

# Effects of Lutein and Astaxanthin Intake on the Improvement of Cognitive Functions among Healthy Adults: A Systematic Review of Randomized Controlled Trials

Nouchi R, Suiko T, Kimura E, Takenaka H, Murakoshi M, Uchiyama A, Aono M, Kawashima R. Effects of Lutein and Astaxanthin Intake on the Improvement of Cognitive Functions among Healthy Adults: A Systematic Review of Randomized Controlled Trials. *Nutrients*. 2020 Feb 27;12(3):617. doi: 10.3390/nu12030617. PMID: 32120794; PMCID: PMC7146131.

# BACKGROUND

- + Fruits and vegetables (F&V) are rich in antioxidants (such as flavonoids and carotenoids)
- + The main source of carotenoids for the human diet are green leafy vegetables
- + Cognitive functions are mental processes that include several domains like:
  - Memory
  - Processing speed
  - Executive function
  - Attention
- + Carotenoids are a group of naturally occurring pigments → over 750 different compounds have been characterized
- + Diets rich in F&V and carotenoids are associated with improved cognitive functions and lower risk of dementia
- + The peak of cognitive function is around 20-30 years of age → declines after 50-60 years of age

# AIM

The aim of this systematic review was to summarize the effects of carotenoid intake on cognitive function in adults.

# METHODS

## Search strategy:

### + Databases searched:

- PubMed, the Cochrane Library, Web of Science, PsycINFO

### + Inclusion criteria:

- Randomized controlled trials
- Individuals without cognitive impairment, 18 years or older
- Trial included when carotenoid intake was oral
- Individuals supplemented with only one type of carotenoid (intake of two or more carotenoids only allowed when the combined types were of similar function)
- Placebo group included

### + Main outcomes, 7 cognitive domains:

- Episodic memory, short-term memory, reasoning, attention, inhibition, shifting, processing speed

# MAIN RESULTS I

- + **7 trials fulfilled inclusion criteria and were included in the systematic review**
- + **Sample size ranged from 44 to 91 participants**
- + **Mean age: from 21 to 73 years**
  - 1 of 7 studies included college students
  - 3 of 7 studies included middle-aged adults (40-60 years)
  - 3 of 7 studies included elderly individuals (over 60 years)
- + **Intervention durations:**
  - 4 studies held for 1 year
  - 1 study held for 4 months
  - 1 study held for 12 weeks
  - 1 study held for 8 weeks
- + **Supplementation:**
  - 5 studies used lutein and its isomers in various doses as intervention
  - 2 studies used astaxanthin as intervention

