脂溶性ビタミン必要量算定のためのレビュー

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研究要旨
食事摂取基準の必要量の策定には、特定の栄養素に特異的な不足又は欠乏症をアウトカムとした研究、また特定の栄養素に特異的に反応する生体指標をアウトカムとした摂取量との関係を検討した研究の文献収集が必須となる。そこで、脂溶性ビタミンの必要量の検討に関係する文献の検索を行い、値の算定時に必須とすべき事項を探索するための資料作成を目的に本研究を行った。過去 5 年以内の各脂溶性ビタミンの摂取量及び生体指標による必要量（欠乏・不足回避、適正量など）の検討を報告した文献を抽出したところ、ビタミン A では欠乏レベルでの検討を行った文献が多く抽出された。ビタミン D では、ビタミン D 栄養状態の指標となる血清 25-hydroxyvitamin D 濃度と骨の健康をはじめとして循環器疾患等との関係を検証した文献、またビタミン D 栄養状態への寄与因子を検証した文献が抽出された。ビタミン E は、摂取量と血中α-トコフェロール濃度との関係を検討した文献が、ビタミン K では骨の健康とビタミン K 摂取量を反映する生体指標を検証した文献が抽出された。以上より、日本人の実態に即した必要量の算定資料の収集にあたり、システマティックレビューに準じた手法での文献レビューのみならず、和文誌並びに他国の DRIs も参照し、必要量の算定を進める必要があることが明らかとなった。

A．研究目的

日本人の食事摂取基準[1)]では、健康の保持・増進並びに生活習慣病の予防を目的に、エネルギー及び栄養素摂取量の基準が策定されている 1)。栄養素の摂取不足の回避を目的とした指標として、推定平均必要量（Estimated Average Requirement: EAR)、その補助的位置づけの推奨量 (Recommended Dietary Allowance: RDA)、EAR・RDA が設定できない場合に用いる目安量（Adequate Intake: AI）がある。摂取不足の回避のための摂取量を検討するにあたり、EAR については集団内の半数の者で「不足又は欠乏の症状が現れ得る摂取量」「体内量が維持される摂取量」「体内量が飽和している摂取量」「これ以外の方法」という定義が示されている。一方、AI は「ある一定の栄養状態を維持するのに十分な量」として定義されている。このような定義に沿った算定を行うために、特定の栄養素に特異的な不足又は欠乏症をアウトカムとした研究、また特定の栄養素に特異的に反応する生体指標をア

ウトカムとした摂取量との関係を検討した研究の文献収集が必須となる。欧州食品安全機関（European Food Safety Authority: EFSA）の Dietary Reference Values（DRV）の Scientific Opinion や全米医学アカデミー（旧　米国医学研究所 The Institute of Medicine （IOM））の Dietary Reference Intakes （DRIs)においては、各栄養素の基本的事項、各指標設定の考え方のみならず、当該栄養素の栄養状態を反映する生体指標や臨床兆候についての記載も詳細になされている。一方で、我が国の食事摂取基準において、この観点でまとめられた項は設けられていないため、本研究では脂溶性ビタミンの必要量の検討に関係する文献の検索を行い、値の算定時に必須とすべき事項を探索するための資料作成を目的に行った。

Ｂ．研究方法

各脂溶性ビタミンの摂取量及び生体指標による必要量(欠乏・不足回避、適正量など)の検討を報告した文献を検索することとした。なお、日本人の食事摂取基準は 5 年ごとの改定が行われているため、過去 5 年以内に発表された文献を収集することとした。その他、Humans、language：English のフィルターを設定した。

文献検索のデータベースには PubMed を用いた。検索語は、基本文として、(当該ビタミン名 OR 化合物名) AND intake AND (biomarker) AND (deficiency OR requirement OR optimal)を用いた。” deficiency”, “requirement”, “optimal” の使い分けについては、欠乏症が多く報告されているビタミンには ” deficiency”、欠乏症が稀であるものは “requirement” または ” optimal” を使用して検索を行った。使用した検索式は以下の通りである。

1. 各脂溶性ビタミンにおける検索式

ビタミン A

（“vitamin A”[tiab] OR “vitamin A” [mesh] OR retinol[tiab] OR retinyl[tiab])

AND (deficiency[mesh] OR deficiency [tiab]) AND (intake[mesh] OR intake[tiab] OR biomarker[mesh] OR biomarker[tiab]).

ビタミン D

ビタミン D は、食事からの摂取並びに皮膚での産生を反映する生体指標として、血中 25-hydroxyvitamin D [25(OH)D] 濃度を用いることが世界的にもコンセンサスを得られているため、intake ではなく、血清 25(OH)D 濃度の至適血中濃度に関する文献検索を行った。

(("25 hydroxyvitamin d"[Supplementary Concept] OR "25 hydroxyvitamin d"[All Fields] OR "25 hydroxyvitamin d"[All Fields]) AND ("optimal"[All Fields] OR "optimality"[All Fields] OR "optimally"[All Fields] OR "optimization"[All Fields] OR "optimizations"[All Fields] OR "optimize"[All Fields] OR "optimized"[All Fields] OR "optimizer"[All Fields] OR "optimizers"[All Fields] OR "optimizes"[All Fields] OR "optimizing"[All Fields]) AND ("range"[All Fields] OR "ranged"[All

Fields] OR "ranges"[All Fields] OR "ranging"[All Fields])

ビタミンE

(("vitamin e"[MeSH Terms] OR "vitamin e"[All Fields]) AND ("require"[All Fields] OR "required"[All Fields] OR "requirement"[All Fields] OR "requirements"[All Fields] OR "requires"[All Fields] OR "requiring"[All Fields]) AND ("intake"[All Fields] OR "intakes"[All Fields] OR "intakes"[All Fields])) AND ("serum"[All Fields] OR "circulating"[All Fields] OR "plasma"[All Fields]))

ビタミンK

(("vitamin K"[All Fields] OR "vitamin K"[MeSH Terms] OR ("phylloquinone"[Title/Abstract] OR "menaquinone"[Title/Abstract]) AND("require"[All Fields] OR "required"[All Fields] OR "requirement"[All Fields] OR "requirements"[All Fields] OR "requires"[All Fields] OR "requiring"[All Fields]) AND ("intake"[All Fields] OR "intakes"[All Fields] OR "intakes"[All Fields])) AND ("serum"[All Fields] OR "circulating"[All Fields] OR "plasma"[All Fields]))

2. 文献の選定

タイトル及びアブストラクトで選定を行った。ただし、アブストラクトで把握しきれないものについては、フルテキストを確認した。除外の基準として、対象とするビタミンに関連の無い文献、in vivo もしくは in vitro の文献(メカニズムのみ記されている文献を含む)、症例報告、特異的な疾患を有する者が対象となっている文献、摂取量のみの文献とした。

C．研究結果ならびに考察

1. ビタミンA

表 1 に検索結果を示す。162 件の文献が抽出され、選定の結果 56 件が残った。ビタミン A 欠乏症は、いわゆる発展途上国に多く、妊婦及び小児の欠乏症に焦点を当てた研究が多い傾向にあった。全般的に欠乏レベルに該当する者での文献が多く見られた。また、バイオマーカーとしては、血清レチノール濃度やレチノール結合タンパクを利用している文献が多かった。炎症との相互関係を示唆する文献も複数見られた。また、耐容上限量 (Tolerable Upper Intake Level (UL)) の算定に関わる文献も抽出された。

2. ビタミンD

食事摂取基準(2020 年版)では、骨の健康をアウトカムとして、骨折予防に最大効果を示す血清 25(OH)D 濃度が設定され、この血中濃度を維持する摂取量として AI が算定されていた。血中 25(OH)D 濃度は、骨以外のその他の疾患との関わりも示唆されているが、骨の健康に対してのみ用量依存性が確認されたため、旧 IOM の DRIs では骨の健康がビタミン D の EAR の算定根拠に用いられている。ここでは、骨の健康以外の臨床アウトカムについても採用することとした。表 2 に検索結果を示す。43 件の文献が抽出され、選定の結果 30 件が残った。選択された文献では、血清副甲状腺ホルモン濃度、骨

の健康、循環器疾患を臨床アウトカムに設定されたものが複数あり、がん、多発性硬化症などもあった。また、血中 25(OH)D 濃度への日光曝露及びビタミン D 摂取量の寄与を検討した文献も一定数抽出された。

3. ビタミンE

表 3 に検索結果を示す。31 件の文献が抽出され、選定の結果 17 件が残った。疾患との関係を検討した文献が他の脂溶性ビタミンに比して少なく、摂取量と血中濃度を同時に調査した文献が一定数見られた。生体指標としては、血中α-トコフェロール濃度が用いられている文献が大半であった。ビタミン E 介入による母乳への効果を検討した文献も複数存在した。

4. ビタミンK

表 4 に検索結果を示す。17 件の文献が抽出され、選定の結果 11 件が残った。臨床アウトカムには骨折や骨密度を対象とした文献が多く、循環器疾患を対象とした文献も複数見られた。ビタミン K 摂取量に対応する生体指標の検討を行った文献も複数あり、生体指標には、血中ビタミン K_1 濃度、protein induced by Vitamin K absence or antagonists-II (PIVKA-II)、 undercarboxylated osteocalcin (ucOC)、dephosphorylated and uncarboxylated (dp-ucMGP) 濃度が用いられていた。

D. 結論

各脂溶性ビタミンの欠乏又は不足回避のための摂取量について調査を行った結果、ビタミン A では、検索式を “deficiency” から ”requirement” に変更した場合でも、欠乏レベルでの調査研究が多く抽出された。しかし、わが国において、ビタミン A 欠乏は稀であると考えられるため、これら文献を EAR の算定に用いることは妥当ではないことが考えられた。すなわち、欠乏よりも高い摂取レベルの「不足」の回避に必要な摂取量を把握するための文献収集が必要となる。その際に、前述した EFSA 及び旧 IOM から報告されている DRIs に記載のバイオマーカーに関する文献を追加で検索する必要があることが示唆された。具体的には、現在の日本人の食事摂取基準でも採用されている同位体希釈法を用いた体内貯蔵量に関する文献の収集となる。ビタミン D については、臨床アウトカムに対する用量依存性を考慮する必要があるため、検索式に ”dose-response も追加する必要があったものと思われる。また、ビタミン D 栄養状態に寄与する因子を検討した文献は、摂取量の算定において一定の情報を提供しうるが、ビタミン D は紫外線の影響を受けるため、緯度や肌の色の影響を大きく受ける。また、ビタミン D の供給源及びサプリメント利用状況が欧米諸国と日本が異なることを考えると、和文を含めた日本人での研究文献の追加が必要となることが考えられた。ビタミン E では、今回抽出された文献では、血中α-トコフェロール濃度を生体指標に用いているものが多かったが、血中α-トコフェロール濃度は血清脂質の影響を大きく受け[2)]、ビタミン E の主要な生理作用である抗酸化性を反映しない可能性も示唆されており[3)]、生体指標が十分に確立している状況にない。ビタミン E についても、EFSA 及び旧 IOM から報告されている DRIs に記載のバイオマーカーに関する文献から、さらに展開して収集する必要性があるものと思

