Ulloa AC, et al. 2021. Prenatal methylmercury exposure and DNA methylation in seven-year-old children in the Seychelles Child Development Study. *Environ Int* 147:106321.
- US DHHS: Mercury Toxicity, Monograph 17. ATSDR Case Studies in Environmental Medicine, 1992.
- United States Environmental Protection Agency (EPA). Choose fish and shellfish wisely. <https://www.epa.gov/choose-fish-and-shellfish-wisely>.
- United States Environmental Protection Agency (EPA). 2025. Choose Fish and Shellfish Wisely. <https://www.epa.gov/choose-fish-and-shellfish-wisely>.
- United States Environmental Protection Agency (EPA). Estimated Fish Consumption Rates for the U.S. Population and Selected Subpopulations (NHANES 2003-2010). Final Report. April 2014. EPA-820-R-14-002. <https://www.epa.gov/sites/production/files/2015-01/documents/fish-consumption-rates-2014.pdf>.
- United States Environmental Protection Agency (EPA). Trends in Blood Mercury Concentrations and Fish Consumption Among U.S. Women of Reproductive Age (EPA NHANES, July 2013).
- United States Environmental Protection Agency (EPA) 2025. National Biomonitoring Program. Mercury Factsheet. <https://www.epa.gov/americaschildrenenvironment/biomonitoring-mercury> [Accessed 2025].

- United States Food and Drug Administration (FDA). Eating Fish for Those Who Might Become or Are Pregnant or Breastfeeding and Children Ages 1 to 11 Years. <https://www.fda.gov/food/consumers/questions-answers-fdaepa-advice-about-eating-fish-those-who-might-become-or-are-pregnant-or> [Accessed August 2025].
- United States Food and Drug Administration (FDA) & United States Environmental Protection Agency (EPA). Eating Fish: What Pregnant Women and Parents Should Know. <https://www.fda.gov/food/consumers/advice-about-eating-fish> [Accessed August 2025].
- van Wijngaarden E, et al. 2017. Methyl mercury exposure and neurodevelopmental outcomes in the Seychelles Child Development study main cohort at age 22 and 24 years. *Neurotoxicol Teratol* 59:35-42.
- Vigeh M, et al. 2018. Prenatal mercury exposure and birth weight. *Reprod Toxicol* 76:78-83.
- Weichselbaum E, et al. 2013. Fish in the diet: a review. *Nutrition Bulletin* 38: 128-177.
- Xiang H, et al. 2019. Protective effect of high zinc levels on preterm birth induced by mercury exposure during pregnancy: A birth cohort study in China. *J Trace Elem Med Biol* 55:71-77.
- Young EC, et al. 2020 (Reproduction from 2004). Association between prenatal dietary methyl mercury and developmental outcomes on acquisition of articulatory-phonologic skills in children in the Republic of Seychelles. *Neurotoxicology* 81:353-357.

¿Preguntas? Llame al 866.626.6847 | Texto 855.999.3525 | Correo electrónico o chat en [MotherToBaby.org](https://www.MotherToBaby.org) .

Descargo de responsabilidad: las hojas informativas de MotherToBaby están destinadas a fines de información general y no deben reemplazar los consejos de su proveedor de atención médica. MotherToBaby es un servicio de la Organización sin fines de lucro de Especialistas en Información de Teratología (OTIS). Copyright de OTIS, 1 de agosto de 2025.