Glutathione in erythrocytes

February 2009

INDICATIONS

Glutathione (GSH - a tripeptide consisting of glutamic acid - cysteine – glycine), acts as the substrate for the enzyme glutathione peroxidase. It is also the product of the enzyme glutathione reductase. GSH is the major intracellular antioxidant, protecting cytosolic organelles in particular from the damaging effects of the many oxidative and nitrosative substances formed during normal metabolism and xenobiotic detoxification. In addition, GSH also acts synergistically with ascorbic acid and alpha-tocopherol to re-cycle these nutrient antioxidant vitamins to their reduced state after their interaction with reducing chemical species inside the cell. Dietary sources of glutathione are found in fresh fruit and vegetables and it has been suggested that deficiency in the consumption of these is an important factor in the development of many cancers [1].

PATIENT PREPARATION

No supplements for at least 24 hours before the test.

SPECIMEN REQUIREMENTS

Reduced glutathione (GSH) is present in blood as an intracellular component of erythrocytes at a concentration of about 1.0 mmol/L. Concentrations in the plasma water are very much lower, representing less than 1.0% of the total GSH in the whole blood. Red cell lysates are thus the sample of choice for GSH measurement and determination of blood GSH is well established as an accurate indicator of whole body GSH status [2].

Green top tubes (heparinised - available from Biolab on request). If posted samples must reach us within 24 hours.

LABORATORY METHOD

The reaction of sulphydryl compounds with 5,5'-dithiobis-(2-nitrobenzoic acid) (DTNB) [3].

TURN AROUND TIME

2-3 working days.

P.T.O.

• The Stone House • 9 Weymouth Street • London W1W 6DB England • Tel: (+44) 020 7636 5959/5905 • Fax: (+44) 020 7580 3910 • Email: info@biolab.co.uk •

INTERPRETATION

The reference interval for erythrocyte glutathione is 1.6 - 2.8 mmoles of GSH per litre of red cells.

In glutathione synthetase deficiency (5-oxoprolinuria), as well as in nutritional deficiency, the total level of GSH in the red cells is reduced. Enzyme-deficient subjects may be identified by studies of the stability of the enzyme; affected individuals may also suffer from chronic haemolysis and from late-onset intellectual regression.

REFERENCES

1. Jones DP, Coates RJ, Flagg EW, Eley JW, Block G, Greenberg RS, Gunter EW, Jackson B (1992). Glutathione in foods listed in the National Cancer Institute's Health Habits and History Food Frequency questionnaire. Nutr Cancer 17: 57-75.

2. Richie JP, Skowronski L, Abraham P, Leutzinger Y (1996). Blood glutathione concentrations in a large scale human study. Clin Chem 42:64-70.

3. Beutler E, Duron O, Kelly BM (1963). Improved method for the determination of blood glutathione. J Lab and Clin Med 61:882-888.