ビタミンD結合タンパクに影響する遺伝子多型が血清ビタミンD(25[OH]D3)と食物アレルギーとの関係を修正する

背景

ビタミンD不足が食物アレルギーと関連しているというエビデンスが増加している。ビタミンD結合タンパク (DBD)低下が血清ビタミン D 生物学的活性を増加させる。遺伝的多型が結合タンパクの変化の80%を説明出来る。

目的

DBP の低下が食物アレルギーにおける血清ビタミン D 低下による悪影響を代償することが出来るかについて調べた。

方法

集団ベース研究(n=5276)より血清 serum 25-hydroxyvitamin D3 (25[OH]D3) と 1 歳時の食物アレルギー（負荷試験で証明した 338 名の食物アレルギーと 269 名のコントロール）と 2 歳時（55 名の持続した食物アレルギーと寛解した 50 名）との関連について調べた。液体クロマトグラフィータンデムマススペクトロメトリーにて 25(OH)D3 値を測定し、季節で補正した。解析は DBP 代理のマーカとして rs7041 のゲノム型によって層別化した（low, the GT/TT genotype; high, the GG genotype)。

結果

1 歳時の低血清 25(OH)D3 level (≤50 nM/L) 値は食物アレルギーと関連した。特に GG ゲノム型の乳児で(オッズ比 [OR], 6.0; 95% CI, 0.9-38.9)、しかし GT/TT ゲノム型では関連しなかった (OR, 0.7; 95% CI, 0.2-2.0;

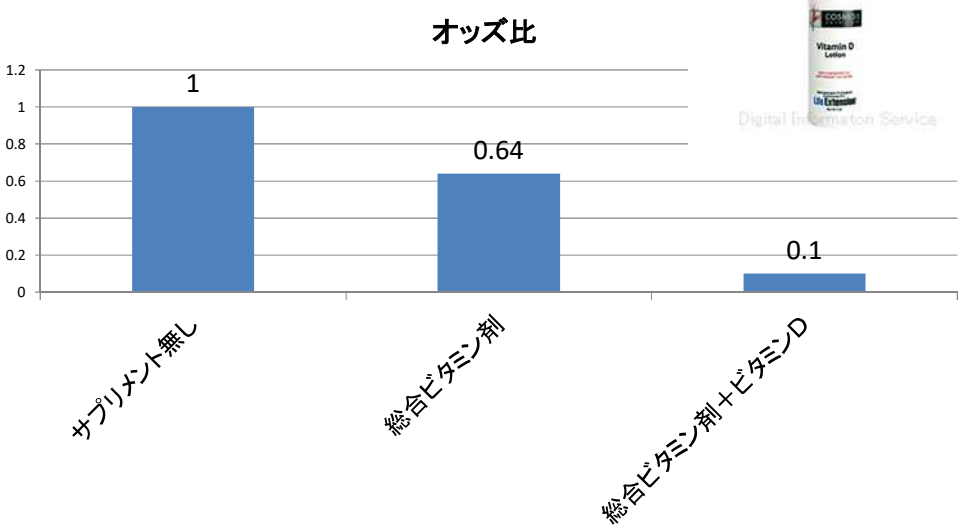
P interaction = .014)。母親の出生前のビタミンDサプリメントは食物アレルギーの減少と関連した、特にGT/TT ゲノム型 (OR, 0.10; 95% CI, 0.03-0.41)。持続的なビタミン D 不足は持続的食物アレルギーを増加させ(OR, 12.6; 95% CI, 1.5-106.6)、特に GG ゲノム型においてみられた。

