Examination of antioxidant capacity parameters

Direct measurement is difficult due to the short half-life free radicals (VR). Substances caused by their action are determined.

Direct determinations

Determination of oxygen radicals

- pulsed radiolysis - radicals are generated by ionizing radiation
- electron spin resonance spectrometry (ESR) - identification according to spin changes
- chemiluminescence method

Determination of nitrogen radicals and its adducts

- nitric oxide - very difficult to determine
- methods such as oxygen
- most often indirect methods - nitrites, nitrates or substances modified by nitration - nitrosohemoglobin

Determination of radical generating substances

- xanthine oxidase - produces superoxide
- determination of transition metals - Fe, Cu (catalyses reactions where free radicals are formed)

Indirect measurements

- most often determination of lipoperoxidation products, adducts with DNA

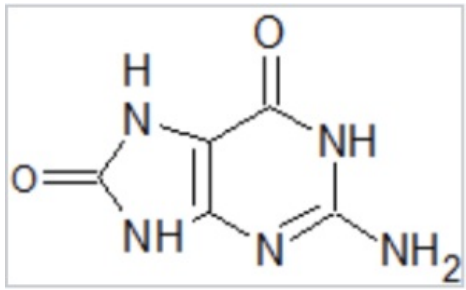
VR Damage Products

Damage to NK

- the most significant (irreversible) damage - hydroxyl radical
- main product - thymine glycol and 8-hydroxyguanine
- repair enzymes remove them from cells - we can determine them in the urine

Damage to proteins and AMK

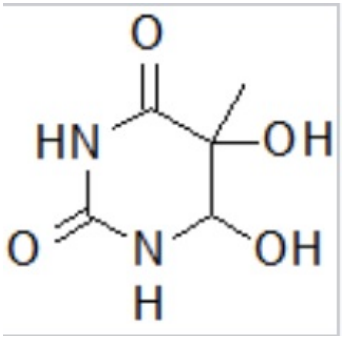
- many damage mechanisms, little used
- a sensitive method is for measuring carbonyl residues from lysine



8-hydroxyguanin

Lipoperoxidation

- in direct connection with the formation of free radicals
- most common - determination of malondialdehyde (MDA) - reaction with thiobarbiturate forms a color complex, non-specific, also reacts eg bilirubin, DNA
- also other aldehydes (eg 4-hydroxynonenal)
- conjugated dienes - characteristic UV absorption (234 nm)
- measurement of hydrocarbons in exhaled air
- isoprostanes - by peroxidation product ofarachidonic acid



Thyminglycol

Oxidized LDL

- contribution to atherosclerosis
- 2 methods

1. delayed phase change during stimulated peroxidation - examines the ability of LDL to cope with oxidative stress
2. determination of oxLDL - extraction, oxFFA is determined at 234 nm

Antioxidant protection of the organism

Total antioxidant capacity

- artificial formation of free radicals in biological material - we measure the ability to slow down or stop this reaction

- TRAP determination - ability of plasma after the addition of a generator - conversion to the Trolox capacity - 1 molecule of trolox has 2.0 units when using TRAP - disadvantage - end-point oxygen electrode
- more used ABTS - inhibition of ABTS radical cation

Antioxidant enzymes

- determination of SOD rather indirectly, determination of catalase - rarely

Antioxidant substrates

- vitamins A, E, C
- determination of thiols is irrelevant (they are on albumin, they have a long half-life)
- also others - ubiquinone Q, lipoate, flavonoids..., using high performance liquid chromatography (HPLC)

Links

Related Articles

- Basic reactive forms of oxygen and nitrogen

External links

- Tartrate-resistant acid phosphatase

Used literature

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Source

- ws: Vyšetření parametrů antioxidační kapacity