われる。この点については、ビタミン K も同様であり、ビタミン K 栄養状態を十分に反映するような生体指標の確立には至っていない。従って、今後はハンドサーチも重ねて、算定に適切な文献の収集を行う必要がある。

本研究の限界点として、選定した文献の質の評価ができていないため、今後この作業を進める必要がある。また、文献検索のデータベースが PubMed のみであるため、Scopus や Cochrane Library、医中誌等、和文誌の検索も考慮したデータベースでの検索も必要である。

以上より、脂溶性ビタミンの必要量の検討につながる文献の検索を行うにあたって、システマティックレビューに準じた手法を取り入れるのみならず、他国の DRIs も参照し、必要量の算定を進める必要があることが明らかとなった。

F．研究発表

１．論文発表

なし

２．学会発表

なし

G．知的財産権の出願・登録状況

１．特許取得

なし

２．実用新案登録

なし

３．その他

なし

H．引用文献

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2) Berger MM, Shenkin A, Schweinlin A, Amrein K, Augsburger M, Biesalski HK, Bischoff SC, Casaer MP, Gundogan K, Lepp HL, de Man AME, Muscogiuri G, Pietka M, Pironi L, Rezzi S, Cuerda C (2022) ESPEN micronutrient guideline. Clin Nutr. 41:1357-1424.

3) Luo J, Hashimoto Y, Martens LG, Meulmeester FL, Ashrafi N, Mook-Kanamori DO, Rosendaal FR, Jukema JW, van Dijk KW, Mills K, le Cessie S, Noordam R, van Heemst D (2022) Nutrition. 93:111440.

表1. ビタミンAの検索結果

PMID	論題	書誌情報	筆頭著者	出版年	選定（〇）または除外理由
36657914	Dietary inadequacies overestimate the blood deficiencies of magnesium, zinc, and vitamins A, C, E, and D among residents of Sao Paulo	Clin Nutr ESPEN. 2023 Feb;53:196-205. doi: 10.1016/j.clnesp.2022.12.015. Epub 2022 Dec 20.	Hermes Sales C	2023	O
36170963	Breast Milk Retinol Concentrations Reflect Total Liver Vitamin A Reserves and Dietary Exposure in Thai Lactating Women from Urban and Rural Areas	J Nutr. 2023 Jan 14;152(12):2689-2698. doi: 10.1093/jn/nxac223.	Nimmannun K	2023	O
36008009	Assessment of dietary carotenoid intake and biologic measurement of exposure in humans	Methods Enzymol. 2022;674:255-295. doi: 10.1016/bs.mie.2022.05.007. Epub 2022 Jun 25.	Grainger EM	2022	O
34629794	Liver disease and COVID-19: The link with oxidative stress, antioxidants and nutrition	World J Gastroenterol. 2021 Sep 14;27(34):5682-5699. doi: 10.3748/wjg.v27.i34.5682.	Ristic-Medic D	2021	O
34552903	Vitamin A Levels Among Pre-School Children of Central and Western China	Front Public Health. 2021 Sep 6;9:694106. doi: 10.3389/fpubh.2021.694106. eCollection 2021.	Chen Q	2021	O
34380588	Vitamin A deficiency: experience from a tertiary referral UK hospital; not just a low- and middle-income country issue	Public Health Nutr. 2021 Dec;24(18):6466-6471. doi: 10.1017/S1368980021003347. Epub 2021 Aug 12.	Marley A	2021	O
34251518	Prevalence of vitamin A deficiency and dietary inadequacy in Indian school-age children and adolescents	Eur J Nutr. 2022 Feb;61(1):197-209. doi: 10.1007/s00394-021-02636-7. Epub 2021 Jul 12.	Reddy GB	2022	O
34066852	High Prevalence of Stunting and Anaemia Is Associated with Multiple Micronutrient Deficiencies in School Children of Small-Scale Farmers from Chamwino and Kilosa Districts, Tanzania	Nutrients. 2021 May 8;13(5):1576. doi: 10.3390/nu13051576.	Gowele VF	2021	O
33807563	Re-Defining the Population-Specific Cut-Off Mark for Vitamin A Deficiency in Pre-School Children of Malawi	Nutrients. 2021 Mar 5;13(3):849. doi: 10.3390/nu13030849.	Likoswe BH	2021	O
33801011	Vitamin A and Bone Health: A Review on Current Evidence	Molecules. 2021 Mar 21;26(6):1757. doi: 10.3390/molecules26061757.	Yee MMF	2021	O
33765844	Biological evidence to define a vitamin A deficiency cutoff using total liver vitamin A reserves	Exp Biol Med (Maywood). 2021 May;246(9):1045-1053. doi: 10.1177/1535370221992731. Epub 2021 Mar 25.	Tanumihardjo SA	2021	O
33751046	Vitamin A deficiency has declined in Malawi, but with evidence of elevated vitamin A in children	Am J Clin Nutr. 2021 Apr 6;113(4):854-864. doi: 10.1093/ajcn/nqab004.	Williams AM	2021	O
33642459	Assessment of Vitamin A Supplementation Practices in Countries of the Eastern Mediterranean Region: Evidence to Implementation	J Nutr Sci Vitaminol (Tokyo). 2021;67(1):1-12. doi: 10.3177/jnsv.67.1.	Saad F	2021	O
33544296	Vitamin A deficiency after prolonged intake of an unbalanced diet in a Japanese hemodialysis patient	Doc Ophthalmol. 2021 Aug;143(1):85-91. doi: 10.1007/s10633-021-09823-1. Epub 2021 Feb 5.	Kishimoto N	2021	O
33413713	The contribution of provitamin A biofortified cassava to vitamin A intake in Nigerian pre-schoolchildren	Br J Nutr. 2021 Nov 14;126(9):1364-1372. doi: 10.1017/S0007114521000039. Epub 2021 Jan 8.	Afolami I	2021	O
33330941	Vitamin A deficiency among children younger than 5 y in India: an analysis of national data sets to reflect on the need for vitamin A supplementation	Am J Clin Nutr. 2021 Apr 6;113(4):939-947. doi: 10.1093/ajcn/nqaa314.	Reddy GB	2021	O
33245109	Breast Milk-Derived Retinol Is a Potential Surrogate for Serum in the 13C-Retinol Isotope Dilution Test in Zambian Lactating Women with Vitamin A Deficient and Adequate Status	J Nutr. 2021 Jan 4;151(1):255-263. doi: 10.1093/jn/nxaa320.	Kaliwile C	2021	O
33130884	Systematic Review and Meta-Analysis of the Relative Dose-Response Tests to Assess Vitamin A Status	Adv Nutr. 2021 Jun 1;12(3):904-941. doi: 10.1093/advances/nmaa136.	Sheftel J	2021	O
33119397	Serum concentration of vitamin A and its relationship with body adiposity, oxidative stress, and cardiovascular risk in women with recommended dietary intake of vitamin A	Nutr Hosp. 2020 Dec 16;37(6):1135-1142. doi: 10.20960/nh.03129.	Bento C	2020	O
33052059	Vitamin A deficiency indicating as low expression of LRAT may be a novel biomarker of primary hypertension	Clin Exp Hypertens. 2021 Feb 17;43(2):151-163. doi: 10.1080/10641963.2020.1833023. Epub 2020 Oct 14.	Liang X	2021	O
32939553	High-Dose Neonatal Vitamin A Supplementation to Bangladeshi Infants Increases the Percentage of CCR9-Positive Treg Cells in Infants with Lower Birthweight in Early Infancy, and Decreases Plasma sCD14 Concentration and the Prevalence of Vitamin A Deficiency at Two Years of Age	J Nutr. 2020 Nov 19;150(11):3005-3012. doi: 10.1093/jn/nxaa260.	Ahmad SM	2020	O