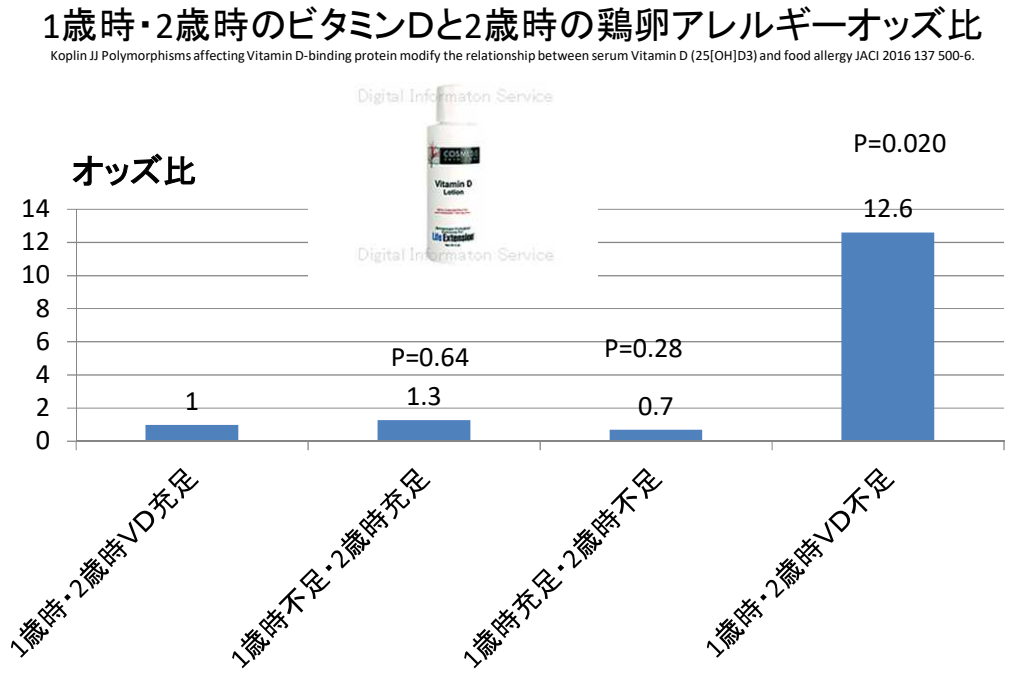
結論

DBP 値の低下と関連した遺伝的多型は低血清 25(OH)D3 と食物アレルギーとの関連を弱めた。そのことは低 DBP を伴ったビタミンD生物学的活性が高くなることと一致する。これは食物アレルギーにおけるビタミンDの役割をうまく説明できる。

妊娠中の総合ビタミン剤・ビタミンDと1歳時の食物アレルギーオッズ比

Koplin JJ Polymorphisms affecting Vitamin D-binding protein modify the relationship between serum Vitamin D (25[OH]D3) and food allergy JACI 2016 137 500-6.





食物アレルギーのある人はビタミンDのサプリメントとしての摂取が、食物アレルギーを改善する可能性がある

Polymorphisms affecting vitamin D-binding protein modify the relationship between serum

vitamin D (25[OH]D3) and food allergy

- J Allergy Clin Immunol. 2016 Feb;137(2):500-506.e4. doi: 10.1016/j.jaci.2015.05.051. Epub 2015 Aug 7.
- **Polymorphisms affecting vitamin D-binding protein modify the relationship between serum vitamin D (25[OH]D3) and food allergy.**
- Koplin JJ[1], Suaini NH[2], Vuillermin P[3], Ellis JA[2], Panjari M[4], Ponsonby AL[2], Peters RL[2], Matheson MC[1], Martino D[2], Dang T[4], Osborne NJ[5], Martin P[4], Lowe A[1], Gurrin LC[1], Tang ML[6], Wake M[7], Dwyer T[4], Hopper J[8], Dharmage SC[1], Allen KJ[9]; HealthNuts Study.
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- Abstract
- BACKGROUND:

- There is evolving evidence that vitamin D insufficiency may contribute to food allergy, but findings vary between populations. Lower vitamin D-binding protein (DBP) levels increase the biological availability of serum vitamin D. Genetic polymorphisms explain almost 80% of the variation in binding protein levels.
- OBJECTIVE:
- We sought to investigate whether polymorphisms that lower the DBP could compensate for adverse effects of low serum vitamin D on food allergy risk.
- METHODS:
- From a population-based cohort study (n = 5276) we investigated the association between serum 25-hydroxyvitamin D3 (25[OH]D3) levels and food allergy at age 1 year (338

challenge-proven food-allergic and 269 control participants) and age 2 years (55 participants with persistent and 50 participants with resolved food allergy). 25(OH)D3 levels were measured using liquid chromatography-tandem mass spectrometry and adjusted for season of blood draw. Analyses were stratified by genotype at rs7041 as a proxy marker of DBP levels (low, the GT/TT genotype; high, the GG genotype).

- **RESULTS:**
- Low serum 25(OH)D3 level (≤50 nM/L) at age 1 years was associated with food allergy, particularly among infants with the GG genotype (odds ratio [OR], 6.0; 95% CI, 0.9-38.9) but not in those with GT/TT genotypes (OR, 0.7; 95% CI, 0.2-2.0; P interaction = .014). Maternal antenatal

vitamin D supplementation was associated with less food allergy, particularly in infants with the GT/TT genotype (OR, 0.10; 95% CI, 0.03-0.41). Persistent vitamin D insufficiency increased the likelihood of persistent food allergy (OR, 12.6; 95% CI, 1.5-106.6), particularly in those with the GG genotype.

- CONCLUSIONS:
- Polymorphisms associated with lower DBP level attenuated the association between low serum 25(OH)D3 level and food allergy, consistent with greater vitamin D bioavailability in those with a lower DBP level. This increases the biological plausibility of a role for vitamin D in the development of food allergy.