Provitamin A

Beta-carotene vs. mixed carotenoids

Synthetic / isolated beta-carotene

Cancer

Synthetic beta-carotene (20 mg/day) in adult men for 5 to 8 years resulted in an 8% higher rate of death from lung cancer and heart disease. (ATBC) (1)

Synthetic beta-carotene (30 mg/day) and retinol (25,000 IU) in adult men and women for 4 years increased the incidence of lung cancer by 28% and total death by 17% compared to the group not taking the vitamins. (CARET) (2)

Synthetic beta-carotene (25 mg/day) for 12 years in healthy well-nourished adult men failed to reduce the risk of cancer or death after 12 years of supplementation. (3)

Synthetic beta-carotene (50 mg/day) for 4 years in healthy adults failed to reduce the risk of skin cancer. (4)

Plant-based carotenoids

Cancer

Higher blood levels of total carotenoids were associated with a lower risk of lung and stomach cancers in elderly men. (5)

Greater intakes of food-based alpha-carotene and lycopene were associated with reduced risk of lung cancer, especially in those consuming the greatest variety of carotenoids. (6)

Higher blood levels of alpha-carotene and beta-carotene were associated with a reduced risk of breast cancer. (7)

Higher blood levels (>27 mcg/dL) of beta-carotene from plant-based sources were associated with a 51% lower overall risk of cancer related death (38% lower risk for all causes) in men and women. (8)

Higher blood levels of total carotenoids were associated with a reduced risk of death from cancer and other causes in elderly men and women. (9)

Higher blood levels of the carotenoids alpha-carotene, beta-carotene, and lycopene were associated with a reduced risk for gastric cancer in middle aged adults. (10)

Higher blood levels of alpha-carotene were associated with reduced risk for ovarian cancer in middle-aged and elderly women. (11)

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Cardiovascular / Heart

Synthetic beta-carotene (25 mg/day) for >2 years in adult women failed to reduce cardiovascular disease or death from cardiovascular disease. (12)

Synthetic beta-carotene (50-100 mg/day) for 3 weeks in adult volunteers accelerated oxidative damage to cholesterol particles (LDL). (13)

Cardiovascular / Heart

Higher blood levels of beta-carotene and alpha-carotene were associated with a reduced risk for cardiovascular disease (including stroke) in adult men. (14)

Higher blood levels of alpha-carotene and gamma-carotene were associated with a reduced risk for atherosclerosis (arterial blockage). (15)

Mixed algae-based carotenoids (60 mg/day) for 3 weeks in adult diabetic patients reduced oxidative damage to cholesterol particles (LDL) (16)

Vitamin E

Alpha-tocopherol vs. mixed tocochromanols

Synthetic / isolated alpha-tocopherol

Plant-based tocochromanols

Cancer

Synthetic alpha-tocopherol (>100 mg/day) for 10+ years in men and women over the age of 50 was associated with a slight increased risk for lung cancer. (VITAL) (17)

Synthetic alpha-tocopherol (363 mg / 400 IU per day) for 7+ years in men over the age of 50 was associated with a 17% increased risk for prostate cancer. (SELECT) (18)

Cancer

Palm fruit based tocochromanols (200 mg/day) resulted in fewer deaths in breast cancer patients after 5 years of supplementation compared to the non-supplemented group. However, the results were not “statistically significant” due to the small number of participants. (19)

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Health Outcomes: Synthetic vs. Plant-Based Vitamins

Supplemental data for blog article: **Vitamins: Synthetic vs. "Natural" vs. Plant-Based.**

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Cardiovascular / Heart Synthetic alpha-tocopherol (50 mg / 55 IU per day) for 5+ years in adult men resulted in a 50% higher rate of mortality from hemorrhagic stroke (blood deficiency to the brain due to rupture of blood vessel). (ATBC) (1) Synthetic alpha-tocopherol (363 mg / 400 IU per day) for 8 years in male physicians over the age of 50 increased the risk for hemorrhagic stroke. (20) Synthetic alpha-tocopherol (363 mg / 400 IU per day) for 1+ year in patients with cardiovascular disease slightly increased risk of fatal heart attack. (CHAOS trial) (21) Synthetic alpha-tocopherol (363 mg / 400 IU per day) for 7 years in men and women over the age of 55 with vascular disease or diabetes increased the risk of heart failure. (22) Semi-synthetic alpha-tocopherol (266 mg / 400 IU per day) in adult men and women with previous cardiovascular events failed to produced therapeutic benefit. (HOPE) (23) Semi-synthetic alpha-tocopherol (182 mg / 272 IU per day) for 3 years in adult men and women failed to prevent or reverse atherosclerosis (carotid artery intima-media thickness). (24)	**Cardiovascular / Heart** Palm fruit based tocochromanols (400 mg/day) for 2 years in adults with cardiovascular risk factors prevented the expansion of white matter lesions (damaged brain tissue). Growth of white matter lesions are linked to increased risk of stroke and neurodegenerative disease. (25) Women who obtained vitamin E obtained from food-based sources were found to have a significantly lower risk of heart disease when compared to women who supplemented with isolated alpha-tocopherol (vitamin E). (26) Palm fruit based tocochromanols (150 mg/day) for 6 months in adult women reduced CRP by 25% and increased APOA1 by 50% which is associated with a reduced risk for cardiovascular disease. (27) Palm fruit based tocochromanols (208 mg/day) for 6 months in adult women improved the HDL and LDL ratio by 13% which is associated with a 23% reduced risk of cardiovascular events. (28) Palm fruit based tocochromanols (100 mg/day) for 2 months in adult men lead to a 10% improvement in artery flexibility (pulse wave velocity) which is associated with reduced cardiovascular risk. (29) Palm fruit based tocochromanols (300 mg/day) for 18+ months in elderly patients prevented and reversed plaque formation in the carotid artery. (carotid artery ultrasonography) (30)
Liver Synthetic alpha-tocopherol (50 mg / 55 IU per day) for 5+ years in adult men failed to reduce the risk of liver disease or liver disease related death. (31) Synthetic alpha-tocopherol (533 mg / 800 IU per day) for 2 years in adults with non-alcoholic steatohepatitis improved the liver condition (biopsy exam) in 43% of patients. (32)	**Liver** Palm fruit based tocochromanols (400 mg/day) for 12 weeks in men and women with end-stage liver disease significantly improved the condition in 50% of patients, while alpha-tocopherol alone (400 mg/day) improved the liver condition in only 20% of patients. (33) Palm fruit based tocochromanols (100 mg/day) for 3 months in adults with non-alcoholic fatty liver disease reduced liver stiffness in 79% of patients, while diet and exercise alone led to an improvement in only 25% of patients. (34) Palm fruit based tocochromanols (400 mg/day) for 1 year in adults with non-alcoholic fatty liver disease normalized the liver parameters (ultrasonography exam) in 50% of the patients, while diet and exercise alone led to an improvement in only 24% of patients. (35)

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