32844187	Association of maternal diet, micronutrient status, and milk volume with milk micronutrient concentrations in Indonesian mothers at 2 and 5 months postpartum	Am J Clin Nutr. 2020 Oct 1;112(4):1039-1050. doi: 10.1093/ajcn/nqaa200.	Gibson RS	2020	O
32821526	Is Dietary Vitamin A Associated with Myopia from Adolescence to Young Adulthood?	Transl Vis Sci Technol. 2020 May 28;9(6):29. doi: 10.1167/tvst.9.6.29. eCollection 2020 May.	Ng FJ	2020	O
32743650	Adjusting iron and vitamin A status in settings of inflammation: a sensitivity analysis of the Biomarkers Reflecting Inflammation and Nutritional Determinants of Anemia (BRINDA) approach	Am J Clin Nutr. 2019 Aug 1;112(Suppl 1):458S-467S. doi: 10.1093/ajcn/nqaa141.	Namaste SML	2019	O
32577225	Appropriate and inappropriate vitamin supplementation in children	J Nutr Sci. 2020 Jun 5;9:e20. doi: 10.1017/jns.2020.12.	Martini L	2020	O
32456038	Diet and Nutrition Status of Mongolian Adults	Nutrients. 2020 May 22;12(5):1514. doi: 10.3390/nu12051514.	Bromage S	2020	O
32424967	Dietary vitamin A intakes among pregnant women attending antenatal care in health facilities in Dessie Town, North East Ethiopia	J Hum Nutr Diet. 2020 Oct;33(5):678-685. doi: 10.1111/jhn.12766. Epub 2020 May 18.	Koricho Z	2020	O
32249112	Vitamin A and iron status of children before and after treatment of uncomplicated severe acute malnutrition	Clin Nutr. 2020 Nov;39(11):3512-3519. doi: 10.1016/j.clnu.2020.03.016. Epub 2020 Mar 24.	Kangas ST	2020	O
31940621	Chapter 6: Vitamins and Oral Health	Monogr Oral Sci. 2020;28:59-67. doi: 10.1159/000455372. Epub 2019 Nov 7.	Gutierrez Gossweiler A	2020	O
31618430	Prenatal Zinc and Vitamin A Reduce the Benefit of Iron on Maternal Hematologic and Micronutrient Status at Delivery in Tanzania	J Nutr. 2020 Feb 1;150(2):240-248. doi: 10.1093/jn/nxz242.	Noor RA	2020	O
31470574	Breast Milk Content of Vitamin A and E from Early- to Mid-Lactation Is Affected by Inadequate Dietary Intake in Brazilian Adult Women	Nutrients. 2019 Aug 29;11(9):2025. doi: 10.3390/nu11092025.	Machado MR	2019	O
31365834	Combined consumption of a single high-dose vitamin A supplement with provision of vitamin A fortified oil to households maintains adequate milk retinol concentrations for 6 months in lactating Moroccan women	Appl Physiol Nutr Metab. 2020 Mar;45(3):275-282. doi: 10.1139/apnm-2019-0116. Epub 2019 Jul 31.	Atalhi N	2020	O
31318696	Association of dietary intake below recommendations and micronutrient deficiencies during pregnancy and low birthweight	J Perinat Med. 2019 Sep 25;47(7):724-731. doi: 10.1515/jpm-2019-0053.	Shankar H	2019	O
31254130	Restricting vitamin A intake increases bone formation in Zambian children with high liver stores of vitamin	Arch Osteoporos. 2019 Jun 28;14(1):72. doi: 10.1007/s11657-019-0617-y.	Tanumihardjo SA	2019	O
31197107	Fat Soluble Vitamins in Institutionalized Elderly and the Effect of Exercise, Nutrition and Cognitive Training on Their Status-The Vienna Active Aging Study (VAAS): A Randomized Controlled Trial	Nutrients. 2019 Jun 14;11(6):1333. doi: 10.3390/nu11061333.	Franzke B	2019	O
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30964204	Association of antioxidants and vitamin D level with inflammation in children with atopic dermatitis	Int J Dermatol. 2019 Sep;58(9):1056-1061. doi: 10.1111/ijd.14438. Epub 2019 Apr 9.	Daniluk U	2019	O
30909386	Vitamin A and Pregnancy: A Narrative Review	Nutrients. 2019 Mar 22;11(3):681. doi: 10.3390/nu11030681.	Bastos Maia S	2019	O
30853033	Maximising benefits and minimising adverse effects of micronutrient interventions in low- and middle-income countries	Proc Nutr Soc. 2019 Nov;78(4):540-546. doi: 10.1017/S0029665119000557. Epub 2019 Mar 11.	Baye K	2019	O
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30307289	Vitamin A deficiency is associated with body mass index and body adiposity in women with recommended intake of vitamin A	Nutr Hosp. 2018 Oct 5;35(5):1072-1078. doi: 10.20960/nh.1630.	Bento C	2018	O

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30205601	The Prevalence of Vitamin A Deficiency and Associated Factors in Pregnant Women Receiving Prenatal Care at a Reference Maternity Hospital in Northeastern Brazil	Nutrients. 2018 Sep 9;10(9):1271. doi: 10.3390/nu10091271.	Bastos Maia S	2018	○
30189693	Effects of Inflammation on Biomarkers of Vitamin A Status among a Cohort of Bolivian Infants	Nutrients. 2018 Sep 5;10(9):1240. doi: 10.3390/nu10091240.	Burke RM	2018	○
30134568	Vitamin A Deficiency and the Lung	Nutrients. 2018 Aug 21;10(9):1132. doi: 10.3390/nu10091132.	Timoneda J	2018	○
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29846525	Retinol-to-Fat Ratio and Retinol Concentration in Human Milk Show Similar Time Trends and Associations with Maternal Factors at the Population Level: A Systematic Review and Meta-Analysis	Adv Nutr. 2018 May 1;9(suppl_1):332S-346S. doi: 10.1093/advances/nmy021.	Dror DK	2018	○
29779810	Association between nutritional blood-based biomarkers and clinical outcome in sarcopenia patients	Clin Nutr ESPEN. 2018 Jun;25:145-148. doi: 10.1016/j.clnesp.2018.03.002. Epub 2018 Mar 31.	Gariballa S	2018	○
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36479498	Main nutritional deficiencies	J Prev Med Hyg. 2022 Oct 17;63(2 Suppl 3):E93-E101. doi: 10.15167/2421-4248/jpmh2022.63.2S3.2752. eCollection 2022 Jun.	Kiani AK	2022	低栄養の実態のみ示した文献
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36303869	The relationship between thyroid disorders and vitamin A.: A narrative minireview	Front Endocrinol (Lausanne). 2022 Oct 11;13:968215. doi: 10.3389/fendo.2022.968215. eCollection 2022.	Capriello S	2022	甲状腺疾患との関係について量的検討がない
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35995922	The need and safety of vitamin supplementation in adults with obesity within 9 months post sleeve gastrectomy (SG): assessment based on intake	Sci Rep. 2022 Aug 22;12(1):14295. doi: 10.1038/s41598-022-18487-z.	Wawrzyniak A	2022	スリーブ状胃切除術後が対象

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35405994	Usual Nutrient Intake Distribution and Prevalence of Inadequacy among Australian Children 0-24 Months: Findings from the Australian Feeding Infants and Toddlers Study (OzFITS) 2021	Nutrients. 2022 Mar 25;14(7):1381. doi: 10.3390/nu14071381.	Moumin NA	2022	摂取量のみ
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35115060	Standardisation and application of a novel multiplex assay for estimating micronutrient status and inflammatory markers in women of Sauria Paharia and Santhal tribes of Jharkhand	Br J Nutr. 2022 Dec 28;128(12):2464-2479. doi: 10.1017/S0007114522000320. Epub 2022 Feb 4.	Singh A	2022	測定法の文献
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34888885	Comparing estimated cost-effectiveness of micronutrient intervention programs using primary and secondary data: evidence from Cameroon	Ann N Y Acad Sci. 2022 Apr;1510(1):100-120. doi: 10.1111/nyas.14726. Epub 2021 Dec 9.	Adams KP	2022	摂取量のみ
34863877	Musings in the twilight of my career	Free Radic Biol Med. 2022 Jan;178:219-225. doi: 10.1016/j.freeradbiomed.2021.11.038. Epub 2021 Dec 1.	Ames BN	2022	筆者の研究紹介
34689200	Development and Validation of a Novel Food-Based Global Diet Quality Score (GDQS)	J Nutr. 2021 Oct 23;151(12 Suppl 2):75S-92S. doi: 10.1093/jn/nxab244.	Bromage S	2021	食事スコアの開発論文
34689198	The Global Diet Quality Score is Associated with Higher Nutrient Adequacy, Midupper Arm Circumference, Venous Hemoglobin, and Serum Folate Among Urban and Rural Ethiopian Adults	J Nutr. 2021 Oct 23;151(12 Suppl 2):130S-142S. doi: 10.1093/jn/nxab264.	Bromage S	2021	食事の質のスコアリング票の妥当性の検討
34679088	Micronutrient intake status and associated factors among children aged 6-23 months in the emerging regions of Ethiopia: A multilevel analysis of the 2016 Ethiopia demographic and health survey	PLoS One. 2021 Oct 22;16(10):e0258954. doi: 10.1371/journal.pone.0258954. eCollection 2021.	Gebremedhin T	2021	摂取量のみ
34578797	Assessment of the Nutritional Status of Four Selected Rural Communities in KwaZulu-Natal, South Africa	Nutrients. 2021 Aug 24;13(9):2920. doi: 10.3390/nu13092920.	Govender L	2021	摂取量のみ
34444943	Assessment of Micronutrient Situation among Reproductive-Age Women (15-49) and Under-Five Children in Sudan	Nutrients. 2021 Aug 13;13(8):2784. doi: 10.3390/nu13082784.	SwareldhabESE	2021	ビタミンAを多く含む食品の消費について示されている
34357395	Evaluation of Hemoglobin Cutoff Levels to Define Anemia Among Healthy Individuals	JAMA Netw Open. 2021 Aug 2;4(8):e2119123. doi: 10.1001/jamanetworkopen.2021.19123.	Addo OY	2021	健常人の貧血に対するヘモグロビンの基準値の論文ん
34352251	Visual Dysfunction and Structural Correlates in Sorsby Fundus Dystrophy	Am J Ophthalmol. 2022 Feb;234:274-284. doi: 10.1016/j.ajo.2021.07.032. Epub 2021 Aug 2.	Raming K	2022	Sorsby眼底ジストロフィーの論文
34290324	Serum zinc status is a matter of concern among children and non-pregnant women in a nationwide survey of Nepal	Sci Rep. 2021 Jul 21;11(1):14904. doi: 10.1038/s41598-021-94344-9.	Mehata S	2021	亜鉛が対象

