Progesterone and Progestins

Selected References – Progesterone and progestins:

- Abu-Zaid A, et al. 2025. Cervical pessary versus vaginal progesterone to prevent preterm birth in women with a singleton pregnancy and a short cervix: a systematic review and meta-analysis. Reprod Sci, 32(8):2540-2557.
- American College of Obstetricians and Gynecologists' Committee on Practice Bulletins-Obstetrics. 2021. Prediction and prevention of spontaneous preterm birth: ACOG Practice Bulletin, Number 234. Obstet Gynecol, 138(2):e65-e90.
- Bidabadi E, et al. 2026. The association between maternal progesterone use during pregnancy and offspring attention deficit hyperactivity disorder risk. J Atten Disord, 30(3):292-299.
- Carmichael SL, et.al. 2005. Maternal progestin intake and risk of hypospadias. Archives of Pediatrics & Adolescent Medicine, 159(10):957-962.
- Check JH, et al. 1986. The risk of fetal anomalies as a result of progesterone therapy during pregnancy. Fertil Steril, 45:575-577.
- Committee on Drugs. 2001. The transfer of drugs and other chemicals into human milk. Pediatrics, 108(3):776-789.
- Danielsson BR, Ritchie HE. 2025. Review: hormone pregnancy tests were teratogenic by the same failed abortion and hypoxia-related mechanism as misoprostol. Birth Defects Res, 117(3):e2462.
- Devall AJ, et al. 2021. Progestogens for preventing miscarriage: a network meta-analysis. Cochrane Database Sys Rev, 4(4):CD013792.
- Dominsky O, et al. 2026. Vaginal progesterone and the risk of preterm birth in patients with short cervix beyond 24 weeks. Int J Gynaecol Obstet, 172(2):1039-1046.
- Duds I, et al. 2006. Population-based case-control teratogenic study of hydroxyprogesterone treatment during pregnancy. Congenit Anom (Kyoto), 46:194-198.
- Elenis E, et al. 2025. Perinatal outcomes of progesterone in natural frozen-thawed embryo transfer pregnancies: insights from 2 randomized controlled trials. Fertil Steril, 124(1):104-112.
- Eshraghi N, et al. 2025. Combined vaginal progesterone and cervical pessary effect on preterm birth in singleton pregnancies with short cervix: a retrospective cohort study. BMC Pregnancy Childbirth, 25(1):1055.
- Fawzy M, et al. 2008. Treatment options and pregnancy outcome in women with idiopathic recurrent miscarriage: a randomized placebo-controlled study. Arch Gynecol Obstet, 278(1):33-38.
- Fernandes Dias M, et al. 2026. Progesterone in pregnancy and neonatal outcomes: a systematic review and meta-analysis of randomized controlled trials. Int J Gynaecol Obstet, 172(2):685-696.
- He YTN, et al. 2025. Cervical cerclage versus cervical pessary with or without vaginal progesterone for preterm birth prevention in twin pregnancies and a short cervix: a two-by-two factorial randomised clinical trial. PLoS Med, 22(2):e1004526.
- Heinonen OP, et al. 1977. Birth Defects and Drugs in Pregnancy. Littleton, Mass.: John Wright-PSG, pp 389, 391-392, 394, 443, 478, 497.
- Heinonen OP, et al. 1977. Cardiovascular birth defects and antenatal exposure to female sex hormones. N Engl J Med, 296:67-60.
- Kanbak AR, Öztekin DC. 2025. Is the use of vaginal progesterone a factor in pregnant women diagnosed with gestational diabetes mellitus? Rev Assoc Med Bras (1992), 71(8):e20250444.
- Lokshin VN, et al. 2024. Progestin-primed ovarian stimulation outcomes in in-vitro fertilization (IVF) – a systematic review of the literature. Gynecol Endocrinol, 40(1):2414783.
- Massai R, et al. 2005. Extended use of a progesterone-releasing vaginal ring in nursing women: a phase II clinical trial. Contraception, 72:352-357.
- Mei Y, et al. 2025. Impact of the PPOS protocol on euploidy embryo rates and reproductive outcomes in preimplantation genetic testing cycles: a systematic review. Front Endocrinol (Lausanne), 16:1595232.

