

点多态性及区块(rs1544410、rs7967152)GC单倍型与GDM的发病风险升高有关。VDR基因多态性与GDM的关系可能为GDM的预防提供新的思路,通过VDR的基因分型可以找到易感GDM的人群,从而提供有针对性的维生素D补充建议,具有潜在的科学和临床意义。

利益冲突 所有作者声明无利益冲突

作者贡献声明 李金波:分析/解释数据、统计分析、论文撰写;郭孟竹、任庆文:实施研究、采集数据;李汪俊:采集数据、分析/解释数据;冯永亮、杨海澜:酝酿和设计实验、研究指导;张亚玮、王素萍:酝酿和设计实验、研究指导、论文修改;邹惟为:酝酿和设计实验、研究指导、论文修改、经费支持

参 考 文 献

- [1] Alfadhli EM. Gestational diabetes mellitus[J]. Saudi Med J, 2015, 36(4):399-406. DOI:10.15537/smj.2015.4.10307.
- [2] Gao CH, Sun X, Lu L, et al. Prevalence of gestational diabetes mellitus in mainland China: A systematic review and meta-analysis[J]. J Diabetes Investig, 2019, 10(1): 154-162. DOI:10.1111/jdi.12854.
- [3] Yan B, Yu YX, Lin MZ, et al. High, but stable, trend in the prevalence of gestational diabetes mellitus: a population-based study in Xiamen, China[J]. J Diabetes Investig, 2019, 10(5):1358-1364. DOI:10.1111/jdi.13039.
- [4] Wang XJ, Li W, Ma LK, et al. Investigation of miRNA-binding site variants and risk of gestational diabetes mellitus in Chinese pregnant women[J]. Acta Diabetol, 2017, 54(3):309-316. DOI:10.1007/s00592-017-0969-y.
- [5] Daly B, Toulis KA, Thomas N, et al. Increased risk of ischemic heart disease, hypertension, and type 2 diabetes in women with previous gestational diabetes mellitus, a target group in general practice for preventive interventions: a population-based cohort study[J]. PLoS Med, 2018, 15(1):e1002488. DOI:10.1371/journal.pmed.1002488.
- [6] Li J, Song CH, Li CP, et al. Increased risk of cardiovascular disease in women with prior gestational diabetes: a systematic review and meta-analysis[J]. Diabetes Res Clin Pract, 2018, 140: 324-338. DOI: 10.1016/j.diabres.2018.03.054.
- [7] Damm P. Future risk of diabetes in mother and child after gestational diabetes mellitus[J]. Int J Gynaecol Obstet, 2009, 104(S1):S25-26. DOI:10.1016/j.ijgo.2008.11.025.
- [8] Rasmussen L, Poulsen CW, Kampmann U, et al. Diet and healthy lifestyle in the management of gestational diabetes mellitus[J]. Nutrients, 2020, 12(10): 3050. DOI: 10.3390/nu12103050.
- [9] Zhao P, Liu EQ, Qiao YJ, et al. Maternal gestational diabetes and childhood obesity at age 9-11: results of a multinational study[J]. Diabetologia, 2016, 59(11): 2339-2348. DOI:10.1007/s00125-016-4062-9.
- [10] Plows JF, Stanley JL, Baker PN, et al. The pathophysiology of gestational diabetes mellitus[J]. Int J Mol Sci, 2018, 19(11):3342. DOI:10.3390/ijms19113342.
- [11] Mao HY, Li Q, Gao SJ. Meta-analysis of the relationship between common type 2 diabetes risk gene variants with gestational diabetes mellitus[J]. PLoS One, 2012, 7(9): e45882. DOI:10.1371/journal.pone.0045882.
- [12] Poulsen P, Levin K, Petersen I, et al. Heritability of insulin secretion, peripheral and hepatic insulin action, and intracellular glucose partitioning in young and old Danish twins[J]. Diabetes, 2005, 54(1): 275-283. DOI: 10.2337/diabetes.54.1.275.
- [13] Zhang CL, Bao W, Rong Y, et al. Genetic variants and the risk of gestational diabetes mellitus: a systematic review[J]. Human Reprod Update, 2013, 19(4):376-390. DOI:10.1093/humupd/dmt013.
- [14] Guo SW, Magnuson VL, Schiller JJ, et al. Meta-analysis of vitamin D receptor polymorphisms and type 1 diabetes: a HuGE review of genetic association studies[J]. Am J Epidemiol, 2006, 164(8): 711-724. DOI: 10.1093/aje/kwj278.
- [15] Aghajafari F, Nagulesapillai T, Ronksley PE, et al. Association between maternal serum 25-hydroxyvitamin D level and pregnancy and neonatal outcomes: systematic review and meta-analysis of observational studies[J]. BMJ, 2013, 346:f1169. DOI:10.1136/bmj.f1169.
- [16] Wei SQ, Qi HP, Luo ZC, et al. Maternal vitamin D status and adverse pregnancy outcomes: a systematic review and meta-analysis[J]. J Matern Fetal Neonatal Med, 2013, 26(9):889-899. DOI:10.3109/14767058.2013.765849.