34283841	Impact of IgG response to malaria-specific antigens and immunity against malaria in pre-school children in Ghana. A cluster randomized, placebo-controlled trial	PLoS One. 2021 Jul 20;16(7):e0253544. doi: 10.1371/journal.pone.0253544. eCollection 2021.	Tchum SK	2021	内因性マラリア抗原に対する鉄の介入効果
34282655	Knowledge Gaps in Understanding the Etiology of Anemia in Indonesian Adolescents	Food Nutr Bull. 2021 Jun;42(1_suppl):S39-S58. doi: 10.1177/0379572120979241.	van Zutphen KG	2021	貧血に対する知識に関する検討
34231266	Scoping review of nutrition intervention and dietary assessment studies in Khmer populations living in Cambodia	J Hum Nutr Diet. 2021 Dec;34(6):953-968. doi: 10.1111/jhn.12932. Epub 2021 Aug 16.	Windus JL	2021	カンボジア人の栄養介入研究と食事評価の研究の体系をまとめた文献
34135397	Marker-assisted pyramiding of lycopene-ε-cyclase, β-carotene hydroxylase1 and opaque2 genes for development of biofortified maize hybrids	Sci Rep. 2021 Jun 16;11(1):12642. doi: 10.1038/s41598-021-92010-8.	Singh J	2021	ビタミンAを増強するための遺伝子改変作物の文献
34080675	Nutrient intakes and adequacy among preschool children under blockade in Gaza City, Palestine	East Mediterr Health J. 2021 May 27;27(5):467-473. doi: 10.26719/2021.27.5.467.	Radi S	2021	摂取量のみ
34066082	The Status of Dietary Energy and Nutrients Intakes among Chinese Elderly Aged 80 and Above: Data from the CACDNS 2015	Nutrients. 2021 May 12;13(5):1622. doi: 10.3390/nu13051622.	Zhao F	2021	中国人高齢者における栄養素摂取量の実態
34046932	Vitamin A deficiency in K14E7HPV expressing transgenic mice facilitates the formation of malignant cervical lesions	APMIS. 2021 Aug;129(8):512-523. doi: 10.1111/apm.13159. Epub 2021 Jun 24.	Ocadiz-Delgado R	2021	in vivo研究
34004415	Vitamin A deficiency-associated corneal perforation in a boy with autism spectrum disorder: A case report and literature review	Nutrition. 2021 Oct;90:111275. doi: 10.1016/j.nut.2021.111275. Epub 2021 Apr 20.	Adachi S	2021	自閉症スペクトラム者の論文
33933750	Vitamin A status, inflammation adjustment, and immunologic response in the context of acute febrile illness: A pilot cohort study among pediatric patients	Clin Nutr. 2021 May;40(5):2837-2844. doi: 10.1016/j.clnu.2021.03.023. Epub 2021 Apr 7.	Colt S	2021	急性熱性疾患を呈した小児患者が対象
33905433	Factors associated with iron deficiency anaemia among pregnant teenagers in Ashanti Region, Ghana: A hospital-based prospective cohort study	PLoS One. 2021 Apr 27;16(4):e0250246. doi: 10.1371/journal.pone.0250246. eCollection 2021.	Annan RA	2021	貧血への関連因子の検討
33852732	Novel application of biofortified crops: consumer acceptance of pasta from yellow cassava and leafy vegetables	J Sci Food Agric. 2021 Nov;101(14):6027-6035. doi: 10.1002/jsfa.11259. Epub 2021 May 6.	Lawal OM	2021	ビタミンAを効率よく供給する食品開発に関する調査
33809705	Examining Associations of HIV and Iron Status with Nutritional and Inflammatory Status, Anemia, and Dietary Intake in South African Schoolchildren	Nutrients. 2021 Mar 16;13(3):962. doi: 10.3390/nu13030962.	Goosen C	2021	鉄が対象
33745575	Importance of plasma ghrelin levels with special reference to nutritional metabolism and energy expenditure in pediatric patients with severe motor and intellectual disabilities	Clin Nutr ESPEN. 2021 Apr;42:180-187. doi: 10.1016/j.clnesp.2021.01.043. Epub 2021 Feb 10.	Zenitani M	2021	重症心身障がい者におけるビタミンAを始めとする栄養状態の検討
33683154	Potential of pumpkin to combat vitamin A deficiency during complementary feeding in low and middle income countries: variety, provitamin A carotenoid content and retention, and dietary reference intakes	Crit Rev Food Sci Nutr. 2022;62(22):6103-6112. doi: 10.1080/10408398.2021.1896472. Epub 2021 Mar 8.	Buzigi E	2022	かぼちゃにのみ焦点が絞られている
33541138	The Development of a Quantified Food Frequency Questionnaire for Assessing Iron Nutrition in Schoolchildren from Resource-Limited Settings in Cape Town, South Africa	Ecol Food Nutr. 2021 Nov-Dec;60(6):707-721. doi: 10.1080/03670244.2021.1881896. Epub 2021 Feb 4.	Goosen C	2021	食事調査票の妥当性検証
33453623	Nutrient density, but not cost of diet, is associated with anemia and iron deficiency in school-age children in South Africa	Nutrition. 2021 Apr;84:111096. doi: 10.1016/j.nut.2020.111096. Epub 2020 Nov 29.	Visser M	2021	貧血及び鉄欠乏に対する栄養素密度、食事コストの関係
33261247	Associations Between Antioxidant Vitamin Status, Dietary Intake, and Retinol-binding Protein 4 Levels in Prepubertal Obese Children After 3-month Weight Loss Therapy	J Clin Res Pediatr Endocrinol. 2021 Jun 2;13(2):187-197. doi: 10.4274/jcrpe.galenos.2020.2020.0207. Epub 2020 Dec 2.	Gajewska J	2021	肥満児の減量に伴うビタミンAの変化の検討
33221247	Nutritional Deficiency Disease Secondary to ARFID Symptoms Associated with Autism and the Broad Autism Phenotype: A Qualitative Systematic Review of Case Reports and Case Series	J Acad Nutr Diet. 2021 Mar;121(3):467-492. doi: 10.1016/j.jand.2020.10.017. Epub 2020 Nov 19.	Yule S	2021	自閉症スペクトラム者の栄養障害の論文
33163469	Intake of Vitamins and Minerals From Voluntarily Fortified Foods and/or Dietary Supplements in School Adolescents in Central-Eastern Poland	Front Public Health. 2020 Oct 9;8:504015. doi: 10.3389/fpubh.2020.504015. eCollection 2020.	Sicińska E	2020	摂取量のみの文献
33049574	Micronutrient deficiency in the diets of para-athletes participating in a sports scholarship program	Nutrition. 2021 Jan;81:110992. doi: 10.1016/j.nut.2020.110992. Epub 2020 Aug 29.	Sasaki CAL	2021	パラアスリートが対象
32947849	Serum Vitamin Levels and Their Relationships with Other Biomarkers in Korean Breast Cancer Patients	Nutrients. 2020 Sep 16;12(9):2831. doi: 10.3390/nu12092831.	Kim JA	2020	乳がん患者が対象

32937736	Intra-Individual Double Burden of Malnutrition among Adults in China: Evidence from the China Health and Nutrition Survey 2015	Nutrients. 2020 Sep 14;12(9):2811. doi: 10.3390/nu12092811.	Huang Q	2020	中国における栄養障害の二重負荷を検討するため、体格別での微量栄養素摂取量不足を検討した文献
32835434	Complementary feeding practices and associated factors among Mongolian children 6-23 months of age	Matern Child Nutr. 2020 Oct;16 Suppl 2(Suppl 2):e12838. doi: 10.1111/mcn.12838. Epub 2020 Aug 24.	Janmohamed A	2020	モンゴルの子供の食事に影響を与える要因について調査した文献
32824083	Provincial Dietary Intake Study (PDIS): Micronutrient Intakes of Children in a Representative/Random Sample of 1- to <10-Year-Old Children in Two Economically Active and Urbanized Provinces in South Africa	Int J Environ Res Public Health. 2020 Aug 14;17(16):5924. doi: 10.3390/ijerph17165924.	Senekal M	2020	摂取量のみのデータ
32560166	SNP rs6564851 in the BCO1 Gene Is Associated with Varying Provitamin a Plasma Concentrations but Not with Retinol Concentrations among Adolescents from Rural Ghana	Nutrients. 2020 Jun 16;12(6):1786. doi: 10.3390/nu12061786.	Graßmann S	2020	βカロテン15,15'オキシゲナーゼの遺伝子多型の検討
32530922	Micronutrient intake and prevalence of micronutrient inadequacy among women (15-49 y) and children (6-59 mo) in South Kivu and Kongo Central, Democratic Republic of the Congo (DRC)	PLoS One. 2020 Jun 12;15(6):e0223393. doi: 10.1371/journal.pone.0223393. eCollection 2020.	Moumin NA	2020	摂取量のみの文献
32445076	Psychopharmacological Medication Has No Influence on Vitamin Status After Bariatric Surgery in Long-term Follow-up	Obes Surg. 2020 Oct;30(10):3753-3760. doi: 10.1007/s11695-020-04698-8.	Beiglböck H	2020	肥満者における向精神薬服用によるビタミン栄養状態への影響
32443412	Micronutrient and Inflammation Status Following One Year of Complementary Food Supplementation in 18-Month-Old Rural Bangladeshi Children: A Randomized Controlled Trial	Nutrients. 2020 May 18;12(5):1452. doi: 10.3390/nu12051452.	Campbell RK	2020	炎症が高いと、鉄やビタミンA栄養状態を改善、炎症抑制
32344842	The Effects of Vitamin D Supplementation on Lipid and Inflammatory Profile of Healthy Adolescent Boys: A Randomized Controlled Trial	Nutrients. 2020 Apr 25;12(5):1213. doi: 10.3390/nu12051213.	Yarparvar A	2020	ビタミンD介入効果の論文
32242832	Gesell Developmental Schedules scores and the relevant factors in children with Down syndrome	J Pediatr Endocrinol Metab. 2020 Apr 28;33(4):539-546. doi: 10.1515/jpem-2019-0236.	Yang J	2020	ダウン症患者を対象にした、GDSスコアと血清ビタミンA濃度の関係
32225174	Vitamin A deficiency increases the risk of gastrointestinal comorbidity and exacerbates core symptoms in children with autism spectrum disorder	Pediatr Res. 2021 Jan;89(1):211-216. doi: 10.1038/s41390-020-0865-y. Epub 2020 Mar 30.	Cheng B	2021	自閉症スペクトラム者の論文
32166024	Breakfast skipping is related to inadequacy of vitamin and mineral intakes among Japanese female junior high school students: a cross-sectional study	J Nutr Sci. 2020 Feb 10;9:e9. doi: 10.1017/jns.2019.44.	Matsumoto M	2020	欠食と微量栄養素摂取量との関係
32156021	Risk Factors for Anemia and Micronutrient Deficiencies among Women of Reproductive Age-The Impact of the Wheat Flour Fortification Program in Uzbekistan	Nutrients. 2020 Mar 7;12(3):714. doi: 10.3390/nu12030714.	Petry N	2020	強化食品利用による貧血への効果
32107773	Home fortification of foods with multiple micronutrient powders for health and nutrition in children under two years of age	Cochrane Database Syst Rev. 2020 Feb 28;2(2):CD008959. doi: 10.1002/14651858.CD008959.pub3.	Suchdev PS	2020	マルチビタミン・ミネラルの介入による臨床アウトカムへの効果（主に貧血）
32077039	Environment-wide association study to comprehensively test and validate associations between nutrition and lifestyle factors and testosterone deficiency: NHANES 1988-1994 and 1999-2004	Hormones (Athens). 2020 Jun;19(2):205-214. doi: 10.1007/s42000-020-00179-w. Epub 2020 Feb 19.	Lopez DS	2020	テストステロン欠乏における微量栄養素の関係
31933297	Micronutrient Intake And Perceived Barriers Among Anaemic Pregnant Women In Aceh, Indonesia	J Ayub Med Coll Abbottabad. 2019 Oct-Dec;31(4):491-495.	Nahrisah P	2019	摂取量のみの文献
31883009	Age, Ethnicity, Glucose-6-Phosphate Dehydrogenase Deficiency, Micronutrient Powder Intake, and Biomarkers of Micronutrient Status, Infection, and Inflammation Are Associated with Anemia Among Children 6-59 Months in Nepal	J Nutr. 2020 Apr 1;150(4):929-937. doi: 10.1093/jn/nxz307.	Ford ND	2020	貧血が対象であり、RBPがリスクの一つであるという文献
31863969	Interplay between β-carotene and lipoprotein metabolism at the maternal-fetal barrier	Biochim Biophys Acta Mol Cell Biol Lipids. 2020 Nov;1865(11):158591. doi: 10.1016/j.bbalip.2019.158591. Epub 2019 Dec 19.	Quadro L	2020	メカニズムの論文
31847176	Diet Quality and Micronutrient Intake among Long-Term Weight Loss Maintainers	Nutrients. 2019 Dec 13;11(12):3046. doi: 10.3390/nu11123046.	Pascual RW	2019	減量者が対象
31845541	Liver is widely eaten by preschool children in the Northern Cape province of South Africa: Implications for routine vitamin A supplementation	Matern Child Nutr. 2020 Jul;16(3):e12931. doi: 10.1111/mcn.12931. Epub 2019 Dec 17.	van Stuijvenberg ME	2020	レバーの摂取状況とビタミンA摂取量