- Michaelis J, et al. 1983. Prospective study of suspected associations between certain drugs administered during early pregnancy and congenital malformations. Teratology, 27:57-64.
- Nachum Z, et al. 2024. Vaginal progesterone for pregnancy prolongation after arrested preterm labor: a randomized clinical trial. JAMA Netw Open, 7(7):e2419894.
- Nguyen HTL, et al. 2025. Intensive luteal phase support in hormone replacement and modified natural cycle frozen embryo transfers in ovulatory patients: a propensity score-matched study. PLoS One, 20(7):e0327470.
- Norman JE, et al. 2009. Progesterone for the prevention of preterm birth in twin pregnancy (STOPPIT): a randomised, double-blind, placebo-controlled study and meta-analysis. Lancet, 373(9680):2034-2040.
- Practice Committee of the American Society for Reproductive Medicine. 2008. Progesterone supplementation during the luteal phase and in early pregnancy in the treatment of infertility: an educational bulletin. Fertility and Sterility, 89(4):789-792.
- Practice Committee of the American Society for Reproductive Medicine. 2012. Evaluation and treatment of recurrent pregnancy loss: a committee opinion. Fertility and Sterility, 98(5):1103-1111.
- RamaRao S, et al. 2013. Progesterone vaginal ring: introducing a contraceptive to meet the needs of breastfeeding women. Contraception, 88(5):591-598.
- Rinaldi L, et al. 2024. Oral dydrogesterone along with vaginal micronized progesterone supplementation for luteal phase support in IVF patients, and its impact on pregnancy and live birth rates: a prospective randomized trial. BMC Pregnancy Childbirth, 24(1):845.
- Roy M, et al. 2020. Progesterone vaginal ring as a new contraceptive option for lactating mothers: evidence from a multicenter non-randomized comparative clinical trial in India. Contraception, 102(3):159-167.
- Silver RI, et al. 1999. In vitro fertilization is associated with an increased risk of hypospadias. J Urology, 161(6):1954-1957.
- Ti A, et al. 2025. Progestogen-only contraception use during breastfeeding: an updated systematic review. BMJ Sex Reprod Health, 51(Suppl 1):s4-s17.
- Wang X, et al. 2024. The effectiveness of vaginal progesterone to prevent preterm birth in singleton pregnant women with a short cervix at 18-32 weeks gestation. J Matern Fetal Neonatal Med, 37(1):2412751.
- Wu HM, et al. 2025. Smooth endoplasmic reticulum aggregates in oocytes: a comparison of progestin-primed and GnRH antagonist IVF protocols. J Ovarian Res, 18(1):181.
- Wu JN, et al. 2025. Association of combined folic acid and progesterone use with congenital malformations in women with vaginal bleeding during early pregnancy: a multicenter cohort study. Eur J Med Res, 30(1):1057.
- Xie YX, et al. 2025. Comparison of oral dydrogesterone and vaginal progesterone for luteal phase support in natural and modified natural cycle frozen embryo transfers. J Ovarian Res, 18(1):183.
- Yu L, et al. 2024. Evaluation of two luteal support regimens, intramuscular progesterone and progesterone vaginal gel, for vitrified-warmed embryo transfer in women with chronic salpingitis: a single-center 8-year retrospective study. Eur J Med Res, 29(1):619.
- Zhang W, et al. 2025. No improvement in pregnancy and perinatal outcomes with combined luteal support in modified natural cycle frozen embryo transfer. Front Endocrinol (Lausanne), 15:1458527.
- Zhao H, et al. 2025. Efficacy and safety of different progestogens in women with first threatened miscarriage: a network meta-analysis. Int J Gynaecol Obstet, 168(3):944-957.
- Zhao J, et al. 2025. Cesarean delivery modifies the association between prenatal exogenous progesterone and cryptorchidism: a case-control study. Eur J Pediatr, 184(12):746.

