

Azithromycin (Z-Pak®)

Selected References:

- Abdellatif M, et al. 2019. Association between exposure to macrolides and the development of infantile hypertrophic pyloric stenosis: a systematic review and meta-analysis. *Eur J Pediatr*. 178:301-314.
- Antonucci R, et al. 2022. Use of Azithromycin in Pregnancy: More Doubts than Certainties. *Clinical drug invest*. 42(11): 921-935.
- Bakheit, AH, et al. 2014. Azithromycin. *Profiles of Drug Substn, Excip, and Rel Methodol*. 39:1-40.
- Bérard A et al. 2015. Use of macrolides during pregnancy and the risk of birth defects: a population-based study. *Pharmacoepidemiol Drug Saf* 24(12):1241-1248.
- Cooper WO, et al. 2002. Prenatal prescription of macrolide antibiotics and infantile hypertrophic pyloric stenosis. *Obstet Gynecol*; 100:101-106.
- Cooper WO, et al. 2009. Antibiotics potentially used in response to bioterrorism and the risk of major congenital malformations. *Paediatr Perinat Epidemiol*. 23(1):18-28.
- Damkier P, et al. 2019. In utero exposure to antibiotics and risk of congenital malformations: a population-based study. *Am J Obstet Gynecol* 221(6):648.e1-648.e15.
- Fan H, et al. 2020. Associations between macrolide antibiotics prescribing during pregnancy and adverse child outcomes in the UKL Population based cohort study. *BMJ* 368:m331.
- Figueroa-Romero A, et al. 2022. Drugs for intermittent preventive treatment of malaria in pregnancy: current knowledge and way forward. *Trop. Med. Infect. Dis*. 8(7): 152.
- Goldstein LH, et al. 2009. The safety of macrolides during lactation. *Breastfeed Med*, 4(4):197-200.
- Heikkinen T., et al. 2005. The transplacental transfer of the macrolide antibiotics erythromycin, roxithromycin and azithromycin. *BJOG: An Intern Jour of Obstet and Gynaecol*. 107(6):770-775.
- Hume-Nixon M, et al. 2021. A systematic review and meta-analysis of the effect of administration of azithromycin during pregnancy on perinatal and neonatal outcomes. *EClinicalMedicine* 40:101123.
- Leke, AZ, et al. 2021. Macrolide and lincosamide antibiotic exposure in the first trimester of pregnancy and risk of congenital anomaly: A European case-control study. *Reprod Toxicol* 100:101-108.
- Lund M, et al. 2014. Use of macrolides in mother and child and risk of infantile hypertrophic pyloric stenosis: nationwide cohort study. *BMJ*. 348:g1908.
- Mårdh PA. 2002. Influence of infection with chlamydia trachomatis on pregnancy outcome, infant health and life-long sequelae in infected offspring. *Best Pract and Research Clin Obstet and Gynaec*. 16(6): 847-864.
- Muanda FT, et al. 2017. Use of antibiotics during pregnancy and risk of spontaneous abortion. *CMAJ*. 189(17):625-633.
- Pfizer Labs. 2021. Zithromax (azithromycin) label. Available at: https://www.accessdata.fda.gov/drugsatfda_docs/label/2021/050670s036,050710s051,050711s050,050784s037lbl.pdf. Accessed 4 Nov 2025.
- Rahangdale L, et al. 2006. An observational cohort study of Chlamydia trachomatis treatment in pregnancy. *Sex Transm Dis*. 33(2):106-110.
- Sandman Z., Iqbal OA. 2024. Azithromycin. *StatPearls*. Available at: <https://www.ncbi.nlm.nih.gov/books/NBK557766/>. Accessed 4 Nov 2025.
- Sarkar M, et al. 2006. Pregnancy outcome following gestational exposure to azithromycin. *BMC Pregnancy Childbirth*. 6:18.
- Sørensen HT, et al. 2003. Risk of infantile hypertrophic pyloric stenosis after maternal postnatal use of macrolides. *Scand J Infect Dis*. 35(2):104-106.
- Sutton A, et al. 2014. Azithromycin accumulates in breast milk following a single dose for cesarean

prophylaxis. AJOG. 210(1):S235.