31702104	Nutritional status of Tajik children and women: Transition towards a double burden of malnutrition	Matern Child Nutr. 2020 Apr;16(2):e12886. doi: 10.1111/mcn.12886. Epub 2019 Nov 8.	Barth-Jaeggi T	2020	RBPによるビタミンA欠乏評価はあるが、摂取量は無い。
31591722	Pro-vitamin A carotenoid content of 48 plantain (Musa AAB genome) cultivars sourced from eastern Democratic Republic of Congo	J Sci Food Agric. 2020 Jan 30;100(2):634-647. doi: 10.1002/jsfa.10058. Epub 2019 Nov 25.	Blomme G	2020	ビタミンA欠乏地域におけるビタミンA供給源の検討
31565748	Intestinal permeability and inflammation mediate the association between nutrient density of complementary foods and biochemical measures of micronutrient status in young children: results from the MAL-ED study	Am J Clin Nutr. 2019 Oct 1;110(4):1015-1025. doi: 10.1093/ajcn/nqz151.	McCormick BJJ	2019	環境性腸管機能障害患者において血中レチノール濃度は低値
31370866	Vitamin A deficiency in critically ill children with sepsis	Crit Care. 2019 Aug 1;23(1):267. doi: 10.1186/s13054-019-2548-9.	Zhang X	2019	敗血症患者の論文
31318024	Suboptimal Biochemical Riboflavin Status Is Associated with Lower Hemoglobin and Higher Rates of Anemia in a Sample of Canadian and Malaysian Women of Reproductive Age	J Nutr. 2019 Nov 1;149(11):1952-1959. doi: 10.1093/jn/nxz151.	Aljaadi AM	2019	ビタミンB2と貧血との関係
31286672	Dietary intake and micronutrient deficiency in children with cancer	Pediatr Blood Cancer. 2019 Oct;66(10):e27895. doi: 10.1002/pbc.27895. Epub 2019 Jul 9.	Morrell MBG	2019	がんの小児が対象
31286620	Impact of behaviour change communication interventions on sales of fortified sunflower oil in Tanzania: A spatial-temporal analysis and association study	Matern Child Nutr. 2019 Oct;15(4):e12873. doi: 10.1111/mcn.12873. Epub 2019 Aug 2.	Wu DCN	2019	ビタミンA強化油をインセンティブをつけて販売したが、その後の継続状況、フォローアップ方法について調査した文献
31199585	Pancreatic lipase-related protein 2 is responsible for the increased hepatic retinyl ester hydrolase activity in vitamin A-deficient mice	FEBS J. 2019 Nov;286(21):4232-4244. doi: 10.1111/febs.14958. Epub 2019 Jun 28.	Gao Y	2019	in vitro研究
31081127	Serum retinol-binding protein: a novel biomarker for recalcitrant cutaneous warts	Int J Dermatol. 2019 Dec;58(12):1435-1438. doi: 10.1111/ijd.14475. Epub 2019 May 12.	El-Esawy F	2019	尋常性疣贅患者対象の論文
31067775	Consumption of Dark Green Leafy Vegetables Predicts Vitamin A and Iron Intake and Status among Female Small-Scale Farmers in Tanzania	Nutrients. 2019 May 7;11(5):1025. doi: 10.3390/nu11051025.	Stuetz W	2019	タンザニア人で緑色野菜摂取がビタミンA及び鉄栄養状態の推測因子となる
31006978	Impacts of carbohydrate-restricted diets on micronutrient intakes and status: A systematic review	Obes Rev. 2019 Aug;20(8):1132-1147. doi: 10.1111/obr.12857. Epub 2019 Apr 22.	Churuangsuk C	2019	糖質制限食の微量栄養素摂取及び栄養状態への影響
30976780	Within-individual differences in plasma ferritin, retinol-binding protein, and zinc concentrations in relation to inflammation observed during a short-term longitudinal study are similar to between-individual differences observed cross-sectionally	Am J Clin Nutr. 2019 May 1;109(5):1484-1492. doi: 10.1093/ajcn/nqz014.	Wessells KR	2019	急性炎症を伴う者におけるRBP濃度への影響
30925444	Nutrient patterns and their relation to anemia and iron status in 5- to 12-y-old children in South Africa	Nutrition. 2019 Jun;62:194-200. doi: 10.1016/j.nut.2019.01.016. Epub 2019 Jan 26.	Visser M	2019	ビタミンA摂取量と貧血との関係
30822819	Micronutrient status differs among Maasai and Kamba preschoolers in a supplementary feeding programme in Kenya	Matern Child Nutr. 2019 Jul;15(3):e12805. doi: 10.1111/mcn.12805. Epub 2019 Apr 11.	Houghton LA	2019	ビタミンAを含む微量栄養素の欠乏実態
30710311	Driving Policy Change to Improve Micronutrient Status in Women of Reproductive Age and Children in Southeast Asia: The SMILING Project	Matern Child Health J. 2019 Jan;23(Suppl 1):79-85. doi: 10.1007/s10995-018-02730-z.	Berger J	2019	微量栄養素への認識の醸成と栄養政策の改善プロジェクトの課題と今後の在り方について
30624600	Effects of lipid-based nutrient supplements and infant and young child feeding counseling with or without improved water, sanitation, and hygiene (WASH) on anemia and micronutrient status: results from 2 cluster-randomized trials in Kenya and Bangladesh	Am J Clin Nutr. 2019 Jan 1;109(1):148-164. doi: 10.1093/ajcn/nqy239.	Stewart CP	2019	脂質ベースの栄養補助食品の効果を検討しているが、アウトカムが貧血
30620768	Measurement of micronutrient deficiency associated biomarkers in dried blood spots using a multiplexed immunoarray	PLoS One. 2019 Jan 8;14(1):e0210212. doi: 10.1371/journal.pone.0210212. eCollection 2019.	Brindle E	2019	乾燥血液スポット使用の有用性
30609695	Assessment of Dietary Intake and Nutrient Gaps, and Development of Food-Based Recommendations, among Pregnant and Lactating Women in Zinder, Niger: An Optifood Linear Programming Analysis	Nutrients. 2019 Jan 2;11(1):72. doi: 10.3390/nu11010072.	Wessells KR	2019	摂取量のみ
30600288	An Argument for Vitamin D, A, and Zinc Monitoring in Cirrhosis	Ann Hepatol. 2018 Oct 16;17(6):920-932. doi: 10.5604/01.3001.0012.7192.	Koop AH	2018	肝硬変患者を対象