- [17] Mukhtar M, Batool A, Wajid A, et al. Vitamin D receptor gene polymorphisms influence T1D susceptibility among pakistanis[J]. Int J Genomics, 2017, 2017: 4171254. DOI: 10.1155/2017/4171254.
- [18] Jain R, von Hurst PR, Stonehouse W, et al. Association of vitamin D receptor gene polymorphisms with insulin resistance and response to vitamin D[J]. Metabolism, 2012, 61(3): 293-301. DOI: 10.1016/j.metabol.2011.06.018.
- [19] Ogunkolade BW, Boucher BJ, Prah J, et al. Vitamin D receptor (VDR) mRNA and VDR protein levels in relation to vitamin D status, insulin secretory capacity, and VDR genotype in Bangladeshi Asians[J]. Diabetes, 2002, 51(7): 2294-2300. DOI:10.2337/diabetes.51.7.2294.
- [20] Safar HA, Chehadah SEH, Abdel-Wareth L, et al. Vitamin D receptor gene polymorphisms among Emirati patients with type 2 diabetes mellitus[J]. J Steroid Biochem Mol Biol, 2018, 175: 119-124. DOI: 10.1016/j.jsmb.2017.03.012.
- [21] Yu F, Cui LL, Li X, et al. The genetic polymorphisms in vitamin D receptor and the risk of type 2 diabetes mellitus: an updated meta-analysis[J]. Asia Pacific J Clin Nutr, 2016, 25(3):614-624. DOI:10.6133/apjcn.092015.12.
- [22] Lauenborg J, Grarup N, Damm P, et al. Common type 2 diabetes risk gene variants associate with gestational diabetes[J]. J Clin Endocrinol Metab, 2009, 94(1): 145-150. DOI:10.1210/jc.2008-1336.
- [23] Zhou Q, Wen SW, Liu M, et al. Association between gene polymorphisms of Vitamin D receptor and gestational diabetes mellitus: a systematic review and meta-analysis[J]. Int J Environ Res Public Health, 2021, 18(1):205. DOI: 10.3390/ijerph18010205.
- [24] Shang M, Lin L. IADPSG criteria for diagnosing gestational diabetes mellitus and predicting adverse pregnancy outcomes[J]. J Perinatol, 2014, 34(2): 100-104. DOI: 10.1038/jp.2013.143.
- [25] Zhang X, Cal AJ, Borevitz JO. Genetic architecture of regulatory variation in Arabidopsis thaliana[J]. Genome Res, 2011, 21(5):725-733. DOI:10.1101/gr.115337.110.
- [26] Rosen CJ. Clinical practice. Vitamin D insufficiency[J]. N Engl J Med, 2011, 364(3):248-254. DOI:10.1056/NEJMc1009570.
- [27] Palomer X, González-Clemente JM, Blanco-Vaca F, et al. Role of vitamin D in the pathogenesis of type 2 diabetes mellitus[J]. Diabetes Obes Metab, 2008, 10(3): 185-197. DOI:10.1111/j.1463-1326.2007.00710.x.
- [28] Takiishi T, Gysemans C, Bouillon R, et al. Vitamin D and diabetes[J]. Rheum Dis Clin North Am, 2012, 38(1): 179-206. DOI:10.1016/j.rdc.2012.03.015.
- [29] Liu JQ, Dai Q, Li W, et al. Association of vitamin D receptor gene polymorphisms with gestational diabetes mellitus-a case control study in Wuhan, China[J]. BMC Pregnancy Childbirth, 2021, 21(1): 142. DOI: 10.1186/s12884-021-03621-y.
- [30] Shi AW, Wen J, Liu GQ, et al. Genetic variants in vitamin D signaling pathways and risk of gestational diabetes mellitus[J]. Oncotarget, 2016, 7(42): 67788-67795. DOI: 10.18632/oncotarget.11984.
- [31] Zhu BB, Huang K, Yan SQ, et al. VDR variants rather than early pregnancy Vitamin D concentrations are associated with the risk of gestational diabetes: the Ma'anshan birth cohort(MABC) study[J]. J Diabetes Res, 2019, 2019: 8313901. DOI:10.1155/2019/8313901.
- [32] Apaydin M, Beysel S, Eyerci N, et al. The VDR gene FokI polymorphism is associated with gestational diabetes mellitus in Turkish women[J]. BMC Med Genet, 2019, 20(1):82. DOI:10.1186/s12881-019-0820-0.
- [33] Rahmannedzhad G, Mashayekhi FJ, Goodarzi MT, et al. Association between vitamin D receptor Apal and TaqI gene polymorphisms and gestational diabetes mellitus in an Iranian pregnant women population[J]. Gene, 2016, 581(1):43-47. DOI:10.1016/j.gene.2016.01.026.
- [34] Cartegni L, Wang JH, Zhu ZW, et al. ESEfinder: A web resource to identify exonic splicing enhancers[J]. Nucleic Acids Res, 2003, 31(13): 3568-3571. DOI: 10.1093/nar/kgk616.
- [35] Graveley BR. Sorting out the complexity of SR protein functions[J]. RNA, 2000, 6(9): 1197-1211. DOI: 10.1017/s1355838200000960.