- Tellem R, et al. 2005. Pregnancy outcome after gestational exposure to the new macrolides: a prospective controlled cohort study. Reprod Toxicol.;20(3):484-485.
- U.S. Centers for Disease Control and prevention. 2021. Chlamydia Infections – STI Treatment Guidelines. Available at: <https://www.cdc.gov/std/treatment-guidelines/chlamydia.htm>. Accessed 4 Nov 2025.
- Wilton LV, et al. 1998. The outcomes of pregnancy in women exposed to newly marketed drugs in general practice in England. Br J Obstet Gynaecol. 105(8): 882-889.

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Selected References:

- American Academy of Pediatrics Committee on Genetics. 2008. Maternal phenylketonuria. Pediatrics 122:445-449.
- American College of Obstetricians and Gynecologists Committee on Genetics. 2020. Management of women with phenylalanine hydroxylase deficiency (phenylketonuria). Obstet Gynec, 135(4):e167-e170.
- Bier C, et al. 2024. Outcomes in 14 live births resulting from Pegvaliase-treated pregnancies in PKU-affected females. Mol Genet Metab, 141(3):108152.
- BioMarin Pharmaceutical Inc. Palynziq medication label. Available at: <https://dailymed.nlm.nih.gov/dailymed/fda/fdaDrugXsl.cfm?setid=6dba844a-db02-44f8-8593-ce497ed9406c&type=display>. Accessed 27 October 2025.
- Cunningham A, et al. 2023. Nutrition management of PKU with pegvaliase therapy: Update of the web-based PKU nutrition management guideline recommendations. Orphanet J Rare Dis, 18:155.
- Fisch RO, et al. 1981 Semen studies on phenylketonurics. Biochem Med, 26(3):427434. Kopesky JJ, et al. 2024. Successful outcomes with continued pegvaliase-pqpz treatment throughout pregnancy and lactation in a PKU patient. Mol Genet Metab, 141:18.

- Levy HL, Waisbren SE. 1983. Effects of untreated maternal phenylketonuria and hyperphenylalaninemia on the fetus. N Engl J Med, 309:1269-1274.
- Rohr F, et al. 2020. Discontinuation of pegvaliase therapy during maternal PKU pregnancy and postnatal breastfeeding: A case report. Mol Genet Metab Rep, 22:100555.
- Rohr F, et al. 2022. Reinstitution of pegvaliase therapy during lactation. Mol Genet Metab Rep, 33:100938.
- Teissier R, et al. 2012. Maternal phenylketonuria: low phenylalaninemia might increase the risk of intra uterine growth retardation. J Inherit Metab Dis, 35(6):993-999.
- U.S. Food and Drug Administration Center for Drug Evaluation and Research. Active Risk Identification and Assessment (ARIA) Sufficiency Memo for Pregnancy Safety Concerns. Available at: https://www.accessdata.fda.gov/drugsatfda_docs/nda/2018/761079Orig1s000OtherR.pdf. Accessed 27 October 2025.
- Waisbren SE, et al. 2015. Maternal phenylketonuria: long-term outcomes in offspring and post-pregnancy maternal characteristics. JIMD Rep, 21:23-33.

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Azithromycin (Z-Pak®)

Selected References:

- Anderson KN, et al. 2020. ADHD medication use during pregnancy and risk for selected birth defects: National Birth Defects Prevention Study, 1998-2011. J Atten Dis. 24(3):479-489
- Bang Madsen K, et al. 2025. In utero exposure to methylphenidate, amphetamines and atomoxetine and offspring neurodevelopmental disorders – a population-based cohort study and meta-analysis. Molecular psychiatry, 30(9), 3885–3894.
- Benassayag Kaduri, N, et al. 2024. Amphetamine use for attention deficit hyperactive disorder during

breastfeeding and children's neurodevelopmental outcomes: A pilot study. *Psychiatry research*, 339, 116047.