30529744	A proteomic approach to identify novel disease biomarkers in LCAT deficiency	J Proteomics. 2019 Apr 30;198:113-118. doi: 10.1016/j.jprot.2018.12.005. Epub 2018 Dec 6.	Simonelli S	2019	LCAT欠乏のバイオマーカー論文
30511165	Micronutrient intakes and status assessed by probability approach among the urban adult population of Hyderabad city in South India	Eur J Nutr. 2019 Dec;58(8):3147-3159. doi: 10.1007/s00394-018-1859-y. Epub 2018 Dec 3.	Shalini T	2019	ビタミンAは摂取量のみ
30500928	Biomarkers of Nutrition for Development (BOND): Vitamin B-12 Review	J Nutr. 2018 Dec 1;148(suppl_4):1995S-2027S. doi: 10.1093/jn/nxy201.	Allen LH	2018	対象がビタミンB_{12}
30477842	Vitamin A supplementation decreases disease activity index in patients with ulcerative colitis: A randomized controlled clinical trial	Complement Ther Med. 2018 Dec;41:215-219. doi: 10.1016/j.ctim.2018.09.026. Epub 2018 Sep 28.	Masnadi Shirazi K	2018	潰瘍性大腸炎が対象
30321275	β-Cryptoxanthin and zeaxanthin are highly bioavailable from whole-grain and refined biofortified orange maize in humans with optimal vitamin A status: a randomized, crossover, placebo-controlled trial	Am J Clin Nutr. 2018 Oct 1;108(4):793-802. doi: 10.1093/ajcn/nqy134.	Titcomb TJ	2018	生物学的栄養強化されたトウモロコシの有効性を、血清中のレチノール^{13}C含有量とキサントフィル濃度でモニタリングすることが妥当であるという文献
30101991	Nutrition and Inflammatory Biomarkers in Chronic Pancreatitis Patients	Nutr Clin Pract. 2019 Jun;34(3):387-399. doi: 10.1002/ncp.10186. Epub 2018 Aug 13.	Greer JB	2019	慢性膵炎患者が対象
30070992	Projected effectiveness of mandatory industrial fortification of wheat flour, milk, and edible oil with multiple micronutrients among Mongolian adults	PLoS One. 2018 Aug 2;13(8):e0201230. doi: 10.1371/journal.pone.0201230. eCollection 2018.	Bromage S	2018	モンゴルにおける小麦への栄養強化の効果
29963989	Adiposity, inflammation and fat-soluble vitamins in adolescents	J Pediatr (Rio J). 2019 Sep-Oct;95(5):575-583. doi: 10.1016/j.jped.2018.05.008. Epub 2018 Jun 29.	Paes-Silva RP	2019	内臓脂肪が炎症を促し、脂溶性ビタミン濃度に関係する
29962920	Improving Blood Retinol Concentrations with Complementary Foods Fortified with Moringa oleifera Leaf Powder - A Pilot Study	Yale J Biol Med. 2018 Jun 28;91(2):83-94. eCollection 2018 Jun.	Boateng L	2018	モリンガのビタミンA栄養状態の改善効果
29923936	Multiple Micronutrient Plasma Level Changes Are Related to Oxidative Stress Intensity in Critically Ill Children	Pediatr Crit Care Med. 2018 Sep;19(9):e455-e463. doi: 10.1097/PCC.0000000000001626.	Valla FV	2018	PICU患者における酸化ストレスと抗酸化性物質との関係
29897579	Iron Deficiency, Anemia, and Low Vitamin B-12 Serostatus in Middle Childhood Are Associated with Behavior Problems in Adolescent Boys: Results from the Bogotá School Children Cohort	J Nutr. 2018 May 1;148(5):760-770. doi: 10.1093/jn/nxy029.	Robinson SL	2018	鉄とビタミンB_{12}が対象
29885777	Effect of baseline micronutrient and inflammation status on CD4 recovery post-cART initiation in the multinational PEARLS trial	Clin Nutr. 2019 Jun;38(3):1303-1309. doi: 10.1016/j.clnu.2018.05.014. Epub 2018 May 29.	Shivakoti R	2019	抗レトロウィルス薬へ併用療法中の、CD4+へのビタミンA栄養状態の関係
29844225	Effects of micronutrients on placental function: evidence from clinical studies to animal models	Reproduction. 2018 Sep;156(3):R69-R82. doi: 10.1530/REP-18-0130. Epub 2018 May 29.	Baker BC	2018	メカニズムの論文
29720136	Prevalence and predictors of under-nutrition among school children in a rural South-eastern Nigerian community: a cross sectional study	BMC Public Health. 2018 May 2;18(1):587. doi: 10.1186/s12889-018-5479-5.	Ayogu RNB	2018	ビタミンA欠乏の実態とこれに関連する事項の検討
29462926	Do Current Fortification and Supplementation Programs Assure Adequate Intake of Fat-Soluble Vitamins in Belgian Infants, Toddlers, Pregnant Women, and Lactating Women?	Nutrients. 2018 Feb 16;10(2):223. doi: 10.3390/nu10020223.	Moyersoen I	2018	ベルギーの乳児、妊婦授乳婦の微量栄養素摂取状況
29327472	Mesenchymal stem cell deficiency influences megakaryocytopoiesis through the TNFAIP3/NF-κB/SMAD pathway in patients with immune thrombocytopenia	Br J Haematol. 2018 Feb;180(3):395-411. doi: 10.1111/bjh.15034. Epub 2018 Jan 12.	He Y	2018	免疫性血小板減少症における間葉系幹細胞　機能障害のメカニズム
28980121	Nutritional Status of Children from Women with Previously Bariatric Surgery	Obes Surg. 2018 Apr;28(4):990-995. doi: 10.1007/s11695-017-2950-9.	Gimenes JC	2018	肥満外科手術後が対象
28965533	The potential contribution of yellow cassava to dietary nutrient adequacy of primary-school children in Eastern Kenya; the use of linear programming	Public Health Nutr. 2018 Feb;21(2):365-376. doi: 10.1017/S1368980017002506. Epub 2017 Oct 2.	Talsma EF	2018	イエローキャッサバのビタミンA補給効果の検討

表2. ビタミンDの検索結果

PMID	論題	書誌情報	筆頭著者	出版年	選定（○）または除外理由
33232959	Vitamin D in Toddlers, Preschool Children, and Adolescents	Ann Nutr Metab. 2020;76 Suppl 2:30-41. doi: 10.1159/000505635. Epub 2020 Nov 24.	Taylor SN	2020	○

30615949	Vitamin D supplementation in obesity and during weight loss: A review of randomized controlled trials	Metabolism. 2019 Mar;92:193-205. doi: 10.1016/j.metabol.2018.12.010. Epub 2019 Jan 4.	Bassatne A	2019	O
32620963	Vitamin D Status and Risk of All-Cause and Cause-Specific Mortality in a Large Cohort: Results From the UK Biobank	J Clin Endocrinol Metab. 2020 Oct 1;105(10):dgaa432. doi: 10.1210/clinem/dgaa432.	Fan X	2020	O
35276999	A Narrative Review of the Evidence for Variations in Serum 25-Hydroxyvitamin D Concentration Thresholds for Optimal Health	Nutrients. 2022 Feb 2;14(3):639. doi: 10.3390/nu14030639.	Grant WB	2022	O
29258769	Calcium and vitamin D in human health: Hype or real?	J Steroid Biochem Mol Biol. 2018 Jun;180:4-14. doi: 10.1016/j.jsbmb.2017.12.009. Epub 2017 Dec 16.	Wimalawansa SJ	2018	O
30209779	Vitamin D and health in the Mediterranean countries	Hormones (Athens). 2019 Mar;18(1):23-35. doi: 10.1007/s42000-018-0059-8. Epub 2018 Sep 12.	Grant WB	2019	O
36271125	Vitamin D status in chimpanzees in human care: a Europe wide study	Sci Rep. 2022 Oct 21;12(1):17625. doi: 10.1038/s41598-022-21211-6.	Moittié S	2022	O
34495336	Effect of High-Dose vs Standard-Dose Vitamin D Supplementation on Neurodevelopment of Healthy Term Infants: A Randomized Clinical Trial	JAMA Netw Open. 2021 Sep 1;4(9):e2124493. doi: 10.1001/jamanetworkopen.2021.24493.	Tuovinen S	2021	O
30300262	Vitamin D: Immunomodulatory Aspects	J Clin Gastroenterol. 2018 Nov/Dec;52 Suppl 1, Proceedings from the 9th Probiotics, Prebiotics and New Foods, Nutraceuticals and Botanicals for Nutrition & Human and Microbiota Health Meeting, held in Rome, Italy from September 10 to 12, 2017:S86-S88. doi: 10.1097/MCG.0000000000001112.	Miraglia Del Giudice M	2018	O
31685374	Vitamin D in Adolescents: A Systematic Review and Narrative Synthesis of Available Recommendations	J Adolesc Health. 2020 Apr;66(4):388-407. doi: 10.1016/j.jadohealth.2019.08.025. Epub 2019 Nov 1.	Patseadou M	2020	O
33947070	Oral and Topical Vitamin D, Sunshine, and UVB Phototherapy Safely Control Psoriasis in Patients with Normal Pretreatment Serum 25-Hydroxyvitamin D Concentrations: A Literature Review and Discussion of Health Implications	Nutrients. 2021 Apr 29;13(5):1511. doi: 10.3390/nu13051511.	McCullough PJ	2021	O
34460964	Local protocol helped to deliver vitamin D levels more accurately in preterm infants	Acta Paediatr. 2022 Jan;111(1):76-85. doi: 10.1111/apa.16088. Epub 2021 Sep 5.	Mathilde M	2022	O
32408637	Vitamin D Status and Its Determinants in A Paediatric Population in Norway	Nutrients. 2020 May 12;12(5):1385. doi: 10.3390/nu12051385.	Holten-Andersen MN	2020	O
31906679	Vitamin D deficiency and its health effects	Vnitr Lek. 2019 Winter;65(11):724-727.	Horák P	2019	O
33982112	Associations Between Prenatal, Perinatal, and Early Childhood Vitamin D Status and Risk of Dental Caries at 6 Years	J Nutr. 2021 Jul 1;151(7):1993-2000. doi: 10.1093/jn/nxab075.	Navarro CLA	2021	O
33826696	Sex-specific 25-hydroxyvitamin D threshold concentrations for functional outcomes in older adults: PRoject on Optimal VItamin D in Older adults (PROVIDO)	Am J Clin Nutr. 2021 Jul 1;114(1):16-28. doi: 10.1093/ajcn/nqab025.	Shardell M	2021	O
34948669	Threshold for Relationship between Vitamin D and Parathyroid Hormone in Chinese Women of Childbearing Age	Int J Environ Res Public Health. 2021 Dec 10;18(24):13060. doi: 10.3390/ijerph182413060.	Hu Y	2021	O
30238610	Associations of maternal and fetal vitamin D status with childhood body composition and cardiovascular risk factors	Matern Child Nutr. 2019 Apr;15(2):e12672. doi: 10.1111/mcn.12672. Epub 2018 Sep 21.	Miliku K	2019	O
29657024	Vitamin D and Trabecular Bone Score in a Group of Young Lebanese Adults	J Clin Densitom. 2018 Jul-Sep;21(3):453-458. doi: 10.1016/j.jocd.2018.02.002. Epub 2018 Mar 23.	Alwan A	2018	O
31981800	Canadian recommendations for vitamin D intake for persons affected by multiple sclerosis	J Steroid Biochem Mol Biol. 2020 May;199:105606. doi: 10.1016/j.jsbmb.2020.105606. Epub 2020 Jan 22.	Atkinson SA	2020	O
30987813	Effect of sun exposure versus oral vitamin D supplementation on serum 25-hydroxyvitamin D concentrations in young adults: A randomized clinical trial	Clin Nutr. 2020 Mar;39(3):727-736. doi: 10.1016/j.clnu.2019.03.021. Epub 2019 Mar 21.	Joh HK	2020	O