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Progesterone and Progestins

Selected References:

- Asghar FA, et al. 2024. LTRA use in pregnancy: a systematic review on their safety and association with congenital anomalies'. JRGM, 13(2):1-8.
- Committee on Drugs. American Academy of Pediatrics. 2001. The transfer of drugs and other chemicals into human milk. Pediatrics. 108:776-789.
- Cossette B, et al. 2014. Relative perinatal safety of salmeterol vs formoterol and fluticasone vs budesonide use during pregnancy. Ann Allergy Asthma Immunol. 112(5):459-464.
- Eltonsy S, et al. 2011. Beta2-agonists use during pregnancy and the risk of congenital malformations. Birth Defects Research Clin Mol Teratol. 91(11):937-947.
- Gregersen TL, Ulrik CS. 2013. Safety of bronchodilators and corticosteroids for asthma during pregnancy: what we know and what we need to do better. J Asthma Allergy. 6:117-125.
- Lim A, et al. 2013. Asthma drugs in pregnancy and lactation. Aust Prescr. 36(5):150–153.
- Lim A, et al. 2011. Systematic review of the safety of regular preventive asthma medications during pregnancy. Ann Pharmacother. 45(7-8):931-945.
- Namazy J, Schatz M. 2018. Management of asthma during pregnancy: optimizing outcomes and minimizing risk. Semin Respir Crit Care Med. 39(01):29-35.
- National Asthma Education and Prevention Program. Working Group. 2004. Report on managing asthma during pregnancy: Recommendations for pharmacologic treatment. Update 2004. NIH publication NO.05-5236. Bethesda, MD: US Department of Health and Human Services; National Institutes of Health; National Heart, Lung and Blood Institute.
- Peterka M, ET AL. 2021. Anti-asthma Drugs Formoterol and Budesonide (Symbicort) Induce Orofacial Clefts, Gastroschisis and Heart Septum Defects in an In Vivo Model. In Vivo. 35(3):1451-1460.
- Tamasi L, et al. 2005. The management of bronchial asthma during pregnancy – Hungarian experiences. [Article in Hungarian] Orv Hetil. 146(45):2035-2039.
- Wilton LV, Shakir SA. 2002. A post-marketing surveillance study of formoterol (Foradil). Its use in general practice in England. Drug Saf. 25:213-223.

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Progesterone and Progestins

Selected References:

- Aase JM, et al. 1970. Children of mothers who took LSD in pregnancy. Lancet; 1:100-1.
- Alexander GJ, et al. 1970. Lysergic acid diethylamide intake in pregnancy: fetal damage in rats. J Pharmacol Exp Ther; 173(1):48-59.
- Baquiran M, et al. 2023. Lysergic acid diethylamide toxicity. [Updated 2023 Dec 17]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing. Available from: https://www.ncbi.nlm.nih.gov/books/NBK553216/
- Cohen MM, et al. 1968. The effect of LSD-25 on the chromosomes of children exposed in utero. Pediat Res 2:486-492.
- Das, Saibal et al. 2016. Lysergic acid diethylamide: a drug of 'use'?. Therapeutic advances in psychopharmacology; 6(3):214-28.
- Fabro S, Sieber SM. 1968. Is lysergide a teratogen? Lancet 1(7543):639.
- Fuentes Jet al. 2020. Therapeutic Use of LSD in Psychiatry: A Systematic Review of Randomized-Controlled Clinical Trials. Frontiers in Psychiatry; 10.943.
- Jacobson CB, Berlin CM. 1972. Possible reproductive detriment in LSD users. JAMA 222(11):1367-1373.
- Haden, M, & Woods, B. 2020. LSD overdoses: three case reports. Journal of Studies on Alcohol and Drugs; 81(1), 115-118.
- Long SY. 1972. Does LSD induce chromosomal damage and malformations? A review of the literature. Teratology; 6(1):75-90.
- McElhatton PR. 2000. Fetal effects of substances of abuse. J Toxicol Clin Toxicol; 38:194-5.
- McGlothlin WH, et al.1970. Effect of LSD on human pregnancy. JAMA.1; 212(9):1483-7.
- Mueller, B. A., Daling, J. R., Weiss, N. S., & Moore, D. E. (1990). Recreational drug use and the risk of primary infertility. Epidemiology (Cambridge, Mass.), *1*(3), 195–200.
- Papac DI and Foltz RL. 1990. Measurement of lysergic acid diethylamide (LSD) in human plasma by gas chromatography/negative ion chemical ionization mass spectrometry. J Anal Toxicol; 14(3):189-90.
- Robinson JT, et al. 1974. Chromosome aberrations and LSD. A controlled study in 50 psychiatric patients. J Psychiatry. 125(0):238-44.
- Zellweger H, et al. 1967. Is lysergic-acid diethylamide a teratogen? Lancet; 2(7525):1066-1068.

