



**CENTRE FOR
LIFESTYLE MEDICINE AND RESEARCH**

AT SYDNEY ADVENTIST HOSPITAL

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Carotenoids And Your Health

Carotenoids

There is strong scientific evidence supporting the association between diet and chronic diseases such as cardiovascular disease, diabetes, osteoporosis and cancer. Based on this evidence, dietary guidelines have been formulated for the prevention of chronic disease. The main recommendation of these guidelines is to increase consumption of plant based foods that are good sources of biologically active phytochemicals. Carotenoids are a family of pigmented compounds responsible for the yellow, orange, and red colours of many fruits, vegetables, flowers, and roots¹. Epidemiological studies suggest a link between higher dietary intake and thus tissue concentrations of carotenoids and lower risk of chronic diseases^{2,3}. Carotenoids mediate their beneficial effects via several mechanisms such as gap junction communication, cell growth regulation and the modulation of gene expression and immune response⁴⁻⁷. Chiefly, carotenoids possess potent antioxidant properties that have been shown to mitigate free radicals and thereby prevent oxidative stress⁸.

Following ingestion, carotenoids released from food are taken up by the intestinal mucosal cells and are then transported into the lymphatic and blood systems. There they must be solubilised into fat based packages known as 'micelles', absorbed and packed into chylomicrons before being transported and stored in various tissues¹. The type of food matrix and how the food is processed can affect both carotenoid metabolism and bioavailability⁹. For example it has been estimated that homogenization or heating can increase carotenoid bioavailability up to six times¹⁰.

In addition to the food matrix and effects of food processing, carotenoid metabolism and bioavailability may also be influenced by other host and dietary factors. While some adjunctive dietary constituents, such as fat, may optimize carotenoid absorption other factors, such as various types of dietary fibre or use of statins, have a detrimental effect and decrease carotenoid bioavailability^{11,12}. Individuals may also vary considerably in their ability to absorb carotenoids due to factors such as intestinal pH, gastric disorders and age. For example in a study conducted by Cardinault (2003), young (20-35 years) and older (60-75 years) healthy participants were fed vegetable sources of carotenoids. Nine hours after feeding chylomicron carotenoid levels were measured. Older participants were found to have a significant 40% lower chylomicron lycopene, a common carotenoid^{13,14}.

Current Carotenoid Studies at the ARI

Assessment of the effect of oral supplementation with polyphenols and/or carotenoids on key markers of oxidative stress over time and skin health following acute UV exposure.

Oxidative stress (caused by free radicals) is a primary contributor to the aging process and the development of lifestyle diseases. As we age, free radical activity begins to outstrip the body's antioxidant defences resulting in accelerated damage to proteins and other cellular components such as DNA¹⁵. Exposure to ultra violet (UV) light is a potent inducer of free radical production. In healthy tissue, free radical induced damage is regulated by cells' intrinsic antioxidant defence systems, but UV radiation, particularly UVA and UVB, assault our skin daily and causes many cosmetic, histological and molecular effects. In fact, chronic exposure to sunlight, especially from childhood, is the leading cause of skin cancers¹⁶. More commonly however, sun exposure results in photoageing whereby visible skin changes, such as wrinkle formation and sunspots, damage the skin's appearance.

Carotenoids have attracted considerable attention in recent years owing to the observation that consuming regular amounts of these molecules through diet have a reduced risk of developing a range of lifestyle related diseases¹. In the skin, there is a considerable amount of research regarding the use of these molecules as a means for preventing photodamage and UV induced carcinogenesis. The antioxidant properties of carotenoids, along with its anti-inflammatory and immune modulating abilities, make carotenoids ideal candidates for trialling in skin photoprotection.

Carotenoid Intake & Bioavailability Study

Epidemiological studies suggest a link between higher dietary intake of carotenoids and lower risk of chronic diseases such as cancer¹. While the beneficial effect of carotenoids is well documented much less is known about the factors that affect carotenoid bioavailability.

Evidence suggests that carotenoid bioavailability may be affected by several factors including food processing, co-ingestion of other foods and various individual aspects such as age¹⁰.

This study will determine the carotenoid intake of healthy individuals and examine the impact of age, diet and other biochemical factors on carotenoid bioavailability in the skin.

This data may inform future dietary recommendations and provide important information about the dietary needs of specific population groups such as the elderly.

ARI Juice Recipes

1. Fresh Salsa

You will need:

- 1 cup cherry tomatoes
- 1 medium capsicum (green)
- 1 medium spring onion
- 1 celery stalk
- 1 clove garlic
- 1 stalk coriander
- 1 dash cayenne pepper
- 1 dash salt



Juice ingredients and enjoy!

2. Strawberry Surprise



You will need:

- 250g punnet strawberries
- 3 oranges
- ½ lemon
- 1 tsp. vanilla extract

Blend OR juice ingredients and enjoy!

ARI Juice Recipes

3. Summer Watermelon



You will need:

- 2 cups of chopped watermelon
- 1 peeled orange
- mint to taste.

Blend OR juice ingredients and enjoy!

4. Tropical Carrot

You will need:

- 3 carrots
- 1 orange
- ½ grapefruit
- mint to taste.

Juice ingredients and enjoy!



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