29912394	Circulating Vitamin D and Colorectal Cancer Risk: An International Pooling Project of 17 Cohorts	J Natl Cancer Inst. 2019 Feb 1;111(2):158-169. doi: 10.1093/jnci/djy087.	McCullough ML	2019	○
30634546	Hypovitaminosis D: A Disease Marker in Hospitalized Very Old Persons at Risk of Malnutrition	Nutrients. 2019 Jan 9;11(1):128. doi: 10.3390/nu11010128.	Boccardi V	2019	○
33476996	Is sunlight enough for sufficient vitamin D status in children and adolescents? A survey in a sunny region of southern Italy	Nutrition. 2021 Apr;84:111101. doi: 10.1016/j.nut.2020.111101. Epub 2020 Dec 5.	Rutigliano I	2021	○
29116541	A cross-sectional study of vitamin D levels in a large cohort of patients with rheumatic diseases	Clin Rheumatol. 2018 Mar;37(3):803-810. doi: 10.1007/s10067-017-3870-8. Epub 2017 Nov 7.	Nikiphorou E	2018	○
32822412	Evaluating Vitamin D levels in Rheumatic Heart Disease patients and matched controls: A case-control study from Nepal	PLoS One. 2020 Aug 21;15(8):e0237924. doi: 10.1371/journal.pone.0237924. eCollection 2020.	Thorup L	2020	○
31132508	Maternal and child factors associated with bone length traits in children at 3 years of age	Bone. 2019 Oct;127:1-8. doi: 10.1016/j.bone.2019.05.025. Epub 2019 May 25.	Beardsall A	2019	○
32231092	Suppression of Parathyroid Hormone as a Proxy for Optimal Vitamin D Status: Further Analysis of Two Parallel Studies in Opposite Latitudes	Nutrients. 2020 Mar 28;12(4):942. doi: 10.3390/nu12040942.	Mendes MM	2020	○
32053636	High body fat percentage and low consumption of dairy products were associated with vitamin D inadequacy among older women in Malaysia	PLoS One. 2020 Feb 13;15(2):e0228803. doi: 10.1371/journal.pone.0228803. eCollection 2020.	Leiu KH	2020	○
30515581	Bone mineral density, vitamin D status, and calcium intake in healthy female university students from different socioeconomic groups in Turkey	Arch Osteoporos. 2018 Dec 4;13(1):135. doi: 10.1007/s11657-018-0482-0.	Ersoy B	2018	○
29053944	Investigation of the C-3-epi-25(OH)D(3) of 25-hydroxyvitamin D(3) in urban schoolchildren	Appl Physiol Nutr Metab. 2018 Mar;43(3):259-265. doi: 10.1139/apnm-2017-0334. Epub 2017 Oct 20.	Berger SE	2018	3-epi-25(OH)D_3 について
29235126	Relationships of serum 25-hydroxyvitamin D, ionized calcium and parathyroid hormone after obesity surgery	Clin Endocrinol (Oxf). 2018 Mar;88(3):372-379. doi: 10.1111/cen.13531. Epub 2018 Jan 4.	Hewitt S	2018	肥満外科手術後患者でのビタミンD栄養状態
36145176	Maternal and Neonatal Vitamin D Binding Protein Polymorphisms and 25-Hydroxyvitamin D Cutoffs as Determinants of Neonatal Birth Anthropometry	Nutrients. 2022 Sep 15;14(18):3799. doi: 10.3390/nu14183799.	Karras SN	2022	母体と新生児の25(OH)D濃度の違いにより、母体と新生児のDBP多型が出生時の新生児体格プロファイルに及ぼす複合的な影響の検討
29529167	Role of Vitamin D in the Natural History of Inflammatory Bowel Disease	J Crohns Colitis. 2018 May 25;12(6):742-752. doi: 10.1093/ecco-jcc/jjy025.	Nielsen OH	2018	IBD患者が対象
34570174	Circulating Conjugated and Unconjugated Vitamin D Metabolite Measurements by Liquid Chromatography Mass Spectrometry	J Clin Endocrinol Metab. 2022 Jan 18;107(2):435-449. doi: 10.1210/clinem/dgab708.	Jenkinson C	2022	測定法に関する文献
35944603	Vitamin D Insufficiency and Clinical Outcomes with Chimeric Antigen Receptor T-Cell Therapy in Large B-cell Lymphoma	Transplant Cell Ther. 2022 Nov;28(11):751.e1-751.e7. doi: 10.1016/j.jtct.2022.08.001. Epub 2022 Aug 6.	Nath K	2022	キメラ抗原受容体T細胞療法（CAR-T）治療を受けた再発/難治性大細胞型B細胞リンパ腫患者が対象
33616655	Alfacalcidol vs Calcitriol in the Management of Patient With Hypoparathyroidism: A Randomized Controlled Trial	J Clin Endocrinol Metab. 2021 Jun 16;106(7):2092-2102. doi: 10.1210/clinem/dgab114.	Saha S	2021	薬剤のビタミンDが対象
30348109	Status of vitamin D and parameters of calcium homeostasis in renal transplant recipients in Nepal: a cross sectional study	BMC Nephrol. 2018 Oct 22;19(1):290. doi: 10.1186/s12882-018-1088-x.	Timalsina S	2018	腎移植患者のデータ
31464234	Vitamin D status of children with moderate to severe chronic Kidney Disease at a Tertiary Pediatric Center in Cape Town	Saudi J Kidney Dis Transpl. 2019 Jul-Aug;30(4):781-794. doi: 10.4103/1319-2442.265453.	Solarin AU	2019	重度腎臓病患者が対象
31310957	Vitamin D supplementation after malnutrition associated with time-related increase of cancer diagnoses: A cohort study of 389 patients with Wernicke-Korsakoff syndrome	Nutrition. 2019 Oct;66:166-172. doi: 10.1016/j.nut.2019.05.008. Epub 2019 May 29.	Wijnia JW	2019	ウェルニッケコルサコフ症候群患者が対象
31095673	Central Composite Design for Dispersive Liquid-liquid Microextraction of 25-hydroxy-cholecalciferol in Human Serum	J Chromatogr Sci. 2019 Jul 1;57(6):575-581. doi: 10.1093/chromsci/bmz016.	Mollahosseini A	2019	25D測定法に関する文献
32084381	Consolidation of vitamin A and E methods onto a multiplexing liquid chromatography tandem mass spectrometry platform simplifies laboratory workflow	Clin Chim Acta. 2020 Jun;505:31-33. doi: 10.1016/j.cca.2020.02.020. Epub 2020 Feb 19.	Zha L	2020	ビタミンA,Eの同時測定法に関する文献
36196648	Intestinal Calcium Absorption Decreases After Laparoscopic Sleeve Gastrectomy Despite Optimization of Vitamin D Status	J Clin Endocrinol Metab. 2023 Jan 17;108(2):351-360. doi: 10.1210/clinem/dgac579.	Wu KC	2023	胃切除患者が対象

表3. ビタミンEの検索結果

PMID	論題	書誌情報	筆頭著者	出版年	選定（○）または除外理由
26502280	Micronutrient status and intake in omnivores, vegetarians and vegans in Switzerland	Eur J Nutr. 2017 Feb;56(1):283-293. doi: 10.1007/s00394-015-1079-7. Epub 2015 Oct 26.	Schüpbach R	2017	○
25469382	Vitamin E inadequacy in humans: causes and consequences	Adv Nutr. 2014 Sep;5(5):503-14. doi: 10.3945/an.114.006254.	Traber MG	2014	○
33809457	Determinants of the Essential Elements and Vitamins Intake and Status during Pregnancy: A Descriptive Study in Polish Mother and Child Cohort	Nutrients. 2021 Mar 16;13(3):949. doi: 10.3390/nu13030949.	Jankowska A	2021	○
32443047	Dietary Lipid Intake Influences the Alpha-tocopherol Levels in Human Milk	J Pediatr Gastroenterol Nutr. 2020 Jun;70(6):858-863. doi: 10.1097/MPG.0000000000002668.	da Mata AMB	2020	○
30578660	Relationship between the dietary intake, serum, and breast milk concentrations of vitamin A and vitamin E in a cohort of women over the course of lactation	Matern Child Nutr. 2019 Jul;15(3):e12772. doi: 10.1111/mcn.12772. Epub 2019 Jan 30.	da Silva AGCL	2019	○
30064845	Weight loss program is associated with decrease α-tocopherol status in obese adults	Clin Nutr. 2019 Aug;38(4):1861-1870. doi: 10.1016/j.clnu.2018.07.011. Epub 2018 Jul 20.	Hamułka J	2019	○
25245834	Effect of vitamin E intake from food and supplement sources on plasma α- and γ-tocopherol concentrations in a healthy Irish adult population	Br J Nutr. 2014 Nov 14;112(9):1575-85. doi: 10.1017/S0007114514002438. Epub 2014 Sep 23.	Zhao Y	2014	○
26781762	The challenges of vitamin and mineral supplementation in children with inherited metabolic disorders: a prospective trial	J Hum Nutr Diet. 2016 Aug;29(4):434-40. doi: 10.1111/jhn.12354. Epub 2016 Jan 18.	Daly A	2016	○
30517727	Daily Consumption of Oregon Hazelnuts Affects α-Tocopherol Status in Healthy Older Adults: A Pre-Post Intervention Study	J Nutr. 2018 Dec 1;148(12):1924-1930. doi: 10.1093/jn/nxy210.	Michels AJ	2018	○
25228113	Contribution of cod liver oil-related nutrients (vitamins A, D, E and eicosapentaenoic acid and docosahexaenoic acid) to daily nutrient intake and their associations with plasma concentrations in the EPIC-Norfolk cohort	J Hum Nutr Diet. 2015 Dec;28(6):568-82. doi: 10.1111/jhn.12271. Epub 2014 Sep 16.	Lentjes MA	2015	○
32133498	Can dietary self-reports usefully complement blood concentrations for estimation of micronutrient intake and chronic disease associations?	Am J Clin Nutr. 2020 Jul 1;112(1):168-179. doi: 10.1093/ajcn/nqaa034.	Prentice RL	2020	○
28544241	Effect of RRR-α-tocopherol supplementation on serum of breastfeeding women up to 60 days after delivery: a randomised controlled trial	J Hum Nutr Diet. 2017 Dec;30(6):771-778. doi: 10.1111/jhn.12482. Epub 2017 May 23.	Lira LQ	2017	○
26447154	α-Tocopherol bioavailability is lower in adults with metabolic syndrome regardless of dairy fat co-ingestion: a randomized, double-blind, crossover trial	Am J Clin Nutr. 2015 Nov;102(5):1070-80. doi: 10.3945/ajcn.115.118570. Epub 2015 Oct 7.	Mah E	2015	○
24631112	A cross-sectional study assessing dietary intake and physical activity in Canadian patients with nonalcoholic fatty liver disease vs healthy controls	J Acad Nutr Diet. 2014 Aug;114(8):1181-94. doi: 10.1016/j.jand.2014.01.009. Epub 2014 Mar 14.	Da Silva HE	2014	○
30915444	Application of blood concentration biomarkers in nutritional epidemiology: example of carotenoid and tocopherol intake in relation to chronic disease risk	Am J Clin Nutr. 2019 Apr 1;109(4):1189-1196. doi: 10.1093/ajcn/nqy360.	Prentice RL	2019	○
28031191	Dietary biomarker evaluation in a controlled feeding study in women from the Women's Health Initiative cohort	Am J Clin Nutr. 2017 Feb;105(2):466-475. doi: 10.3945/ajcn.116.144840. Epub 2016 Dec 28.	Lampe JW	2017	○
33958215	Association Between ApoE Status, Circulating Vitamin A and Vitamin E Levels with Dyslipidemia in Aging Adults	Arch Med Res. 2021 Oct;52(7):703-712. doi: 10.1016/j.arcmed.2021.04.007. Epub 2021 May 3.	Ma X	2021	○
34444923	Inadequate Intake of Energy and Nutrients Is Common in Older Family Caregivers	Nutrients. 2021 Aug 12;13(8):2763. doi: 10.3390/nu13082763.	Koponen S	2021	摂取量のみ
27889054	Tocotrienols, health and ageing: A systematic review	Maturitas. 2017 Jan;95:55-60. doi: 10.1016/j.maturitas.2016.11.003. Epub 2016 Nov 9.	Georgouso poulou EN	2017	トコトリエノールが対象
33960217	Low serum lycopene, and adequate α-tocopherol levels in patients with psoriasis: A cross-sectional study	Nutr Health. 2022 Jun;28(2):239-248. doi: 10.1177/02601060211014127. Epub 2021 May 7.	Rocha ACL	2022	乾癬患者が対象
34200192	Intake of Vitamin E and C in Women of Reproductive Age: Results from the Latin American Study of Nutrition and Health (ELANS)	Nutrients. 2021 Jun 7;13(6):1954. doi: 10.3390/nu13061954.	Busso D	2021	摂取量のみ