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Progesterone and Progestins

Selected References:

- Alwan S, et al. 2016. Safety of selective serotonin reuptake inhibitors in pregnancy: a review of current evidence. CNS Drugs, 30(6):499-515.
- Andersen JT, et al. 2014. Exposure to selective serotonin reuptake inhibitors in early pregnancy and the risk of miscarriage. Obstet Gynecol, 124:655-661.
- Bandoli G, et al. 2020. Prenatal antidepressant use and risk of adverse neonatal outcomes. Pediatrics, 146(1):e20192493.
- Berard A, et al. 2017. Antidepressant use during pregnancy and the risk of major congenital malformations in a cohort of depressed pregnant women: an updated analysis of the Quebec Pregnancy Cohort. BMJ Open, 7:e013372.
- Bonari L, et al. 2004. Perinatal risks of untreated depression during pregnancy. Can J Psychiatry, 49(11):726-735.
- Burch KJ and Wells BG. 1992. Fluoxetine/norfluoxetine concentrations in human milk. Pediatrics, 89:676-677.
- Chambers CD, et al. 1999. Weight gain in infants breastfed by mothers who take fluoxetine. Pediatrics, 104(5):I1-15.
- Chambers C, et al. 2006. Selective serotonin-reuptake inhibitors and risk of persistent pulmonary hypertension of the newborn. N Engl J Med, 354(6)579-587.
- Desaunay P, Eude LG, Dreyfus M, Alexandre C, Fedrizzi S, Alexandre J, Uguz F, Guénolé F. Benefits and Risks of Antidepressant Drugs During Pregnancy: A Systematic Review of Meta-analyses. Paediatr Drugs. 2023 May;25(3):247-265. doi: 10.1007/s40272-023-00561-2. Epub 2023 Feb 28. PMID: 36853497.
- Diav-Citrin O, et al. 2008. Paroxetine and fluoxetine in pregnancy: a prospective, multicenter, controlled, observational study. Br J Clin Pharmacol, 66(5):695-705.
- Gao SY, et al. 2017. Fluoxetine and congenital malformations: a systematic review and meta-analysis of cohort studies. Br J Clin Pharmacol, 83(10):2134-2147.
- Goldstein DJ, Marvel DE. 1993. Psychotropic medications during pregnancy: risk to the fetus. JAMA, 270:2177.
- Goldstein DJ, et al. 1997. Effects of first-trimester fluoxetine exposure on the newborn. Obstet Gynecol, 89:713-8.
- Grigoriadis S, et al. 2013. The effect of prenatal antidepressant exposure on neonatal adaptation: a systematic review and meta-analysis. J Clin Psychiatry, 74(4):e309-20.
- Grigoriadis S, et al. 2019. Benzodiazepine use during pregnancy alone or in combination with an antidepressant and congenital malformations: systematic review and meta-analysis. J Clin Psychiatry, 80(4):18r12412.
- Huybrechts KF, et al. 2014. Antidepressant use in pregnancy and the risk of cardiac defects. N Engl J Med, 370:2397-2407.
- Huybrechts KF, et al. 2015. Antidepressant use late in pregnancy and risk of persistent pulmonary hypertension of the newborn. JAMA, 313(21):2142-2151.

