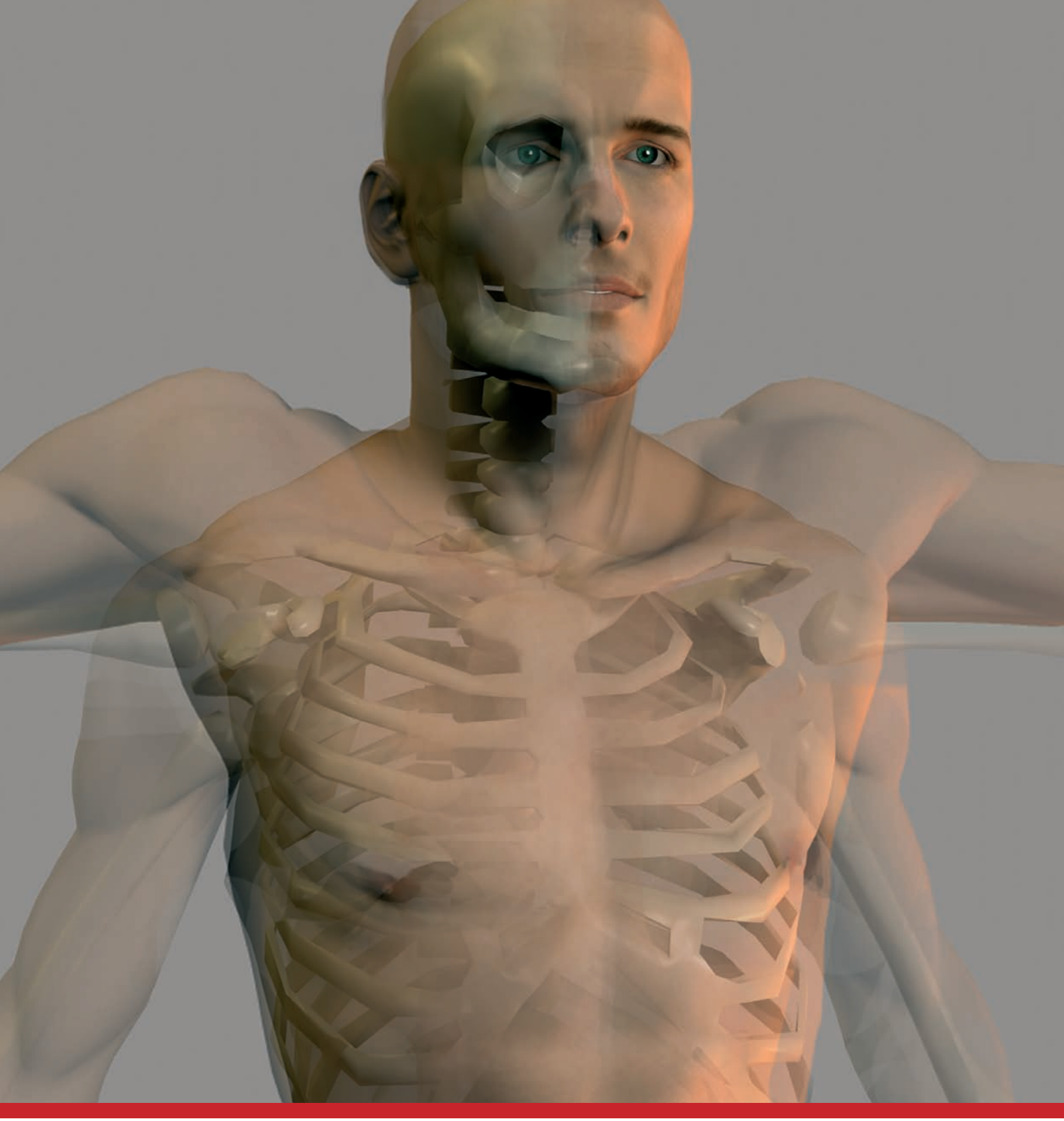


Antioxidant Products

RANDOX
clinical diagnostic solutions

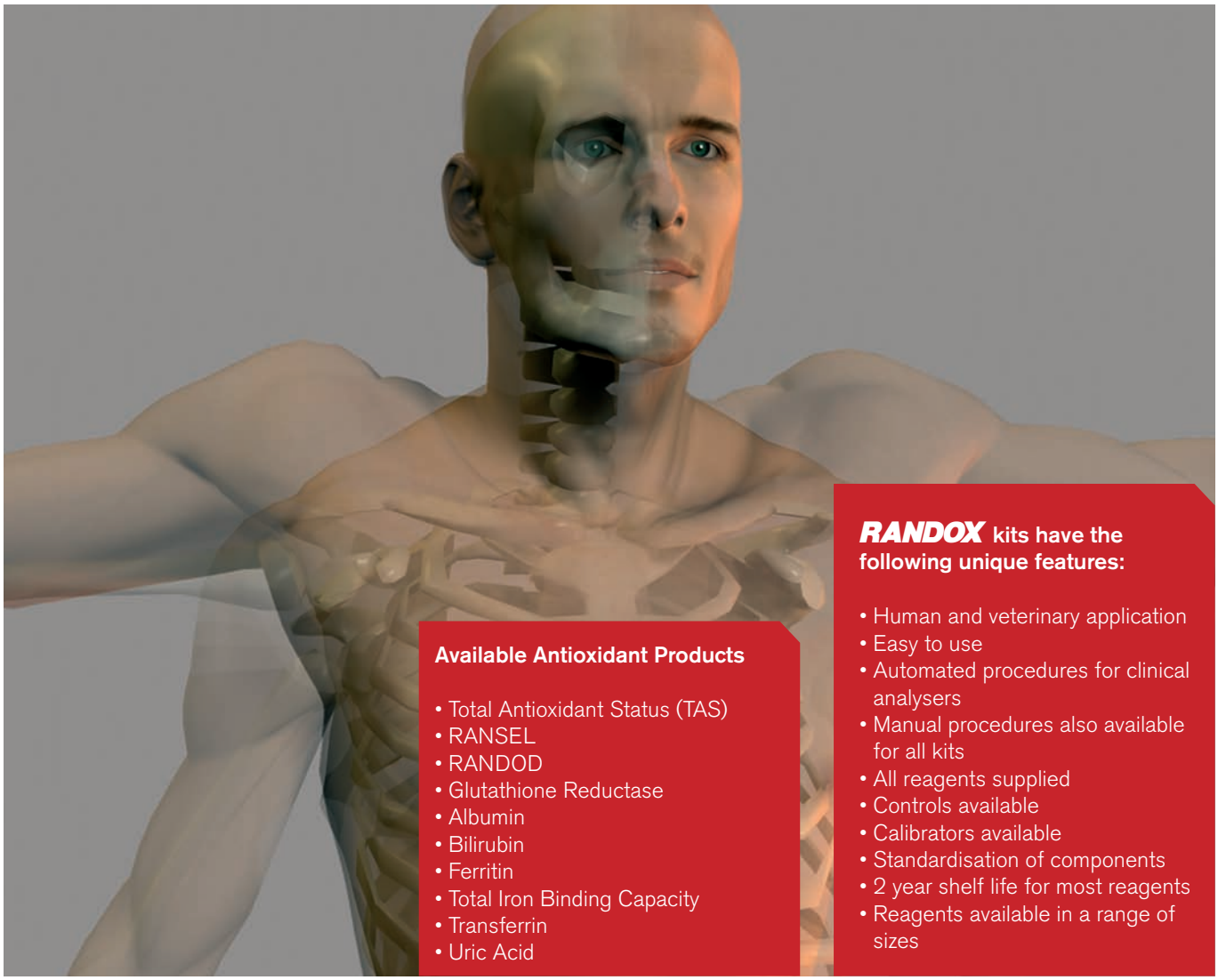
Introduction

Antioxidants help defend living organisms against free radical attack. Many diseases have been associated with low antioxidant levels.

