

Depot Medroxyprogesterone Acetate (Depo Provera®)

Selected References:

- Baheiraei A, et al. 2001. Effects of progestogen-only contraceptives on breast-feeding and infant growth Int J Gynaecol Obstet, 74; 203-205.
- Borgatta L, et al. 2002. Pregnancies diagnosed during Depo- Provera use. Contraception. Sep;66(3):169-72.
- Callahan R et al. 2015. Ectopic pregnancy with use of progestin-only injectables and contraceptive implants: A systemic review. Contraception 92(6):514-522.
- Dahlberg K. 1982. Some effects of depotmedroxyprogesterone acetate (DMPA): Observations in the nursing infant and in the long-term user. Int J Gynaecol Obstet 20:43-48.
- Deshmukh P, Antell K, Brown EJ. 2017. Contraception Update: Progestin-Only Implants and Injections. FP Essent.. 462:25-29.
- Gray RH and Pardthaisong T. 1991. In utero exposure to steroid contraceptives and outcome of pregnancy. Am J Epidemiol 134:795-803.
- Gray RH, Pardthaisong T. 1991. In utero exposure to steroid contraceptives and survival during infancy. Am J Epidemiol; 134:804-811.
- Gu YQ, et al. 2004. Male hormonal contraception: effects of injections of testosterone undecanoate and depot medroxyprogesterone acetate at eight-week intervals in chinese men. J Clin Endocrinol Metab. 89(5):2254-62.
- Hogue CJ. 1991. Invited commentary: the contraceptive technology tightrope. Am J Epidemiol 134: 812-815; author response 816-817.
- Jaffe B et al. 1990. Health, growth and sexual development of teenagers exposed in utero to medroxyprogesterone acetate. Paediatr Perinat Epidemiol 4:184-195.
- Jimenez J et al. 1984. Long-term follow-up of children breast-fed by mothers receiving depotmedroxyprogesterone acetate. Contraception 30:523-533.
- Koetsawang S, et al. 1982. Transfer of contraceptive steroids in milk of women using long-acting gestagens. Contraception 25:321- 331.
- Pardthaisong T, et al. 1992. The long-term growth and development of children exposed to Depo-Provera during pregnancy or lactation. Contraception 45:313-324.
- Pardthaisong T, Gray R. 1988. Steroid contraceptive use and pregnancy outcome. Teratology 38:51-58.
- PDR Entry for: Depo-Provera Contraceptive Injection. 2016. Pharmacia and Upjohn Company LLC.
- Phillips SJ, et al. 2016. Progestogen-only contraceptive use among breastfeeding women: A systematic review. Contraception; 94:226-252.
- Ratchanon S and Taneepanichskul S. 2000. Depot medroxyprogesterone acetate and basal serum prolactin levels in lactating women. Obstetrics & Gynecology 96(6):926-928.
- Saxena BN et al. 1977. Levels of contraceptive steroids in breast milk and plasma of lactating women. Contraception 16:605-613.
- Virutamasen P et al. 1996. Pharmacodynamic effects of depot-lprogesterone acetate (DMPA) administered to lactating women on their male infants. Contraception 54:153-157.
- World Health Organization. 2016. Resource chart medical eligibility contraceptives – FHI 360. (n.d.). Available at: <https://www.fhi360.org/sites/default/files/media/documents/resource-chart-medical-eligibility-contraceptives-english.pdf>. Accessed 13 January 2026.
- Yovich JL, et al. 1988. Medroxyprogesterone acetate therapy in early pregnancy has no apparent fetal effects. Teratology 38:135-144.

Câu hỏi? Gọi 866.626.6847 | Gửi tin nhắn đến 855.999.3525 | Gửi email hoặc trò chuyện tại [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, January 1, 2026.

Depot Medroxyprogesterone Acetate (Depo Provera®)

Selected References:

- Bodkin CL, et al. 2005. OnabotulinumtoxinA therapy during pregnancy. *Mov Disord* 20(8): 1081-1082.
- Briggs J, et al. 2005. *Drugs in pregnancy and lactation*, 7th Ed. 174-175. Lippincott Williams & Wilkins: Philadelphia.
- Brin MF, et al. 2016. Pregnancy outcomes following exposure to onabotulinumtoxinA. *Pharmacoepidemiology and Drug Safety*. 25: 179-187.
- Brin, MF, et al 2023. Pregnancy outcomes in patients exposed to onabotulinumtoxinA treatment. *Neurology*. 101: e103-e113.
- Cardon BR, Smith ME, Cerrati EW. 2021 May-June. Case Series of Botulinum Toxin Administered to Pregnant Patients and Review of the Literature. *Facial Plast Surg Aesthet Med*. 23(3):187-190. De Oliveira Monteiro E. 2006. Botulinum toxin and pregnancy. *Skinmed* 5(6): 308.
- Li Yim and Weir CR. 2010. Botulinum toxin and pregnancy – cautionary tale. *Strabismus* 18(2): 65-66.
- Morgan JC, et al. 2006. Botulinum toxin A during pregnancy: a survey of treating physicians. *J Neurol Neurosurg Psychiatry* 77 (1) 117-119.
- Newman W.J., et al 2004. OnabotulinumtoxinA therapy during pregnancy. *Mov Disord* 19(11): 1384-1385.
- Polo JM, et al. 1996. Botulism and pregnancy. *Lancet* 348: 195.
- Robinson AY, Grogan PM. OnabotulinumtoxinA successfully used as migraine prophylaxis during pregnancy: a case report. *Mil Med*. 2014 Jun;179(6):e703-4.
- St. Clair EH, et al. 1975. Observations of an infant born to a mother with botulism. *J Pediatr* 87: 658.
- Wataganara T, et al. 2009. Treatment of severe achalasia during pregnancy with esophagoscopy injection of botulinum toxin A: a case report. *J Perinatol* 29(9): 639.
- Wong HT, et al. 2020. OnabotulinumtoxinA for chronic migraine during pregnancy: a real-world experience on 45 patients. *J Headache Pain*. 21(1):129.
- Wong HT, et al. 2025. OnabotulinumtoxinA treatment for chronic migraine in pregnancy: An updated report of real-world headache and pregnancy outcomes over 14 years in Hull. *Cephalalgia* 45(5):3331024251327387.

Câu hỏi? Gọi 866.626.6847 | Gửi tin nhắn đến 855.999.3525 | Gửi email hoặc trò chuyện tại 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, January 1, 2026.

Depot Medroxyprogesterone Acetate (Depo Provera®)

Selected References:

- Alembic Pharmaceuticals Inc. 2017. Metoprolol tartrate product labeling. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=24837d82-0f3f-4482-9af0-31e5f675c30f>. Accessed 27 Jan 2026.
- Bateman BT, et al. 2016. Late pregnancy β blocker exposure and risks of neonatal hypoglycemia and bradycardia. *Pediatrics*; 138(3). pii:e20160731.
- Battarbee AN, et al. 2020. Chronic hypertension in pregnancy. *Am J Obstet Gynecol*; 222(6):532-541.
- Davis RL, et al. 2011. Risks of congenital malformations and perinatal events among infants exposed to calcium channel and beta-blockers during pregnancy. *Pharmacoepidemiol Drug Saf*. 20(2):138-145.
- Duan L, et al. 2017. β -Blocker exposure in pregnancy and risk of fetal cardiac anomalies. *JAMA Intern Med*. 177(6): 885-887.
- Duan L, et al. 2018. Beta-blocker subtypes and risk of low birth weight in newborns. *J Clin Hypertens* 20(11):1603-1609.
- Firoz T, et al. 2014. Community Level Interventions for Pre-Eclampsia (CLIP) Working Group. Oral antihypertensive therapy for severe hypertension in pregnancy and postpartum: a systematic review. *BJOG*. 121(10):1210-1218.
- Kulas J et al. 1984. Atenolol and metoprolol. A comparison of their excretion into human breast milk. *Acta Obstet Gynecol Scand Suppl*. 118: 65-69.
- Lindeberg S et al. 1984. Disposition of the adrenergic blocker metoprolol in the late-pregnant woman, the amniotic fluid, the cord blood and the neonate. *Acta Obstet Gynecol Scand Suppl*. 118: 61-64.
- Ruys TP, et al. 2014. Cardiac medication during pregnancy, data from the ROPAC. *Int J Cardiol*. 15. 177(1):124-8.
- Sandstrom B, Regardh CG. 1980. Metoprolol excretion in breast milk. *Br J Clin Pharmacol*. 9: 518-519.
- Tamirisa KP, et al. 2022. Arrhythmias in Pregnancy. *JACC Clin Electrophysiol*. 8(1):120-135.
- Tanaka K, 2016. Beta-blockers and fetal growth restriction in pregnant women with cardiovascular disease. *Circ J*. 80(10):2221-2226.

