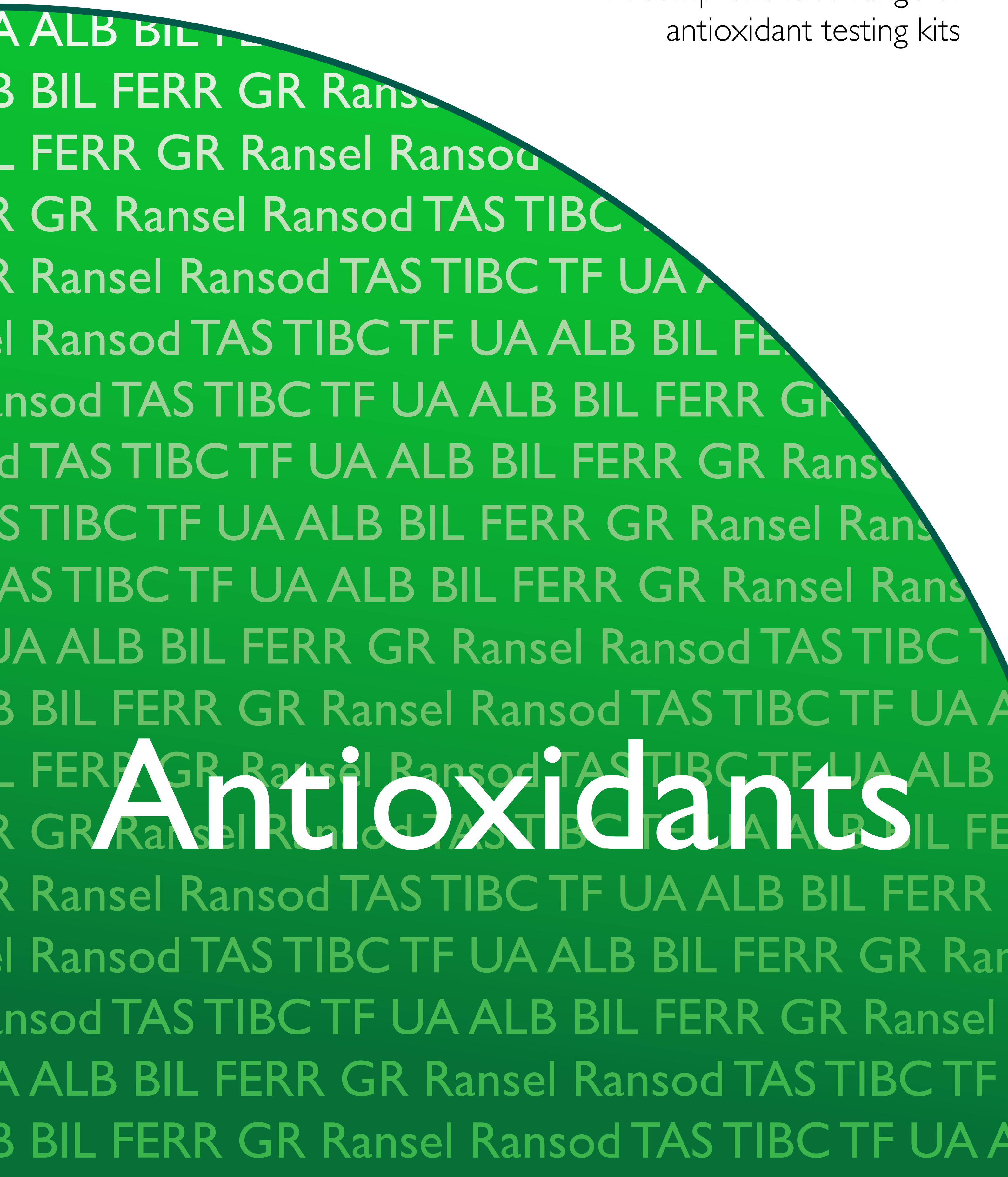
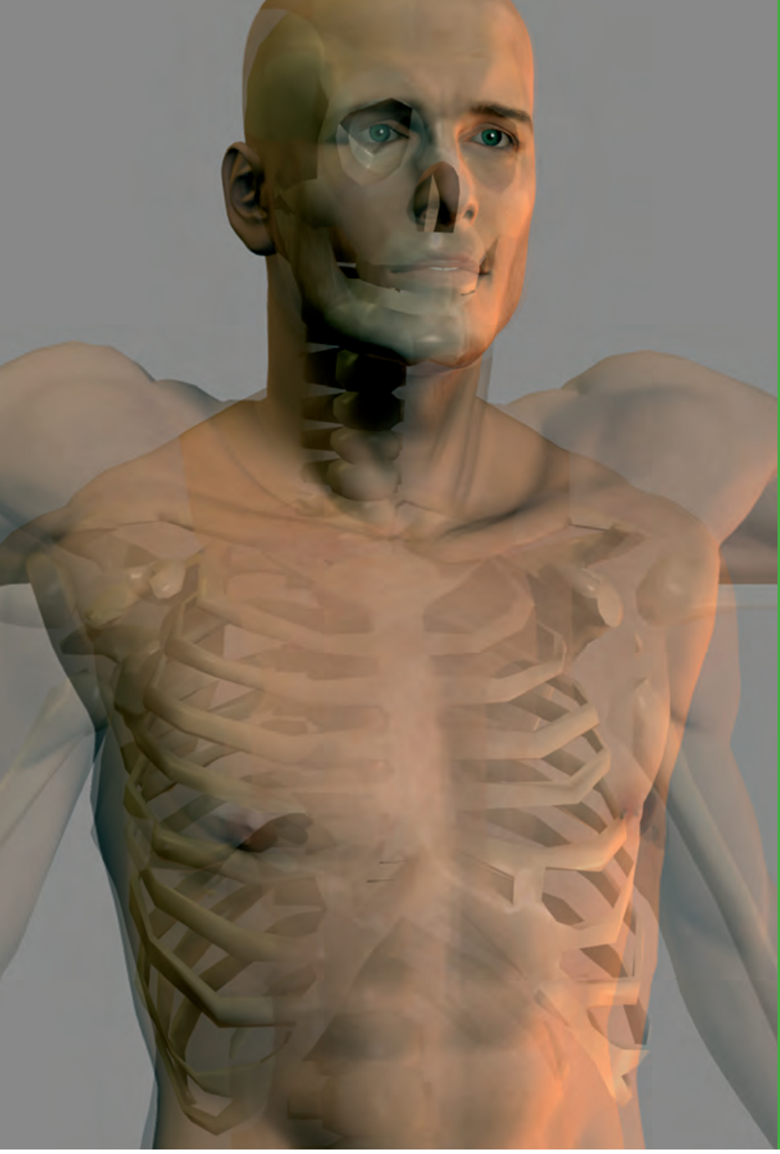
Antioxidant Products

