

A, with excess carotene being excreted. Carotenes have been used as a malabsorption screen because it appears ubiquitously in the diet and is absorbed with intestinal fat. As there are no stores of carotenoids in the body, dietary deficiency can deplete serum carotenoid levels in 3-4 weeks.

## References

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# Serum Vitamin A, E and Beta Carotene

## Clinical Biochemistry



## Sending Specimens for Analysis

**Sample requirement: minimum of 0.5 ml of serum or plasma.** Please contact the laboratory if you would like to send a smaller volume of sample.

- Samples should be stored at 4°C prior to dispatch. There is no need to protect samples from light e.g. wrap in foil
- Send samples by first class post at ambient temperature to the address on the back of this leaflet

## Reference Ranges

**Our reference intervals were established locally and are as follows:**

### Vitamin A (µmol/L)

|                           |           |
|---------------------------|-----------|
| Under 7 years             | 0.70-1.50 |
| From 7 to 12 years        | 0.90-1.70 |
| From 13 to 19 years       | 0.90-2.50 |
| Adult female (≥ 20 years) | 0.99-3.35 |
| Adult male (≥ 20 years)   | 0.77-3.95 |

### Vitamin E (µmol/L)

|                     |           |
|---------------------|-----------|
| Under 1 year        | 11.5-24.4 |
| From 1 to 6 years   | 7.0-21.0  |
| From 7 to 123 years | 10.0-21.0 |
| From 13 to 19 years | 13.0-24.0 |
| Adults (≥ 20 years) | 9.5-41.5  |

### Vitamin E Lipid Ratio (all ages)

Vitamin E/Cholesterol ≥2.22 µmol/mmol

## β Carotene

All ages 0.19 – 0.89 µmol/L

## Factors Affecting Measurement of Vitamins A and E

- If possible vitamin supplements should be stopped two days prior to collecting samples, since vitamins can appear in the blood up to 32 hours after ingestion<sup>1</sup>
- Our own studies have shown that vitamin A and E concentrations are stable for 14 days at room temperature. Carotenes are less stable, after 14 days concentrations can fall by >30% even when stored at -20°C regardless of light exposure<sup>2</sup>
- Serum vitamin E is altered by serum lipid content, and vitamin E deficiency may be missed if circulating lipid levels are high, or overestimated when serum lipid concentrations are low. Therefore when interpreting vitamin E results it is preferable to also take into account lipid status<sup>3</sup>

## Clinical Use

### Vitamin A, E:

In the UK where most individuals are well nourished, Vitamin A and E deficiency is confined to individuals with malabsorption, due to small intestinal

disease, pancreatic insufficiency e.g. Cystic Fibrosis, or alcoholic and biliary cirrhosis<sup>4</sup>

Vitamin A is required for normal vision and is essential for cell division and differentiation. Symptoms of deficiency include: xerophthalmia, keratomalacia, weight loss, diarrhoea, reduced libido and gum disease. Premature and low birth weight infants have low body stores of vitamin A and are often deficient. Xerophthalmia and keratomalacia can occur in the first year of life amongst artificially fed infants.

Vitamin E is a potent antioxidant, protecting against damage caused by free radicals. Vitamin A and E toxicity is rare and is mainly associated with abuse of supplements.

### Carotenoids:

The determination of carotenoids is useful in patients (mainly children) who ingest large quantities of carotenoid rich processed food e.g. carrot puree in baby foods, coloured fruit drinks, and can appear jaundiced due to carotenoid deposition in the skin (carotenoderma). It is not possible to become vitamin A toxic from ingesting large doses of carotenes since transformation of carotenes into vitamin A is determined by the existing concentration of vitamin

