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Prenatal vitamin D3 supplementation: pharmacology and offspring health outcomes

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Citation

Shadid, I. L. C. (2026, June 24). *Prenatal vitamin D3 supplementation: pharmacology and offspring health outcomes*. Retrieved from <https://hdl.handle.net/1887/4307318>

Version: Publisher's Version

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STELLINGEN

Behorende bij het proefschrift getiteld

Prenatal vitamin D3 supplementation: Pharmacology and offspring health outcomes

1. The murine placenta dynamically regulates the transfer of vitamin D₃ metabolites, limiting transfer of 25(OH)D to the fetus under high maternal intake. *This thesis (Chapter 3)*
2. In prenatal care, treating vitamin D₃ as a drug requiring individualized pharmacokinetic-guided dosing rather than as a generic fixed-dose nutrient supplement helps to optimize maternal vitamin D₃ status. *This thesis (Chapter 4)*
3. Standard prenatal vitamins containing 400 IU vitamin D₃ is insufficient to achieve serum 25(OH)D₃ levels of 20 ng/ml in all pregnant women during late pregnancy, even when women are sufficient at baseline. *This thesis (Chapter 5)*
4. Adverse pregnancy outcomes, such as preeclampsia and spontaneous preterm birth, alters the offspring microbiome during early childhood. *This thesis (Chapter 9)*
5. The gestational rise in serum 1,25(OH)₂D₃ represents a pregnancy-specific endocrine adaptation that operates largely independently of canonical calcium, phosphate, and PTH control mechanisms, and is partially dependent on substrate availability from maternal 25(OH)D₃. *Hollis et al. J Bone Miner Res. 2011. 26(10), 2341-2357.*
6. Extrarenal CYP27B1 and CYP24A1 enable tissue-specific vitamin D₃ metabolism that regulates local cellular function beyond the effects of circulating 1,25(OH)₂D. *Bikle et al. Bone Rep. 2018. 8, 255-267.*
7. Placental uptake of 25(OH)D₃ and metabolism to 1,25(OH)₂D₃ or 24,25(OH)₂D₃ is an active process that contributes to maternal circulating 1,25(OH)₂D₃ and governs fetal vitamin D availability. Effects of vitamin D on fetal development may also be mediated via effects on the placenta function itself. *Ashley et al. Elife. 2022. 11, e71094.*
8. Prenatal vitamin D₃ trials that do not selectively enroll deficient women and do not confirm biochemical correction on treatment will structurally bias effect estimates towards the null and obscure true benefits. *Wimalawansa, S.J. Nutr Rev. 2025. 83(7), e1740-1781.*
9. Success depends on how many experiments you can fit into 24 hours. (Productivity is determined by how well time is structured and utilized, persistence is key) *Thomas A. Edison. 1901.*
10. If innovation requires time to think, the MBTA Green Line is Boston's greatest intellectual asset – *The Boston Globe. 2023*