Free radicals are highly reactive species that have been implicated in the development of over 100 diseases affecting all major organs in the body. Known to cause extensive cell damage, they are extremely reactive in both animals and humans. Antioxidant mechanisms act synergistically in the body to offer the best line of defence against free radical attack.

The body has 3 levels of defence against free radical attack including:

1. **Preventative antioxidants** to inhibit the formation of free radicals e.g. metal binding proteins like; Caeruloplasmin (Cu), Metallothionine (Cu), Albumin (Cu), Transferrin (Fe), Ferritin (Fe) and Myoglobin (Fe).
2. **Scavenging antioxidants** to remove reactive species once formed. e.g. superoxide dismutase, glutathione peroxidase, catalase and small molecules such as glutathione, ascorbate, tocopherol, bilirubin, uric acid, carotenoids and flavonoids.
3. **Repair enzymes** to repair damaged biomolecules e.g. DNA repair enzymes.



Available Antioxidant Products

- Total Antioxidant Status (TAS)
- RANSEL
- RANDOD
- Glutathione Reductase
- Albumin
- Bilirubin
- Ferritin
- Total Iron Binding Capacity
- Transferrin
- Uric Acid

RANDOX **kits have the following unique features:**

- Human and veterinary application
- Easy to use
- Automated procedures for clinical analysers
- Manual procedures also available for all kits
- All reagents supplied
- Controls available
- Calibrators available
- Standardisation of components
- 2 year shelf life for most reagents
- Reagents available in a range of sizes

ANTIOXIDANT APPLICATIONS

CLINICAL RESEARCH
Laboratory evidence indicates that antioxidants may slow or possibly prevent the development of diseases such as cancer.

SPORTS RESEARCH
Sports professionals need a strong antioxidant defence system to help minimise free radical damage during exercise.

VETERINARY RESEARCH
Selenium deficient animals can develop white muscle disease, which left untreated is life threatening.

FOOD & BEVERAGES
Assessment of antioxidant capacity of food stuffs and their effects on humans and animals.

COSMETICS
Moisturisers and cosmetic formulas containing antioxidants can help protect skin from free radical damage.

PHARMA RESEARCH
Determining antioxidant levels in clinical trials at each stage of the drug development process.

Antioxidant Products

	TAS	Ransel	Ransod	Glutathione Reductase
Component measured	Total Antioxidant Status	Glutathione Peroxidase	Superoxide Dismutase	Glutathione Reductase
Relevance	Abnormal levels in various diseases human & veterinary. Wine, beverages and cosmetics	Selenium deficiency and antioxidant level	Abnormal levels in various diseases	Required for regeneration of reduced glutathione
Assay principle	Formation of ABTS® radical	Oxidation of NADPH	Xanthine Oxidase method	Oxidation of NADPH
Sample type	Serum or plasma, wine, beer, fruit juice, other beverages, food, and cosmetics	Whole blood	Whole blood	Serum, plasma or erythrocytes
Automated Procedures	YES	YES	YES	YES

Please contact Randox for further advice on sample types

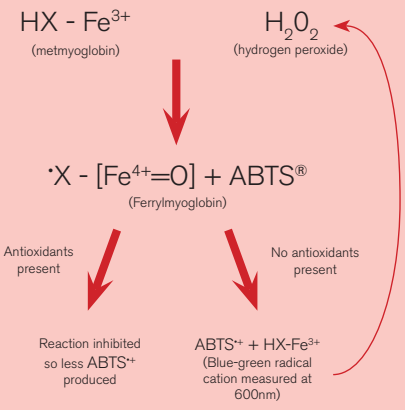
Total Antioxidant Status (TAS)

WHY MEASURE TOTAL ANTIOXIDANT STATUS?