- Isenberg KE. 1990. Excretion of fluoxetine in human breast milk. J Clin Psychiatry, 51:169.
- Jimenez-Solem E et al. 2012. Exposure to selective serotonin reuptake inhibitors and the risk of congenital malformations: a nationwide cohort study. BMJ, 2:e001148.
- Jordan S, et al. 2019. Antidepressant prescriptions, discontinuation, depression, and perinatal outcomes, including breastfeeding: a population cohort analysis. PLoS One, 14(11):e0225133.
- Kaplan et al. 2017. Maternal SSRI discontinuation, use, psychiatric disorder and the risk of autism in children: a meta-analysis of cohort studies. Br J Clin Pharmacol, 83(12):2798-2806.
- Kieviet N, et al. 2015. Risk factors for poor neonatal adaptation after exposure to antidepressants in utero. Acta Paediatr, 104(4):384-391.
- Kristensen JH, et al. 1999. Distribution and excretion of fluoxetine and norfluoxetine in human milk. Br J Clin Pharmacol, 48(4):521-527.
- Levinson-Castiel R, et al. 2006. Neonatal abstinence syndrome after in utero exposure to selective serotonin reuptake inhibitors in term infants. Arch Pediatr Adolesc Med, 160:173-176.
- Louik C, et al, 2007. First-trimester use of selective serotonin-reuptake inhibitors and the risk of birth defects. N Engl J Med, 356:2675-2683.
- Lusskin SI, et al. 2018. Pharmacotherapy for Perinatal Depression. Clin Obstet Gynecol, 61(3):544-561.
- Masarwa R, et al. 2019. Prenatal exposure to selective serotonin reuptake inhibitors and risk for persistent pulmonary hypertension of the newborn: a systematic review, meta-analysis, and network meta-analysis. Am J Obstet Gynecol, 220(1):57.e1-57.e13.
- Morris R, Matthes J. 2015. Serotonin syndrome in a breast-fed neonate. BMJ Case Rep, doi:10.1136/bcr-2015-209418.
- Moses-Kolko, E.L. et al. 2005. Neonatal signs after late in utero exposure to serotonin reuptake inhibitors. Literature review and implications for clinical applications. J Am Med Assoc, 293: 2372-2383.
- Nulman I, et al. 1997. Neurodevelopment of children exposed in utero to antidepressant drugs. NEJM, 336(4):258-262.
- Nulman I, et al. 2002. Child development following exposure to tricyclic antidepressants or fluoxetine throughout fetal life: a prospective, controlled study. Am J Psychiatry, 159(11):1889-1895.
- Ornoy A. 2017. Neurobehavioral risks of SSRIs in pregnancy: Comparing human and animal data. Reprod Toxicol, 72:191-200.
- PD-Rx Pharmaceuticals, Inc. 2025. *Fluoxetine capsules: Prescribing information*. DailyMed. [Accessed August 2026]. https://dailymed.nlm.nih.gov/dailymed/fda/fdaDrugXsl.cfm?setid=d26f7450-7650-43df-a63b-1fe2472882a9&type=display
- Pedersen LH, et al. 2009. Selective serotonin inhibitors in pregnancy and congenital malformations: population based cohort study. BMJ, 339:b3569.
- Rampono J, et al. 2009. Placental transfer of SSRI and SNRI antidepressants and effects on the neonate. Pharmacopsychiatry, 42(3):95-100.
- Ruchkin V, Martin A. 2005. SSRIs and the developing brain. Lancet, 365:451-453.
- Sanz E, et al. 2005. Selective serotonin reuptake inhibitors in pregnant women and neonatal withdrawal syndrome: a database analysis. Lancet, 365:482-487.
- Sjaarda LS et al. 2020. Urinary selective serotonin reuptake inhibitors across critical windows of pregnancy establishment: a prospective cohort study of fecundability and pregnancy loss. Fertil Steril, 114(6):1278-1287.
- Strain, SL. 1994. Fluoxetine-initiated ovulatory cycles in two clomiphene-resistant women. J Am J Psychiatry, 151(4):620.
- Salisbury AL, et al. 2016. The roles of maternal depression, serotonin reuptake inhibitor treatment, and concomitant benzodiazepine use on infant neurobehavioral functioning over the first postnatal month. Am J Psychiatry, 173(2):147-157.
- Sylvester C, et al. 2019. selective serotonin reuptake inhibitors and fertility: considerations for couples trying to conceive. Harv Rev Psychiatry, 27(2):108-118.