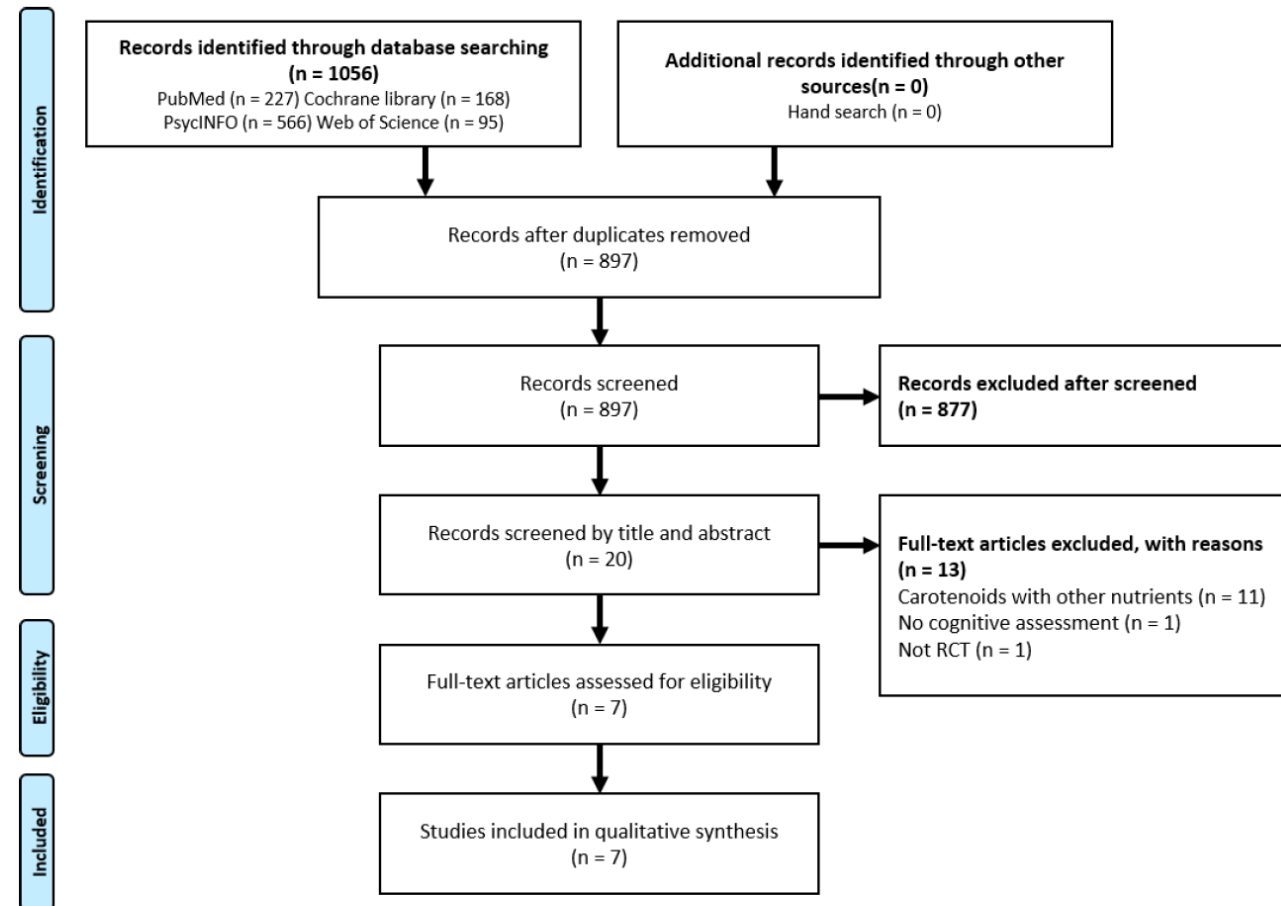


Figure 1. Study selection flow chart.

## MAIN RESULTS II – OUTCOME MEASUREMENTS

- + Across all 7 included studies, 80 cognitive test outcomes were used
- + The Systematic Review divided the 80 outcomes into 7 cognitive domains
  - Verbal and visual episodic memory
  - Short-term memory and working memory
  - Reasoning
  - Attention
  - Inhibition
  - Shifting
  - Processing

## MAIN RESULTS II – OUTCOME MEASUREMENTS

### + Astaxanthin intervention:

- The systematic review only included 2 studies using astaxanthin as intervention.
  - One study supplemented with 12mg or 6mg astaxanthin for 12 weeks
  - One study supplemented with 8mg astaxanthin for 8 weeks
- Some positive effects were found in:
  - Verbal episodic memory
  - Working memory
  - Visual episodic memory

However, due to the small number of studies, the authors could not conclude on astaxanthin's effects on cognitive functions.

### + Lutein intervention:

- Studies using lutein supplements (10-12 mg/d, 4-12 months) reported significant positive effects on the following cognitive functions (compared to placebo group):
  - Visual episodic memory: significant improvement in young and middle-aged adults
  - Inhibition: significant improvement in middle-aged and older adults
  - Attention performance improved in older adults

## CONCLUSION

“This SR showed that the 10 mg lutein per day for twelve months can lead to improvement of cognitive functions. Due to the small number of studies, it is difficult to conclude whether astaxanthin would have a positive effect on cognitive functions.”