- Cohen JM, et al. 2017. Placental complications associated with psychostimulant use in pregnancy. *Obstet Gynecol*. 130(6):1192-201.
- Eriksson M, et al. 1981. Amphetamine addiction and pregnancy II. Pregnancy, delivery, and the neonatal period. Socio-medical aspects. *Acta Obstet Gynecol Scand* 60:253-259.
- Food and Drug Administration. 2017. Adderall® CII. 2017. Accessed from https://www.accessdata.fda.gov/drugsatfda_docs/label/2017/011522s043lbl.pdf.
- Food and Drug Administration. 2013. Highlights of Prescribing Information – Adderall XR. Accessed from https://www.accessdata.fda.gov/drugsatfda_docs/label/2013/021303s026lbl.pdf.
- Garey JD, et al. 2020. Teratogen update: Amphetamines. *Birth Defects Res*. 112(15):1171-1182.
- Hasan SA, et al. 2026. Prescription Stimulant Continuation in Pregnancy and Birth Outcomes. *Journal of attention disorders*, 30(3), 315-328.
- Huybrechts KF, et al. 2018. Association Between Methylphenidate and Amphetamine Use in Pregnancy and Risk of Congenital Malformations: A Cohort Study From the International Pregnancy Safety Study Consortium. *JAMA Psychiatry*. 75(2):167-175.
- Ilett KF, et al. 2007. Transfer of dexamphetamine into breast milk during treatment for attention deficit hyperactivity disorder. *Br J Clin Pharmacol*, 63(3):371-375.
- Newport DJ, et al. 2016. Prenatal psychostimulant and antidepressant exposure and risk of hypertensive disorders of pregnancy. *J Clin Psychiatry*. 77(11):1538-45.
- Norby U, et al. 2017. Perinatal outcomes after treatment with ADHD medication during pregnancy. *Pediatrics* 140(6).
- Öhman I, et al. 2015. Narcolepsy treated with racemic amphetamine during pregnancy and breastfeeding. *J Hum Lact* 31:374-6.
- Pham MN, et al. 2022. The adverse association between stimulant use for attention deficit hyperactivity disorder (ADHD) and semen parameters. *Andrologia*, 54(2), e14315.
- Poulton AS, et al. 2018. Perinatal outcomes of women diagnosed with attention-deficit/hyperactivity disorder: An Australian population-based cohort study. *CNS Drugs* 32(4):377-386.
- Rose SJ, et al. 2020. Amphetamine-dextroamphetamine and pregnancy: neonatal outcomes after prenatal prescription mixed amphetamine exposure. *J Attention Dis*. 25(9): 1295-1301.
- Russell DJ, et al. 2024. Investigating maternal and neonatal health outcomes associated with continuing or ceasing dexamphetamine treatment for women with attention-deficit hyperactivity disorder during pregnancy: a retrospective cohort study. *Archives of women's mental health*. 27(5), 785-94.
- Srinivas C, et al. 2025. Attention-Deficit/Hyperactivity Disorder Medication Use in Pregnancy and Risk of Preterm Birth: A Population-Based Cohort Study. *Paediatric and perinatal epidemiology*, 10.1111/ppe.70031.
- Steiner E et al. 1984. Amphetamine secretion in breast milk. *Eur J Clin Pharmacol* 27:123-4.
- Suarez EA, et al. 2024. Prescription Stimulant Use During Pregnancy and Risk of Neurodevelopmental Disorders in Children. *JAMA psychiatry*, 81(5), 477-488.
- Szpunar MJ, et al. 2023. Risk of Major Malformations in Infants After First-Trimester Exposure to Stimulants: Results From the Massachusetts General Hospital National Pregnancy Registry for Psychiatric Medications. *Journal of clinical psychopharmacology*, 43(4), 326-332.

