# Vitamin C

Vitamin C (ascorbic acid) is a water soluble vitamin present in fruit and vegetables. It is rapidly broken down by heating. Absorption occurs readily, mostly from the stomach and is found in most tissues. The half life in the body is about 2 weeks. Loss occurs in the urine.

Vitamin C is a cofactor for procollagen hydroxylase and hence plays a vital role in connective tissue integrity. It also has an antioxidant role and is involved in hormone, neurotransmitter and carnitine synthesis.

## Deficiency

Deficiency (which is rare in western cultures) can lead to fatigue and easy bruising. Structurally weakened tissue, as in scurvy, is swollen, tender and bleeding.

## Toxicity

Large doses of vitamin C have generally been considered nontoxic.

Gastrointestinal symptoms, vitamin B12 deficiency, increased iron absorption, and increased oxalate production may occur.

## Measurement

The assessment of vitamin C status can be performed by measuring plasma vitamin C. This is affected by recent diet and the acute phase response. **Suggest check CRP prior to submitting sample for vitamin C assay**.

Assessment of Vitamin C status has also been determined by measurement in white cells, typically by incubation with a colour reagent - dinitrophenylhydrazine, thiourea and sulphuric acid - and also by a saturation test. These are rarely performed, and have their own limitations.

## Reference ranges

For plasma -
Adult = 26 - 85 µmol/L
Source: W. Lee Clin Chem (1997) 43, 154 – 157

Deficiency < 11.1 µmol/L

Plasma vitamin C is low in smokers.
Any contact with EDTA destroys the vitamin

## Vitamin C stability

Special requirements are necessary for the measurement of vitamin C.

1. ***The laboratory should be contacted prior to taking the sample to request preservation tubes containing metaphosphoric acid (MPS). These tubes can be stored at -20C prior to use.***

2. Ideally the plasma should be mixed with metaphosphoric acid (MPS) - stabilises vitamin C from oxidative damage - prior to freezing. Rotherham will supply MPS as 200µL aliquots in small polypropylene tubes to external labs who can then add 500µL of plasma). For paediatric samples, 100µL of MPS is supplied – 250µL of plasma should then be pipetted into this tube, mixed and frozen straight away.

3. Samples ideally need to be sent on dry ice.

## Specimen type

Lithium heparin plasma ONLY (no gel tube)
Adult - minimum volume 500µL treated with MPS (700µL in total, plasma + MPS)
Child - minimum volume 250µL treated with MPS (350µL in total, plasma + MPS)

## Storage

Freeze plasma asap after collection

## Transport

Dry ice transport recommended. Sample must remain frozen.
Protect from light.

## Address for specimens

Department of Clinical Biochemistry
Rotherham Hospital
Moorgate Road
Rotherham, S60 2UD

## Cost

Contact - neil.cuthbert@nhs.net

## Method / Turnaround

HPLC assay carried out as required

## Accreditation

Accredited to UKAS ISO15189

## External QA

Instand

## Contact persons

Consultant Clinical Scientist
rgh-tr.biochemistry@nhs.net
Tel 01709 820000 (Hospital)
Tel 01709 424051 (Secretary)

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