- Welzel T, et al. 2021. Intrauterine Growth Retardation in Pregnant Women with Long QT Syndrome Treated with Beta-Receptor Blockers. *Neonatology*. 118(4):406-415.
- Wichman K et al. 1984. A placebo controlled trial of metoprolol in the treatment of hypertension in pregnancy. *Scand J Clin Lab Invest Suppl*. 169: 90-95.
- Xie RH, et al. 2014. Beta-blockers increase the risk of being born small for gestational age or of being institutionalised during infancy. *BJOG*. 121(9):1090-1096.
- Yakoob MY, et al. 2013. The risk of congenital malformations associated with exposure to β -blockers in pregnancy: a meta-analysis. *Hypertension* 62(2):375-381.

Câu hỏi? Gọi 866.626.6847 | Gửi tin nhắn đến 855.999.3525 | Gửi email hoặc trò chuyện tại [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, January 1, 2026.

Depot Medroxyprogesterone Acetate (Depo Provera®)

Selected References:

- AlHarthi A, et al. 2023. Investigating behavioral and neuronal changes in adolescent mice following prenatal exposure to electronic cigarette (e-cigarette) vapor containing nicotine. *Brain Sci*, 13(10): 1417.
- Archie S, et al. 2023. Maternal e-cigarette use can disrupt postnatal blood-brain barrier (BBB) integrity and deteriorates motor, learning and memory function: influence of sex and age. *Fluids Barriers CNS*, 20.
- Baez-Loya S, et al. 2014. Perceptions about e-cigarette safety may lead to e-smoking during pregnancy. *Bull Menninger Clin*. 78(3):243-52.
- Bednarczuk N, et al. 2022. Nicotine replacement therapy and e-cigarettes in pregnancy and infant respiratory outcomes. *Early Hum Dev*, 164:105509.
- Bell L, et al. 2023. Use of e-cigarettes in pregnancy: a systematic review of evidence published from 2020-2022. *Journal of Public Health*, 33: 315-328
- Bolumen-Lopez A, et al. 2025. Neonatal nicotine withdrawal in a newborn exposed to maternal e-cigarette use.]

Neonatal Perinatal Med. Published online October 9, 2025.

- Cardenas VM, et al. 2019. Use of Electronic Nicotine Delivery Systems (ENDS) by pregnant women I: Risk of small-for-gestational-age birth. *Tobacco induced diseases*, 17:44.
- Centers for Disease Control and Prevention (CDC). 2018. Electronic Cigarettes. https://www.cdc.gov/tobacco/e-cigarettes/?CDC_AAref_Val=https://www.cdc.gov/tobacco/basic_information/e-cigarettes/index.htm [Accessed 4/2025].
- Centers for Disease Control and Prevention (CDC). 2023: General Information About Secondhand Smoke. https://www.cdc.gov/tobacco/secondhand-smoke/?CDC_AAref_Val=https://www.cdc.gov/tobacco/secondhand-smoke/about.html [Accessed 4/2025].
- Çetin T & Durmaz Ö. 2024. An assessment of the impact of smoking and vaping during pregnancy on placental dysfunction using shear-wave elastography. *Arch Basic Clin Res*, 6(3): 188-194.
- Chen T, et al. 2023. Ovarian toxicity of e-cigarette liquids: effects of components and high and low nicotine concentration e-cigarette liquid in vitro. *Tobacco Induced Diseases*, 21:128.
- Deprato A, et al. 2025. Associations between vaping during pregnancy and perinatal outcomes: A systematic review and meta-analysis. *J Hazard Mater.*;486:137028.
- Froggatt S, et al. 2020. The effects of prenatal cigarette and e-cigarette exposure on infant neurobehavior: A comparison to a control group. *EClinicalMedicine*, 28:10062.
- Hahn J, et al. 2014. Electronic cigarettes: overview of chemical composition and exposure estimation. *Tob Induc Dis*, 12(1):23.
- Galanti F, et al. 2023. Impact of different typologies of smoking on ovarian reserve and oocyte quality in women performing ICSI cycles: an observational prospective study. *Eur Rev Med Pharmacol Sci*. 27(11):5190-5199.
- Holmboe SA, et al. 2020. Use of e-cigarettes associates with lower sperm counts in a cross-sectional study of young men from the general population. *Hum Reprod*, 35(7):1693-1701.
- Kahr MK, et al. 2015. A qualitative assessment of the perceived risks of electronic cigarette and hookah use in pregnancy. *BMC Public Health*. 15(1):1273.
- Kim S, Oancea SC. 2020. Electronic cigarettes may not be a “safer alternative” of conventional cigarettes during pregnancy: Evidence from the nationally representative PRAMS data. *BMC Pregnancy Childbirth*, 20(1):557.
- Kim HK, et al. 2025. Impact of conventional cigarette and electronic cigarette use on sperm quality and IVF/ICSI outcomes. *Sci Rep*. ;15(1):23714.
- Kopa-Stojak PN & Pawliczak R. 2024. Disposable electronic cigarettes – chemical composition and health effects of their use. A systematic review. *Toxicology Mechanisms and Methods*, 35(3): 250-261.
- Le AD, et al. 2025. A Preconception Cohort Study of Nicotine Vaping and Incidence of Spontaneous Abortion. *Nicotine Tob Res*. Published online July 3, 2025.
- Lin S, et al. 2023. E-cigarette use during pregnancy and its association with adverse birth outcomes in the US. *Prev Med*, 166:107375.
- McDonnell BP, et al. 2020. Electronic cigarettes and obstetric outcomes: A prospective observational study. *BJOG*, 127(6):750-756.
- Nanninga EK et al. 2023. Adverse maternal and infant outcomes of women who differ in smoking status: e-cigarette and tobacco cigarette users. *Int. J. Environ. Res. Public Health*, 20(3): 2632.
- Nguyen T, et al. 2018. Maternal e-cigarette exposure results in cognitive and epigenetic alterations in offspring in a mouse model. *Chemical research in toxicology*, 31(7): 601-611.
- Noël A, et al. 2020. In utero exposures to electronic-cigarette aerosols impair the *Wnt* signaling during mouse lung development. *American journal of physiology. Lung cellular and molecular physiology*, 318(4):L705-L722.
- O’Connell, A., et al. 2025. Vaping and Smoking in Pregnancy-A Meta-Analysis of Neurobehavioural Development in Prenatally Exposed Offspring. *Acta paediatrica (Oslo, Norway : 1992)*, 114(12), 3108-3121.
- Orzabal MR, et al. 2019. Chronic exposure to e-cig aerosols during early development causes vascular dysfunction and offspring growth deficits. *Translational research: the journal of laboratory and clinical medicine*, 207:70-82.
- Popham K & Kandasamy Y. 2023. The impact of smoking and nicotine exposure during pregnancy on fetal nephrogenesis: a systematic review. *Journal of Developmental Origins of Health and Disease*, 14(5): 559-569.

