



Glutathione reductase

February 2009

Reduced glutathione (GSH) is the major intracellular antioxidant, acting as a trap for the numerous oxidants produced by oxidative and nitrosative stress. The *in vivo* bioavailability of GSH is a function of the activity of glutathione reductase (GSHr), a flavoprotein that catalyses the NADPH-dependent reduction of glutathione disulphide to GSH (i.e. the opposite reaction to glutathione peroxidase). The activity of GSHr is dependent on vitamin B2 (riboflavin) [1] although it is also reported to be dependent on selenium status [2]. Deficiency of GSHr is characterised by haemolysis associated with increased sensitivity of the erythrocyte membrane to oxidative stress [3]. The activity of GSHr is inhibited by paraquat [3] and by anti-tumour agents [4].

Genetic deficiency of GSHr has been described and is associated with a tendency to haemolysis after consumption of fava beans. Moderately low levels of GSHr are also associated with sickle cell disease, hereditary spherocytosis and thalassemia [4].

This activity of GSHr is thus required for the maintenance of glutathione (GSH) levels *in vivo* and a favourable GSH/GSSG ratio inside the cell. Measurement of GSHr activity is an important component in the assessment of the antioxidant status of the cell and of the functionality of the glutathione cycle.

GSHr activity can be detected and measured in the serum, as well as in erythrocytes.

Specimen

Whole blood, collected with heparin as an anticoagulant. The correct tubes are available from Biolab on request. If posted, blood samples must reach us within 24 hours.

Patient preparation

No special preparation is required prior to venipuncture.

Interpretation

The reference intervals for glutathione reductase are:

Plasma / serum	33 – 73 U/L
Erythrocytes	4.7 – 13.2 U / g Hb

Price

The fee is £26.00. Please make cheques payable to BIOLAB.

P.T.O.

Turn around time

1 weeks (5 working days).

References

1. Gibson RS. In: Principles of Nutritional Assessment, 2nd edition, Oxford University Press, 2005, pp 554-560.
2. Castano A, Ayala A, Rodriguez-Gomez JA et al. Increase of dopamine turnover and tyrosine hydroxylase in the hippocampus of rats fed a low selenium diet. *Neurosci Res* 1995;42:684-691.
3. Harmening D. In: Clinical Haematology and Fundamentals of Haemostasis, 2nd edition, FA Davis Co Philadelphia PA, pp 251, 540.
4. Beutler E, Dale GL (1989) Erythrocyte glutathione: function and metabolism. In: Dolphin D, Poulsen R, Avramovic O (eds). *Glutathione: chemical, biochemical and medical aspects* 1989:291-318, John Wiley, New York NY (pubs).
5. Carlberg I, Mannervik B. Glutathione reductase. *Methods Enzymol* 1985;113: 484-490.