A comprehensive range of
antioxidant testing kits



Antioxidants



Free radicals are molecules containing one or more unpaired electrons; as such they are highly reactive species that seek stability by gaining electrons. In an attempt to gain extra electrons they often attack nearby molecules resulting in cellular or systemic damage. They are produced as a result of normal cellular metabolism however can also be the direct result of external sources such as pollution and smoking.

Antioxidants act by preventing or slowing down oxidative damage.

They can be present as vitamins in food, flavonoids in wine or enzymes in the body e.g. Superoxide Dismutase (SOD) and Glutathione Peroxidase.

Free radicals have been implicated in the progression of numerous conditions including cancer, diabetes, cardiovascular disease, ageing and neurological disorders.

The body has three levels of defence against free radical attack

1 **Preventative antioxidants** to inhibit the formation of free radicals e.g. metal binding proteins like; Ceruloplasmin, Metallothionine, Albumin, Transferrin, Ferritin and Myoglobin.

2 **Scavenging antioxidants** to remove any reactive species once formed. e.g. Superoxide Dismutase, Glutathione Peroxidase, Catalase and small molecules such as Ascorbate, Tocopherol, Bilirubin, Uric Acid, Carotenoids and Flavonoids.

3 **Repair enzymes** to repair damaged biomolecules e.g. DNA repair enzymes.

Antioxidant products available from Randox

- Albumin
- Bilirubin
- Ferritin
- Glutathione Reductase
- Glutathione Peroxidase
- Superoxide Dismutase
- Total Antioxidant Status (TAS)
- Total Iron Binding Capacity
- Transferrin
- Uric Acid

TOTAL ANTIOXIDANT STATUS (TAS)

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. The Randox TAS kit measures the total antioxidant capacity of a sample i.e. anything that has an antioxidant effect.

APPLICATIONS

Cosmetics

The measurement of antioxidant levels is important during the production process to confirm the presence of antioxidants and enable any necessary product improvements to be made. Also allows marketing claims to be made.

Food and Beverages

The antioxidant potential of foods and beverages can be determined during production to promote health benefits and product stability.

Clinical and Veterinary

Antioxidant levels in patients or animals at risk from diseases such as cancer, heart disease, rheumatoid arthritis, diabetes, retinopathy and age-related conditions can be measured to promote supplementation and disease prevention.