The antioxidant defence system has many components. A deficiency in any of these components can cause a reduction in the overall antioxidant status of an individual. Reduction in total antioxidant status has been implicated in several disease states, such as cancer and heart disease. Randox total antioxidant status kit enables assessment of the integrated antioxidant system which encompasses the biological components with antioxidant activity.

HOW DOES THE RANDOX TOTAL ANTIOXIDANT STATUS KIT WORK?

Incubation of ABTS® with a peroxidase (metmyoglobin) results in production of the radical cation $ABTS^{\cdot+}$®. This species is blue-green in colour and can be detected at 600 nm. Antioxidants in the added sample cause inhibition of this colour production to a degree that is proportional to their concentration. This is a two-reagent assay and may be performed using either serum or plasma. The antioxidant potential of drugs, beverages and foodstuffs can also be assessed using this method if samples are suitably solubilised.



Total Antioxidant Status (TAS) Applications

FOOD & BEVERAGES

- Determination of the antioxidant potential of foods and beverages during production and to promote health benefits and product stability.

COSMETICS

- Measurement of antioxidant levels during the production process enables product improvements and marketing of antioxidant properties to the customer.

CLINICAL & VETERINARY

- Measurement of antioxidant levels in patients or animals at risk from diseases such as cancer, heart disease, rheumatoid arthritis, diabetes, retinopathy and age-related conditions. Promote supplementation and disease prevention.

Ransel

WHY MEASURE GLUTATHIONE PEROXIDASE (GPx) AND SELENIUM STATUS?

Selenium is an essential trace element, involved in the aetiology of several diseases. At normal concentrations, selenium may have a protective effect against several diseases, including cancer. However, this protection is lost at low concentrations and selenium is highly toxic at high concentrations. Therefore, it is important that selenium levels should be monitored, so that they may be kept within the normal range. Ransel measures glutathione peroxidase which has a direct correlation with selenium levels.

Ransel Applications

PHARMA

- Determination of the therapeutic efficacy and antioxidant potential of drugs.

SPORTS

- Identifying and correctly treating sports professionals at risk of selenium deficiency.

CLINICAL & VETERINARY

- Patients or animals suffering from diseases related to GPx or selenium deficiency.
- Identification of those with increased risk of selenium deficiency - risk factors include increasing age, poor nutritional status, smoking, alcoholism, stress, renal failure, crohn's disease, cystic fibrosis, autoimmune disease and chemotherapy.
- Identification of GPx and selenium deficiency in patients allows dietary supplementation of selenium and antioxidants.

HOW DOES RANSEL WORK?

Ransel shows excellent correlation with the original method of GPx assessment developed by Paglia and Valentine[1]. The method is based on the reaction below:

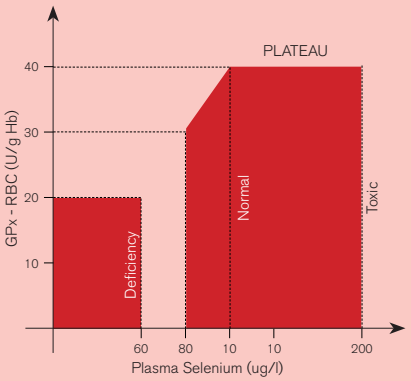
$$2GSH + ROOH \xrightarrow{GPx} GSSG + ROH + H_2O$$

$$GSSG + NADPH + H^+ \xrightarrow{\text{glutathione reductase}} 2GSH + NADP^+$$

(ROOH = cumene hydroperoxide)

The concentration of GPx is assessed from the decrease in absorption at 340 nm due to the oxidation of NADPH to $NADP^+$

RELATIONSHIP BETWEEN GPx ACTIVITY AND PLASMA SELENIUM CONCENTRATION



1. Paglia, D.E. and Valentine, W.N., *J. Lab. Clin. Med.*, 1967; **70:** 158.

Did you know?

Free radicals can come from environmental pollution, radiation, cigarette smoke, chemicals, and herbicides.

