

Vitamin A

Vitamin A (retinol) is a fat soluble vitamin present in meat and fish (especially liver). In addition many plant carotenoids such as β carotene can be converted to Vitamin A by an oxygenase in the gut.

After absorption in the small intestine vitamin A is transported via chylomicrons to the liver where it is either stored as retinyl esters or exported from the liver bound to retinol binding protein (RBP).

As retinal, vitamin A forms an important part of the visual pigment system. It exists combined with opsin to form rhodopsin. Light causes a change in retinal from the cis to the trans conformation which results in the generation of an electrical signal. As retinoic acid Vitamin A interacts with nuclear receptors to modulate gene expression. Vitamin A plays a role in embryogenesis and in modulating the immune response.

Deficiency

Deficiency is usually due to -

Dietary lack
Malabsorption
Liver disease

and may lead to xerophthalmia and permanent eye damage.

Blood retinol has several disadvantages for the detection of Vitamin A deficiency -

1. Only decreases in severe deficiency – when hepatic reserves have fallen
2. Infection depresses blood retinol - negative acute phase response (check CRP). If Vitamin A < 0.5 umol/L though, check for clinical deficiency.

Hepatic retinol represents storage vitamin A – but not practicable to measure directly! Other tests include the Relative Dose Response (RDR) test and conjunctival impression cytology. The RDR test and Modified RDR test give an estimate of hepatic retinol.

Toxicity

Vitamin A tends to bioaccumulate.

Care is required in the dermatological use of retinoids due to the possibility of

Teratogenicity
Liver disease
Musculoskeletal problems
Raised intracranial pressure
Hypercalcaemia
Renal insufficiency

Reference ranges

Paediatric

Serum Vitamin A increases with age with children <10yrs having the lowest mean level. Suggested reference ranges –

<1yr	0.5-1.5 umol/L
1-6yrs	0.7-1.5 umol/L
7-12yrs	0.91-1.71 umol/L
13-19yrs	0.91-2.51 umol/L

Adult

0.84-3.6 umol/L

For adults a result <0.5 umol/L may indicate clinical deficiency.

Toxicity is likely when Vitamin A > 5 umol/L.

Specimen type

Serum (also lithium heparin or EDTA plasma)
Protect from light
Minimum volume 50 uL

Storage

Separate serum or plasma asap and freeze

Transport

First class post, ambient temperature

Address for specimens

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

Cost (excluding VAT)

£12.50 (combined assay with Vitamin E = £22.00)

Method / Turnaround

Weekly HPLC assay

External QA

UKNEQAS

Contact person

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