High Performance Reagents

- **Lyophilised reagents -** for enhanced stability
- **Standard supplied with kit -** simplifying the ordering process
- **Rapid analysis -** reaction time of 3 minutes
- **Excellent linearity -** 2.5mmol/l, removing the need for sample dilution
- **Suitable for use with a wide variety of sample types -** including serum, plasma, wine, beer and fruit juice
- **Method -** colorimetric
- **Applications available -** for a wide variety of clinical chemistry analysers
- **Suitable for automation -** only suitable commercially available antioxidant kit

DESCRIPTION	SIZE	CAT. NO.
Total Antioxidant Status	5 x 10ml	NX2332
Total Antioxidant Status Control	10 x 5ml	NX2331
Total Antioxidant Status Standard	10 x 1ml	NX2615

GLUTATHIONE PEROXIDASE (RANSEL)

Selenium is an essential trace element, involved in the aetiology of a number of diseases. At normal concentrations, selenium has a protective effect against several disease states however this protection is lost at lower concentrations and selenium can be toxic at high concentrations. It is therefore important to monitor selenium levels to ensure they are kept within the normal range. Ransel measures Glutathione Peroxidase which has a direct correlation with selenium levels.

APPLICATIONS

Pharma

Glutathione Peroxidase can be measured to determine the therapeutic efficacy and antioxidant potential of newly developed drugs.

Sports

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

Clinical and Veterinary

Diagnosis of patients or animals suffering from diseases related to selenium deficiency e.g. white muscle disease in sheep and goats, or identification of at-risk individuals. Risk factors include age, diet, smoking, stress, autoimmune disease and chemotherapy.

High Performance Reagents

- **Lyophilised reagents -** for enhanced stability
- **Excellent linearity -** 925U/l, removing the need for sample dilution
- **Excellent sensitivity -** 75U/l, allowing depleted levels of selenium to be detected
- **Sample type -** whole blood
- **Precision -** within run precision is less than 5%. Total precision is less than 7.5%
- **Excellent correlation -** a correlation coefficient of r=0.98 was obtained with another commercially available method
- **Method -** enzymatic
- **Applications available -** for a wide variety of clinical chemistry analysers

DESCRIPTION	SIZE	CAT. NO.
Ransel (Glutathione Peroxidase)	8 x 6.5ml	RS504
Ransel (Glutathione Peroxidase)	8 x 10ml	RS505
Ransel Control	10 x 1ml	SC692
Ransel Diluent	10 x 200ml	RS2318

SUPEROXIDE DISMUTASE (RANSOD)

Superoxide Dismutase (SOD) catalyses the dismutation of superoxide into oxygen and hydrogen peroxide, consequently providing protection against superoxide which is one of the most common free radicals in the body. The enzyme acts by repairing and/or reducing the amount of damage done to cells. The fact that Superoxide Dismutase levels have been found to decrease with age, while the level of free radicals in the body has been found to increase, suggests this enzyme plays a major role in the ageing process. As such there is great interest in determining the potential of Superoxide Dismutase in anti-ageing treatments and cosmetics.

APPLICATIONS

Cosmetics

The measurement of antioxidant levels is important during the production process to confirm the presence of antioxidants and enable any necessary product improvements to be made. Also allows marketing claims to be made.

Sports

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

Clinical and Veterinary

Diagnosis of diseases can be associated with abnormal SOD levels e.g. neurological disorders such as Amyotrophic Lateral Sclerosis (ALS). SOD can also be used to treat various ailments including arthritis, burns and inflammatory diseases.

Pharma

Determination of the therapeutic efficacy and antioxidant potential of newly developed drugs.

High Performance Reagents

- **Lyophilised reagents -** for enhanced stability
- **Standard supplied with kit -** simplifying the ordering process
- **Linearity -** samples should be diluted to give an inhibition between 30% and 60% of the sample diluent rate
- **Sensitivity -** the minimum detectable concentration of SOD less than standards should be reported as <S1 standard value
- **Sample type -** whole blood
- **Precision -** within run precision is less than 5%. Between run precision is less than 7.1%
- **Excellent correlation -** a correlation coefficient of r=0.965 was obtained with another commercially available method
- **Method -** colorimetric
- **Applications available -** for a wide variety of clinical chemistry analysers

DESCRIPTION	SIZE	CAT. NO.
Ransod (Superoxide Dismutase)	5 x 20ml	SD125
Ransod Control	10 x 1ml	SD126
Ransod Diluent	6 x 100ml	SD124

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. 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.