- Taddio A, Ito S, and Koren G. 1996. Excretion of fluoxetine and its metabolite, norfluoxetine, in human breastmilk. J Clin Pharmacol, 36(1)42-47.
- Vaidya R, et al. 2024. Non epileptiform abnormal neurologic signs in newborns following in-utero psychotropic medication exposure. Journal of Neonatal-Perinatal Medicine. 17(5):717-722.
- Wang S, et al. 2015. Selective serotonin reuptake inhibitors (SSRIs) and the risk of congenital heart defects: a meta-analysis of prospective cohort studies. Journal of the American Heart Association, 4(5)e001681.
- Wen SW, et al. 2006. Selective serotonin reuptake inhibitors and adverse pregnancy outcomes. Am J Obstet Gynecol, 194(4):961-966.
- Wisner KL, Avram MJ, George AL Jr, Abramova TV, Yang A, Caritis SN, Costantine MM, Stika CS. Concentrations of Fluoxetine Enantiomers Decline During Pregnancy and Increase After Birth. J Clin Psychopharmacol. 2024 Mar-Apr 01;44(2):100-106.
- Yang F, et al. 2017. Risk of autism spectrum disorder in offspring following paternal use of selective serotonin reuptake inhibitors before conception: a population-based cohort study. BMJ Open, 7(12):e016368.
- Yang F, et al. 2018. Prenatal paternal selective serotonin reuptake inhibitors use and risk of ADHD in offspring. Pediatrics, 141(1):e20171081.
- Yonkers KA, et al. 2009. The management of depression during pregnancy: a report from the American Psychiatric Association and the American College of Obstetricians and Gynecologists. Obstet Gynecol, 114(3):703-713.
- Yoshida, K, et al. 1998. Fluoxetine in breastmilk and developmental outcome of breastfed infants. Br J Psychiatry, 172:175-178. Pregnant Women with Suspected or Confirmed Influenza. Obstet Gyn, 132(4):e169-e173.

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Progesterone and Progestins

Selected References:

- Akbari M, et al. 2013. Systematic review and meta-analysis on the effects of thiopurines on birth outcomes from female and male patients with inflammatory bowel disease. Inflamm Bowel Dis, 19(1):15-22.
- Alami Z, et al. 2018. Pregnancy outcome following in utero exposure to azathioprine: a French comparative observational study. Therapie, 73(3):199-207.
- Alshwairikh LA, Zeneb B. 2022. A 25-year-old Saudi woman with a 2-year history of antisynthetase syndrome with interstitial lung disease who commenced azathioprine treatment in the third trimester of pregnancy and had a successful birth at term. Am J Case Rep, 7:23:e936833.
- Balevic S, et al. 2024. Azathioprine metabolite levels and outcomes during pregnancies with rheumatic disease. Lupus Sci Med, 11(1):e0011036.
- Casanova MJ, et al. 2013. Safety of thiopurines and anti-TNF-alpha drugs during pregnancy in patients with inflammatory bowel disease. Am J Gastroenterol, 108(3):433-440.
- Christensen LA, et al. 2008. Azathioprine treatment during lactation. Aliment Pharmacol Ther, 28(10):1209-1213.
- Davison JM et al. 1985. Maternal azathioprine therapy and depressed haematopoiesis in the babies of renal allograft patients. Br J Obstet Gynaecol, 92:233-239.
- de Meij TG, et al. 2013. Dutch Initiative on crohn and colitis. Long-term follow-up of children exposed intrauterine to maternal thiopurine therapy during pregnancy in females with inflammatory bowel disease. Aliment Pharmacol Ther, 38(1):38-43.
- Dejaco C, et al. 2001. Azathioprine treatment and male fertility in inflammatory bowel disease. Gastroenterology, 121:1048-53.
- Francella A, et al. 2003. The safety of 6-mercaptopurine for childbearing patients with inflammatory bowel disease: a retrospective cohort study. Gastroenterology, 124(1):9-17.
- Friedman S, et al. 2017. Paternal use of azathioprine/6-mercaptopurine or methotrexate within 3 months before conception and long-term health outcomes in the offspring: a nationwide cohort study. Reproductive Toxicology, 73:196-200.
- Götestam Skorpen C, et al. 2016. The EULAR points to consider for use of antirheumatic drugs before pregnancy, and during pregnancy and lactation. Ann Rheum Dis, 75(5):795-810.
- Goldstein LH, et al. 2007. Pregnancy outcome of women exposed to azathioprine during pregnancy. Birth Defects Res A Clin Mol Teratol, 79(10):696-701.
- Hoeltzenbein M, et al. 2012. Pregnancy outcome after paternal exposure to azathioprine/6-mercaptopurine. Reprod Toxicol, 34(3):364-369.
- Ikram N, at al. 2021. Breastfeeding in women with rheumatic diseases. Lupus Sci Med, 8(1):e000491.
- Khedr L, Ekram M. 2024. Eur J Case Rep Intern Med, 11(4):004385.
- Kinnucan J, Kane S. 2021. Editorial: thiopurines but not anti-TNF monotherapy are linked to worse pregnancy outcomes in a large population-based study. Aliment Pharmacol Ther, 54(3):343-344.
- Langagergaard V, et al. 2007. Birth outcome in women treated with azathioprine or mercaptopurine during pregnancy: a Danish nationwide cohort study. Aliment Pharmacol Ther, 25(1):73-81.
- Matalon ST, et al. 2004. Review of the potential effects of three commonly used antineoplastic and immunosuppressive drugs (cyclophosphamide, azathioprine, doxorubicin on the embryo and placenta). Reprod Toxicol, 18(2):219-230.
- Matarazzo L, et al. 2021. Pregnancy outcome in women with childhood onset autoimmune hepatitis and autoimmune sclerosing cholangitis on long-term immunosuppressive treatment. Eur J Obstet Gynecol Reprod Biol, 268:7-11.
- Moretti ME et al. 2006. Breast-feeding during maternal use of azathioprine. Ann Pharmacother, 40(12):2269-2272.
- Motta M, et al. 2007. Immune system development in infants born to mothers with autoimmune disease, exposed in utero to immunosuppressive agents. Am J Perinatol, 24(8):441-447.
- Myer A, et al. 2021. Comparative study of pregnancy outcomes in women with inflammatory bowel disease treated with thiopurines and/or anti-TNF: a French nationwide study 2010-2018. Aliment Pharmacol Ther, 54(3):302-311.

- Nørgård B, et al. 2004. The risk of congenital abnormalities in children fathered by men treated with azathioprine or mercaptopurine before conception. Aliment Pharmacol Ther, 19(6):679-685.
- Reynolds JA, et al. 2023. Outcomes of children born to mothers with systemic lupus erythematosus exposed to hydroxychloroquine or azathioprine. Rheumatology (Oxford), 62(3):1124-1135.
- Skejo C, et al. 2024. Early onset sepsis and lobar pneumonia in a newborn exposed in utero to Ustekinumab and azathioprine. Inflamm Bowel Dis, 30(2):314-315.
- Wolf MF, et al. 2023. Azathioprine and 6-mercaptopurine-induced intrahepatic cholestasis of pregnancy: case report and review of literature: Taiwan J Obstet Gynecol, 63(5):761-764.

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