- Phillips L et al. 2023. Developing a taxonomy to describe offspring outcomes in studies involving pregnant mammals' exposure to non-tobacco nicotine: a systematic scoping review. Plos One, 18(2).
- Sana M et al. 2023. Maternal cigarette and electronic cigarette use before pregnancy associated with the risk of hypertension and gestational hypertension. Obstetrics & Gynecology, 141(5S): 83S-83S.
- Sukhato K, et al. 2025. Comparative effects of electronic cigarettes and dual use of electronic and conventional cigarettes on adverse pregnancy outcomes: a systematic review and meta-analysis. BMC Public Health. Published online November 28, 2025.
- Suter MA, et al. 2015. Is there evidence for potential harm of electronic cigarette use in pregnancy? Birth Defects Res A Clin Mol Teratol, 103(3):186-95.
- Trapphoff T, et al. 2024. Consumption of hookahs, e-cigarettes, and classic cigarettes and the impact on medically assisted reproduction treatment. Sci Rep.;14(1):9597.
- Vallée A, et al. 2025. Maternal vaping and pregnancy adverse outcomes: A systematic review and meta-analysis. Women Birth ;38(5):101951.
- Walayat A et al. 2024. Maternal e-cigarette exposure alters DNA methylome, site-specific CpG and CH methylation, and transcriptomic signatures in the neonatal brain. Sci Rep, 14.
- Wang X, et al. 2020. Smoking and use of electronic cigarettes (vaping) in relation to preterm birth and small-for-gestational age in a 2016 U.S. national sample. Preventative medicine, 134:106041.

Câu hỏi? Gọi 866.626.6847 | Gửi tin nhắn đến 855.999.3525 | Gửi email hoặc trò chuyện tại [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, January 1, 2026.

Depot Medroxyprogesterone Acetate (Depo Provera®)

Selected References:

- Bateman BT, et al. 2016. Late pregnancy β blocker exposure and risks of neonatal hypoglycemia and bradycardia. Pediatrics 138(3) pii:e20160731.