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Selected References:

- Ahmad MK, et al. 2010. Withania somnifera improves semen quality by regulating reproductive hormone levels and oxidative stress in seminal plasma of infertile males. *Fertil Steril*, 94(3), 989-996.
- Ali H, et al. 2017. Effect of maternal antenatal and newborn supplementation with vitamin A on cognitive development of school-aged children in rural Bangladesh: a follow-up of a placebo-controlled, randomized trial. *Am J Clin Nutr*, 106(1), 77-87.
- American College of Obstetricians and Gynecologists (ACOG). (n.d.). Nutrition during pregnancy. ACOG. Retrieved May 4, 2025.
- Beurskens LW, et al. 2013. Dietary vitamin A intake below the recommended daily intake during pregnancy and the risk of congenital diaphragmatic hernia in the offspring. *Birth Defects Res A Clin Mol Teratol*, 97(1), 60-66.
- Botto LD, et al. 2001. Vitamin A and cardiac outflow tract defects. *Epidemiology*, 12, 491-496.
- Chameli G & Mukherjee KL. 1988. Relationship between maternal serum vitamin A and vitamin A status of the corresponding fetuses. *J Trop Pediatr*, 34(6), 313-315.
- Christian P, et al. 2013. Effects of vitamin A and beta-carotene supplementation on birth size and length of gestation in rural Bangladesh: a cluster-randomized trial. *Am J Clin Nutr*, 97(1), 188-194.
- Clagett-Dame M & Knutson D. 2011. Vitamin A in reproduction and development. *Nutrients*, 3(4), 385-428.
- Darling AM, et al. 2017. Vitamin A and zinc supplementation among pregnant women to prevent placental malaria: a randomized, double-blind, placebo-controlled trial in Tanzania. *Am J Trop Med Hyg*, 96(4), 826-834.
- Fonseca BM, et al. 2023. Retinoic acid (all-trans) presents antioxidant properties within human ovary and reduces progesterone production by human granulosa cells. *Syst Biol Reprod Med*, 69(2), 129-141.
- Hamdy AM, et al. 2013. Maternal vitamin A deficiency during pregnancy and its relation with maternal and neonatal hemoglobin concentrations among poor Egyptian families. *ISRN Pediatr*, 652148.
- Huang Y & Zheng S. 2011. The effect of vitamin A deficiency during pregnancy on anorectal malformations. *J Pediatr Surg*, 46(7), 1400-1405.
- Institute of Medicine (US) Panel on Micronutrients. 2001. Dietary reference intakes for vitamin A, vitamin K, arsenic, boron, chromium, copper, iodine, iron, manganese, molybdenum, nickel, silicon, vanadium, and zinc. Washington (DC): National Academies Press (US). Available from: <https://www.ncbi.nlm.nih.gov/books/NBK222318/>.
- Ishikawa Y, et al. 2016. Prenatal vitamin A supplementation associated with adverse child behavior at 3 years in a prospective birth cohort in Japan. *Pediatr Int*, 58(9), 855-861.
- Mastroiacovo P, et al. 1999. High vitamin A intake in early pregnancy and major malformations: a multicenter prospective controlled study. *Teratology*, 59(1), 7-11.
- Mills JL, et al. 1997. Vitamin A and birth defects. *Am J Obstet Gynecol*, 177(1), 31-36.
- Panth M, et al. 1990. Effect of vitamin A supplementation on haemoglobin and vitamin A levels during pregnancy. *Br J Nutr*, 64(2), 351-358.

- Pitchik HO, et al. 2018. Prenatal nutrition, stimulation, and exposure to punishment are associated with early child motor, cognitive, language, and socioemotional development in Dar es Salaam, Tanzania. *Child Care Health Dev*, 44(6), 841-849.
- Sakurai T, et al. 2005. Fat-soluble and water-soluble vitamin contents of breast milk from Japanese women. *J Nutr Sci Vitaminol*, 51(4), 239-247.
- Shaw GM, et al. 1997. Periconceptional intake of vitamin A among women and risk of neural tube defect-affected pregnancies. *Teratology*, 55, 132-133.