Ransod

A fast, easy to use method for superoxide dismutase (SOD) analysis, RANSOD allows analysis of erythrocytic levels of SOD, so may be useful in the diagnosis of several diseases and as a research tool for assessing new therapies.

WHY SHOULD WE MEASURE SOD LEVELS?

- In the diagnosis of diseases associated with abnormal SOD levels
- To determine the therapeutic efficacy and antioxidant potential of drugs
- As a research tool, to help identify diseases in which free radicals are involved.

HOW DOES RANSOD WORK?

The reaction between xanthine and xanthine oxidase is used to generate superoxide radicals (O_2•-).

$$\text{XANTHINE} \xrightarrow{\text{xanthine oxidase}} \text{URIC ACID} + O_2\text{•-}$$

The superoxide radicals produced react with p-iodonitrotetrazolium salts (INT) to produce a red formazan dye.

$$\text{INT} + O_2\text{•-} \longrightarrow \text{FORMAZAN DYE}$$

SOD present in the sample competes with the INT for superoxide radicals and so inhibits the production of the formazan dye.

$$O_2\text{•-} \xrightarrow{\text{SOD}} O_2 + H_2O_2$$

SOD is measured by the degree of inhibition of formazan dye formation.

Did you know?

Drinking a glass of red wine per day may cut a man's risk of prostate cancer by half!

Ransod Applications

CLINICAL & VETERINARY

- Diagnosis of diseases associated with abnormal SOD levels , e.g. neurological disorders.
- As a research tool, to help identify diseases in which free radicals are involved.

SPORTS

- Research into assessing inflammatory response of cells or into assessing heart damage.

PHARMA

- Determination of the therapeutic efficacy and antioxidant potential of drugs.

Glutathione Reductase

Glutathione reductase is required for the regeneration of reduced glutathione which is important for normal cellular metabolism. This enzyme is often discussed in association with glutathione peroxidase, which requires reduced glutathione for activation.

WHY MEASURE GLUTATHIONE REDUCTASE?

Glutathione reductase is responsible for maintaining levels of reduced glutathione which has many important functions in the cell. Glutathione plays a role in protein folding and the maintenance of reduced pools of vitamin C and E. Reduced levels of this enzyme have been described in several diseases.

Glutathione Reductase Applications

SPORTS

- Assessing enzyme deficiency states and cell metabolism.
- Assessment of nutrition (riboflavin status).

CLINICAL & VETERINARY

- Assessing enzyme deficiency states and cell metabolism.
- Detection of hepatic and malignant disease.
- Detection of genetically determined deficiency states.
- As a research tool, to help identify diseases in which free radicals are involved.

HOW DOES THE GLUTATHIONE REDUCTASE ASSAY WORK?

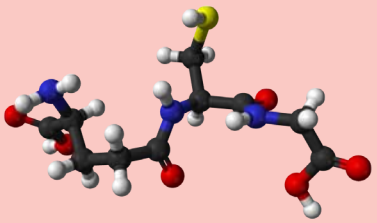
Glutathione reductase catalyses the reduction of glutathione (GSSG) in the presence of NADPH, which is oxidised to $NADP^+$.

$$GSSG + NADPH + H^+ \xrightarrow{\text{glutathione reductase}} 2GSH + NADP^+$$

GSH = Reduced glutathione

GLUTATHIONE FACTS:

- Did you know glutathione is the most powerful, prevalent antioxidant in your body?
- Powerful regenerator of immune cells
- The most important agent in keeping the body detoxified and healthy.
- Vital in the synthesis of DNA and maintenance of DNA.
- Vital in the synthesis of protein and amino acids.
- Strong antiviral effects.



EXAMPLES OF APPLICATIONS USING RANDOX ANTIOXIDANT PRODUCTS

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"Revolutionising healthcare through continuously improving diagnostic solutions"

RANDOX
clinical diagnostic solutions

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