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# **Biolab Medical Unit**

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## **ANTIOXIDANT PROFILE**

### **INDICATIONS**

Suspected oxidative stress states, including the effects of ageing, alcoholism, atherosclerosis, cancer, cataract, cystic fibrosis, diabetes, hepatitis, HIV infection, iron overload, pancreatitis, pre-eclampsia, pulmonary disease, rheumatoid arthritis, tooth and gum disease. Also suspected nutritional deficiencies, especially of vitamin E, copper and selenium.

The profile comprises serum and red cell copper, serum caeruloplasmin, serum vitamin E and beta-carotene, red cell glutathione peroxidase and superoxide dismutase, red cell fragility and a measure of platelet aggregation. This gives a detailed picture of intracellular and extracellular copper status, selenium status and membrane-related antioxidant status. The fragility tests and platelet aggregation tests provide end points to indicate poor tissue antioxidant status.

### **PATIENT PREPARATION**

Abstain from taking antioxidant supplements for 12 hours prior to blood sampling, which should be carried out in the morning not in the afternoon.

### **SPECIMEN REQUIREMENTS**

Two serum separator tubes (red speckled top) and two lithium heparin tubes (green top), filled with blood. Postal samples are unsuitable: platelet aggregation and red cell fragility should be measured within three hours of blood sampling. The blood samples should arrive at Biolab before 1.00 pm to allow prompt processing of the specimen.

### **LABORATORY METHODS**

Atomic absorption spectrophotometry, plasma emission spectroscopy, high pressure liquid chromatography, enzyme analysis and aggregometry. Erythrocyte membrane fragility is measured as a function of resistance to peroxide degradation.

### **TURN AROUND TIME**

The full profile, along with vitamin results, is normally available ten days after receipt of the specimens. An initial report is issued within 48 hours

**P.T.O.**

## **INTERPRETATION**

Functional deficiency of vitamin E can cause spontaneous *in vivo* haemolysis, so the antioxidant profile gives both a quantitative measure of alpha tocopherol and a functional assessment of its effectiveness in protecting lipid membranes against peroxidative degradation. The selenium-dependent red cell enzyme glutathione peroxidase is required for the detoxification of plasma peroxides as they are formed. Every aerobic cell contains superoxide dismutase (SOD), which is required for the detoxification of superoxide leaking from the mitochondrial electron transport chain. Mitochondrial reactive oxygen species are produced primarily at complex I (NADH-coenzyme Q) and to a lesser extent at complex II (succinate-coenzyme Q) and complex III (coenzyme QH<sub>2</sub>-cytochrome C reductases). The superoxide radical anion plays a central role in the development of oxidative stress since other reactive oxygen species appear to be derived from O<sub>2</sub><sup>•-</sup>. Copper (with zinc and manganese) is an essential component of SOD. Copper circulates in the blood principally as a component of caeruloplasmin in the plasma but also within the red cell, along with other mineral cations.

Disease processes and micronutrient deficiencies compromise the protective mechanisms which are essential to aerobic metabolism.

## **PRICE**

The fee is £92. Please make cheques payable to BIOLAB.

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