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Selected References:

- Adhikari EH. 2026. Diagnosis and Management of Syphilis in Pregnancy. *Obstet Gynecol*. 147(3):323-35.
- American College of Obstetricians and Gynecologists. 2024. Screening for syphilis in pregnancy. <https://www.acog.org/clinical/clinical-guidance/practice-advisory/articles/2024/04/screening-for-syphilis-in-pregnancy/>. [Accessed 03/2026].
- Appak O, et al. 2019. [A case of congenital syphilis and prozone phenomenon]. *Mikrobiyol Bul* 53(3): 336-342. Article in Turkish with English abstract.
- Brookings C, et al. 2013. Sexually transmitted infections and sexual function in relation to male fertility. *Korean J Urol*. 54(3):149-56.
- Centers for Disease Control and Prevention. 2025. About syphilis. Centers for Disease Control and

Prevention <https://www.cdc.gov/syphilis/about/index.html>. [Accessed 03/2026]

- Centers for Disease Control and Prevention. 2025. STD facts – congenital syphilis. <https://www.cdc.gov/syphilis/about/about-congenital-syphilis.html>. [Accessed 03/2026]
- Chevalier FJ, et al. 2025. Syphilis: A Review. JAMA. 334(21):1927-40. Erratum in: JAMA. 334(21):1955.
- da Silva HBM, et al. 2024. Syphilis in pregnancy and adverse birth outcomes: A nationwide longitudinal study in Brazil. Int J Gynaecol Obstet. 166(1): 80-9.
- Desjardins AA, et al. 2025. FIGO Committee on Infections During Pregnancy and FIGO Committee on Health Systems Strengthening. Syphilis in pregnancy: A practical guide for prenatal care providers. Int J Gynaecol Obstet. 171(2):601-10.
- Gulersen M, et al. 2023. Risk factors and adverse outcomes associated with syphilis infection during pregnancy. Am J Obstet Gynecol MFM. 5(6):100957. Hegde A, et al. 2023. Congenital syphilis: a rare presentation of a forgotten infection. J Infect
- Dev Ctries 17(1): 135-138.
- Kimberlin DW, et al. 2021. Committee on Infectious Diseases, American Academy of Pediatrics. Red Book: 2021–2024 Report of the Committee on Infectious Diseases. American Academy of Pediatrics; Itasca, IL, USA.
- Mascola L, et al. 1985. Congenital syphilis revisited. Am J Dis Child 139:575-80.
- Mavrov GI, Goubenko TV. 2001. Clinical and epidemiological features of syphilis in pregnant women: the course and outcome of pregnancy. Gynecol Obstet Invest; 52:114-8.
- Mayo Foundation for Medical Education and Research. 2024. Syphilis. Mayo Clinic. <https://www.mayoclinic.org/diseases-conditions/syphilis/symptoms-causes/syc-20351756>. [Accessed 03/2026]
- Office on Women's Health. 2024. Sexually transmitted infections, pregnancy, and breastfeeding. U.S. Department of Health and Human Services. [Accessed 03/2026]. <https://womenshealth.gov/a-z-topics/stis-pregnancy-and-breastfeeding>
- Papp JR, et al. 2024. CDC Laboratory Recommendations for Syphilis Testing, United States, 2024. MMWR Recomm Rep. 73(1):1–32.
- Peeling RW, et al. 2023. Syphilis. Lancet. 402(10398):336-46.
- Rac MW, et al. 2017. Syphilis during pregnancy: a preventable threat to maternal-fetal health. Am J Obstet Gynecol; 216(4): 352-363.
- Sankaran D, et al. 2023. Congenital Syphilis-An Illustrative Review. Children (Basel).; 10(8):1310.
- Schlueter A, et al. 2022 Adverse pregnancy outcomes associated with maternal syphilis infection, The Journal of Maternal-Fetal & Neonatal Medicine, 35 (25): 5828-5833,
- Stafford IA, et al. 2024. Syphilis Complicating Pregnancy and Congenital Syphilis. N Engl J Med. 390(3):242-253.
- Verghese VP, et al. 2018. Early Childhood Neurodevelopmental Outcomes in Infants Exposed to Infectious Syphilis In Utero. Pediatr Infect Dis J; 37(6):576-579.
- Wan Z, et al. 2020. Maternal syphilis treatment and pregnancy outcomes: a retrospective study in Jiangxi province, China. BMC Pregnancy Childbirth. 20:648

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