27133418	Potential of tocotrienols in the prevention and therapy of Alzheimer's disease	J Nutr Biochem. 2016 May;31:1-9. doi: 10.1016/j.jnutbio.2015.10.011. Epub 2015 Nov 2.	Xia W	2016	トコトリエノールが対象
33802295	Nutrient Intake Adequacy from Food and Beverage Intake of US Children Aged 1-6 Years from NHANES 2001-2016	Nutrients. 2021 Mar 3;13(3):827. doi: 10.3390/nu13030827.	Bailey ADL	2021	摂取量のみ
26283325	Associations of fish oil and vitamin B and E supplementation with cardiovascular outcomes and mortality in people receiving haemodialysis: a review	BMC Nephrol. 2015 Aug 18;16:143. doi: 10.1186/s12882-015-0142-1.	Bessell E	2015	血液透析患者が対象
30484139	The Problematic Use of Dietary Reference Intakes to Assess Magnesium Status and Clinical Importance	Biol Trace Elem Res. 2019 Mar;188(1):52-59. doi: 10.1007/s12011-018-1573-x. Epub 2018 Nov 27.	Nielsen FH	2019	マグネシウムが対象
32443563	Effects of Dietary or Supplementary Micronutrients on Sex Hormones and IGF-1 in Middle and Older Age: A Systematic Review and Meta-Analysis	Nutrients. 2020 May 18;12(5):1457. doi: 10.3390/nu12051457.	Janjuha R	2020	成長ホルモン及び性ホルモンに対するVEの関係
29899183	Dietary Intake during 56 Weeks of a Low-Fat Diet for Lomitapide Treatment in Japanese Patients with Homozygous Familial Hypercholesterolemia	J Atheroscler Thromb. 2019 Jan 1;26(1):72-83. doi: 10.5551/jat.44107. Epub 2018 Jun 12.	Kameyama N	2019	家族性高コレステロール血症が対象
36771310	Dietary Factors and Endometrial Cancer Risk: A Mendelian Randomization Study	Nutrients. 2023 Jan 24;15(3):603. doi: 10.3390/nu15030603.	Wang X	2023	がんとの関係
24803271	Redox status and antioxidant response in professional cyclists during training	Eur J Sport Sci. 2014;14(8):830-8. doi: 10.1080/17461391.2014.915345. Epub 2014 May 7.	Leonardo-Mendonça RC	2014	アスリートが対象
26080804	Effect of almond consumption on vascular function in patients with coronary artery disease: a randomized, controlled, cross-over trial	Nutr J. 2015 Jun 17;14:61. doi: 10.1186/s12937-015-0049-5.	Chen CY	2015	冠動脈疾患患者が対象
27729185	Control of antioxidant supplementation through interview is not appropriate in oxidative-stress sport studies: Analytical confirmation should be required	Nutrition. 2017 Jan;33:278-284. doi: 10.1016/j.nut.2016.06.017. Epub 2016 Jul 28.	Barranco-Ruiz Y	2017	スポーツ選手におけるドーピングスクリーニングでのVE測定の有用性

表4. ビタミンKの検索結果

PMID	論題	書誌情報	筆頭著者	出版年	選定（○）または除外理由
28403946	Vitamin K and osteoporosis: Myth or reality?	Metabolism. 2017 May;70:57-71. doi: 10.1016/j.metabol.2017.01.032. Epub 2017 Feb 4.	Palermo A	2017	○
31862867	Laboratory assessment of vitamin K status	J Clin Pathol. 2020 Feb;73(2):70-75. doi: 10.1136/jclinpath-2019-205997. Epub 2019 Dec 20.	Card DJ	2020	○
32919111	Serum vitamin K(1) (phylloquinone) is associated with fracture risk and hip strength in post-menopausal osteoporosis: A cross-sectional study	Bone. 2020 Dec;141:115630. doi: 10.1016/j.bone.2020.115630. Epub 2020 Sep 10.	Moore AE	2020	○
29968548	Effect of Vitamin K Supplementation on Cardiometabolic Risk Factors: A Systematic Review and Meta-Analysis	Endocr Metab Immune Disord Drug Targets. 2019;19(1):13-25. doi: 10.2174/1871530318666180703125007.	Verma H	2019	○
27733530	Phylloquinone Intakes and Food Sources and Vitamin K Status in a Nationally Representative Sample of Irish Adults	J Nutr. 2016 Nov;146(11):2274-2280. doi: 10.3945/jn.116.239137. Epub 2016 Oct 12.	Hayes A	2016	○
27034472	Vitamin K-Dependent Protein Activity and Incident Ischemic Cardiovascular Disease: The Multi-Ethnic Study of Atherosclerosis	Arterioscler Thromb Vasc Biol. 2016 May;36(5):1037-42. doi: 10.1161/ATVBAHA.116.307273. Epub 2016 Mar 31.	Danziger J	2016	○
24296867	Vitamin K status in healthy volunteers	Food Funct. 2014 Feb;5(2):229-34. doi: 10.1039/c3fo60464k.	Theuwissen E	2014	○
30590596	Plasma Response to Deuterium-Labeled Vitamin K Intake Varies by TG Response, but Not Age or Vitamin K Status, in Older and Younger Adults	J Nutr. 2019 Jan 1;149(1):18-25. doi: 10.1093/jn/nxy216.	Ellis JL	2019	○
32612091	Nutritional Therapy with Vitamin K(1) Is Effective in the Improvement of Vitamin K Status and Bone Turnover Markers in Patients with Severe Motor and Intellectual Disabilities	J Nutr Sci Vitaminol (Tokyo). 2020;66(3):278-284. doi: 10.3177/jnsv.66.278.	Kuwabara A	2020	○
27779902	Vitamin D Status and Bone Mineral Density is Influenced by Vitamin D Supplementation and Vitamin K1 Intake in Adults with Diabetes and Chronic Kidney Disease	Can J Diet Pract Res. 2017 Mar;78(1):11-19. doi: 10.3148/cjdpr-2016-023. Epub 2016 Oct 25.	Hoffmann MR	2017	○
25163392	Low-dose menaquinone-4 improves γ-carboxylation of osteocalcin in young males: a non-placebo-controlled dose-response study	Nutr J. 2014 Aug 27;13:85. doi: 10.1186/1475-2891-13-85.	Nakamura E	2014	○
29562325	The 2018 European Heart Rhythm Association Practical Guide on the use of non-vitamin K antagonist oral anticoagulants in patients with atrial fibrillation	Eur Heart J. 2018 Apr 21;39(16):1330-1393. doi: 10.1093/eurheartj/ehy136.	Steffel J	2018	非ビタミンK拮抗型経口抗凝固薬の適用基準と使用時の留意点について

33727709	Hormonal regulation of biomineralization	Nat Rev Endocrinol. 2021 May;17(5):261-275. doi: 10.1038/s41574-021-00477-2. Epub 2021 Mar 16.	Arnold A	2021	バイオミネラリゼーションに関するレビュー
24810388	Edoxaban: a focused review of its clinical pharmacology	Eur Heart J. 2014 Jul 21;35(28):1844-55. doi: 10.1093/eurheartj/ehu181. Epub 2014 May 8.	Lip GY	2014	非ビタミンK拮抗型経口抗凝固薬のエドキサバンについて
31353233	Vitamin K-what is known regarding bariatric surgery patients: a systematic review	Surg Obes Relat Dis. 2019 Aug;15(8):1402-1413. doi: 10.1016/j.soard.2019.05.031. Epub 2019 Jun 5.	Sherf-Dagan S	2019	吸収不良症候群の患者のビタミンK欠乏状態、モニタリング指標および経口投与量などについて言及したレビュー
29562331	The 2018 European Heart Rhythm Association Practical Guide on the use of non-vitamin K antagonist oral anticoagulants in patients with atrial fibrillation: executive summary	Europace. 2018 Aug 1;20(8):1231-1242. doi: 10.1093/europace/euy054.	Steffel J	2018	非ビタミンK拮抗型経口抗凝固薬の適用基準と使用時の留意点について
23719786	Supratherapeutic international normalized ratio due to reduced vitamin K intake secondary to prolonged vomiting in a patient on warfarin	Ann Pharmacother. 2013 Jun;47(6):e28. doi: 10.1345/aph.1R688.	Reaves AB	2013	症例報告