APPLICATIONS

Sports

Assessment of nutrition.
(riboflavin status)

Clinical and Veterinary

Glutathione Reductase can be used to determine genetic deficiency states as well as hepatic and malignant diseases.

Research

Glutathione Reductase can be used as a research tool in the identification of diseases associated with free radicals and reduced antioxidant levels.

High Performance Reagents

- **Lyophilised reagents -** for enhanced stability
- **Excellent linearity -** 387U/l, removing the need for sample dilution
- **Excellent sensitivity -** 9.69 U/l detection limit
- **Suitable for use with a variety of sample types -** serum, plasma and erythrocytes
- **Precision -** within run precision is less than 5%. Total precision is less than 6.6%
- **Excellent correlation -** a correlation coefficient of r=0.988 was obtained with another commercially available method
- **Method -** UV
- **Applications available -** for a wide variety of clinical chemistry analysers

DESCRIPTION	SIZE	CAT. NO.
Glutathione Reductase	5 x 5ml	GR2368
Glutathione Reductase Control	10 x 5ml	GR2608
Glutathione Reductase Calibrator	10 x 5ml	GR2609

Additional Antioxidant products available from Randox

Albumin	Albumin is the most abundant protein in serum representing 55-65% of the total protein. Its main biological functions are to maintain the water balance in serum and plasma and to transport and store a wide variety of ligands e.g. fatty acids, calcium, bilirubin and hormones such as thyroxine. Recent evidence suggests albumin may exert antioxidant properties by functioning as a serum peroxidase in the presence of reduced glutathione. Low albumin levels (Hypoalbuminaemia) have been associated with liver disease, kidney disease, intestinal disease, cardiovascular disease and cancer. High albumin levels on the other hand have little diagnostic relevance, except perhaps in dehydration.
Bilirubin	Bilirubin is formed by the breakdown of haemoglobin in the spleen, liver and bone marrow. It can be conjugated with glucuronic acid or unconjugated (albumin bound). An increase in bilirubin concentration in the serum or tissue is called jaundice and can occur in toxic or infectious diseases of the liver. High levels of conjugated or direct bilirubin indicate that bile is not being properly excreted; therefore an obstruction may be present in the bile duct or gall bladder. High levels of unconjugated bilirubin indicate that too much haemoglobin is being destroyed or that the liver is not actively treating the haemoglobin it is receiving. Bilirubin can be referred to as a scavenging antioxidant and acts by removing harmful peroxyl radicals from the body.
Ferritin	Ferritin consists of a protein shell and contains varying amounts of iron in its core as ferric hydroxide - phosphate complexes. All complexes contain 2 separate subunits, the acidic H type and the weakly basic L type subunit. The basic isoferritins are present in the liver, spleen and bone marrow and are concerned mainly with the long-term storage of iron while the acidic isoferritins are found in the placenta, tumour tissues and myocardium. Ferritin contributes to the body's antioxidant defence by sequestering iron and preventing it from catalyzing the production of free radicals in the cell.
Transferrin	Plasma levels of transferrin are regulated by the availability of iron and increase when plasma levels of iron are low. Transferrin levels are also known to increase during pregnancy and are often associated with a range of conditions including anaemia, iron deficiency, inflammation, malignancy, liver disease, malnutrition and protein loss. Like Ferritin, Transferrin can be described as a preventative antioxidant and acts by binding iron in a redox inactive form. This process is extremely important as free iron is capable of stimulating the production of harmful free radicals.
Total Iron Binding Capacity (TIBC)	Total Iron Binding Capacity (TIBC) measures the blood's capacity to bind iron with transferrin and is therefore an indirect measurement of transferrin. As mentioned above, iron is capable of stimulating the production of harmful free radicals.
Uric Acid	Uric acid measurements are used in the diagnosis and treatment of numerous renal and metabolic disorders including renal failure, gout, leukemia and psoriasis. Uric acid is a potent antioxidant contributing to around half the antioxidant capacity of blood plasma. It is a scavenging antioxidant that acts by inactivating free radicals such as HO and HOCl.

For more information on the full Randox product range, please visit www.randox.com or contact your local representative.

To access instructions for use (IFU) and instrument specific applications (ISA) for a wide variety of instruments, visit **www.randox.com/powerline**

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Randox Laboratories Limited, 55 Diamond Road, Crumlin, County Antrim, BT29 4QY, United Kingdom
T +44 (0) 28 9442 2413 **F** +44 (0) 28 9445 2912 **E** marketing@randox.com **I** www.randox.com

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