- Bauer et al. 1979. Propranolol in human plasma and breast milk. *Am J Cardiol* 43(4):860-862.
- Bratton S, et al. 2024. Does atenolol use during pregnancy cause small for gestational age neonates? A meta-analysis. *Journal of Perinatal Medicine*. 52.8: 858-862.
- Davis RL, et al. 2011. Risks of congenital malformations and perinatal events among infants exposed to calcium channel and beta-blockers during pregnancy. *Pharmacoepidemiol Drug Saf*. 20(2):138-45. Duan L, et al. 2017. b-Blocker exposure in pregnancy and risk of fetal cardiac anomalies. *JAMA Intern Med* 177(6):885-887.
- Duan L, et al. 2018. Beta-blocker subtypes and risk of low birth weight in newborns. *J Clin Hypertens* 20(11):1603-1609.
- Firoz T, et al. 2014. Oral antihypertensive therapy for severe hypertension in pregnancy and postpartum: a systematic review. *BJOG* 121(10):1210-1218.
- Fischer AJ, et al. 2021. Antiarrhythmic drugs – safety and efficacy during pregnancy. *Herzschrittmacherther Elektrophysiol* 32(2): 145-151.
- Freppel R, et al. 2024. Beta-blockers and breastfeeding: a real-life prospective study. *Eur J Clin Pharmacol*. 80(12):1937-1943.
- Halpern DG, et al. 2019. Use of medication for cardiovascular disease during pregnancy: JACC state-of-the-art review. *Journal of the American College of Cardiology*. 73.4: 457-476.
- Hutchinson S, et al. 2013. Use of common migraine treatments in breast-feeding women: A summary of recommendations. *Headache* 53(4):614-627.
- Joglar JA, et al. 2023. 2023 HRS expert consensus statement on the management of arrhythmias during pregnancy. *Heart Rhythm*. 20.10: e175-e264. Karlberg B, et al. 1974. Excretion of propranolol in human breast milk. *Aceta Pharmacol Toxicol* 34(3):222-224.
- Lennestall R, et al. 2009. Maternal use of antihypertensive drugs in early pregnancy and delivery outcome, notably the presence of congenital heart defects in the infants. *Eru J Clin Pharmacol* 65(6):615-625.
- Manolis TA, et al. 2020. Cardiac arrhythmias in pregnant women: need for mother and offspring protection. *Curr Med Res Opin* 36(7):1225-1243.
- Moss HB, Procci WRR. 1982. Sexual dysfunction associated with oral antihypertensive medication: a critical survey of the literature. *Gen Hosp Psych* 4(2):121-129.
- Riant P, et al. 1986. High plasma protein binding as a parameter in the selection of betablockers for lactating women. *Biochem Pharmacol* 35(24):4579-4581.
- Rosen RC, et al. 1988. Beta-blocker effects on sexual function in normal males. *Arch Sex Behav*. 17(3):241-255. Ruys TP, et al. 2014. Cardiac medication during pregnancy, data from the ROPAC. *Int J Cardiol*. 177(1):124-128.
- Salman M, et al. 2016. Erectile dysfunction: prevalence, risk factors, and involvement of antihypertensive drugs intervention. *Trop J Pharm Res* 15(4):869-876.
- Smith MT et al. 1983. Propranolol, propranolol glucuronide, and naphthoxylactic acid in breast milk and plasma. *Ther Drug Monit*. 5(1):87-93.
- Tanaka K, et al. 2016. Beta-blockers and fetal growth restriction in pregnant women with cardiovascular disease. *Circ J* 80(10):2221-2226. Taylor EA, Turner P. 1981. Anti-hypertensive therapy with propranolol during pregnancy and lactation. *Postgrad Med J* 57(669):427-430.
- Thorley KJ, McAinish J. 1983. Levels of the beta-blockers atenolol and propranolol in the breast milk of women treated for hypertension in pregnancy. *Biopharm Drug Dispos*. 4(3):299-301.
- Turnstall ME. 1969. The effect of propranolol on the onset of breathing at birth. *Br J Anaesth* 41(9):792.
- Welzel T, et al. 2021. Intrauterine growth retardation in pregnant women with Long QT syndrome treated with beta-receptor blockers. *Neonatology* 118(4):406-415.
- Xie RH, et al. 2014. Association between labetalol use for hypertension in pregnancy and adverse infant outcomes. *Eur J Obstet Gynecol Reprod Biol* 175:124-128.
- Xie RH, et al. 2014. Beta-blockers increase the risk of being born small for gestational age or of being institutionalized during infancy. *BJOG*. 121(9):1090-1096.

- Yakoob MY, et al. 2013. The risk of congenital malformations associated with exposure to β -blockers in pregnancy: a meta-analysis. Hypertension 62(2):375-381.

Câu hỏi? Gọi 866.626.6847 | Gửi tin nhắn đến 855.999.3525 | Gửi email hoặc trò chuyện tại [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, January 1, 2026.