

FRAS 4 EVOLVO

the **Damage**
of **Oxidative Stress**
in **Sport**





STRENUOUS EXERCISE

POOR TRAINING

OVER-TRAINING

1ST GOAL: FIND THE PROBLEM

FREE RADICALS

✓ HOW THEY FORM

Every person introduces oxygen by breathing. 95% of it is used by the cells of our body to produce the energy needed by the organism, while the remaining 5% gives birth to **FREE RADICALS**.

✓ WHEN THEY BECOME DANGEROUS

When the body is under effort and under physical exercise it uses an amount of oxygen 12-20 times more than when at rest (source: Brooks GA, Fahey TD, Exercise Physiology - New York - John Wiley and sons 1984).

The higher consumption of oxygen is the cause of a **IPER-PRODUCTION** of free radicals which can cause **OXIDATIVE STRESS** and start cellular damage, which if ignored can compromise the natural **PLASMA ANTIOXIDANT BARRIER**.

✓ WHAT THEY PROVOKE

If the quantity of free radicals is higher than the physiological quantity, the antioxidant system is not able anymore to neutralize that excess. The damage starts at the cellular level with alterations of the membrane and of the inner-outer cellular exchanges and can even lead to a DNA modification. During physical activity the oxidation processes interest both the musculoskeletal fibers in active contraction and the extra-cellular matrix. The consequences of the oxidative damage have an impact not only on the muscle, but also on the connective tissues of the musculoskeletal system leading to articular or peri-articular phlogosis, tendinitis and bursitis. Furthermore, also the haematic cells are going to be damaged with a consequent reduction of the oxygen transportation capacity to the musculoskeletal system.

THE RISKS IN SPORT



PEOPLE AT RISK

Seeing the exponential risk increase with a higher oxygen consumption it is automatic to understand that the subjects most exposed to oxidative stress are (at the opposite poles) **ATHLETES AND LOW TRAINED PEOPLE**. Competitions and intense trainings, in both isometric and isotonic types of exercises, produce



a significant high concentration of free radicals, even more evident in subjects with little training or in over-training. **Higher is the value of free radicals and slower will be the recovery and harder will be the getting back to the same performances.** During physical activity the peroxidation processes interest both the **MUSCULOSKELETAL FIBERS** in active contraction and **THE EXTRACELLULAR MATRIX**. Therefore, the consequences of oxidative damage affect not only the muscle (predisposition towards traumatic, physiological and overuse lesions) but also the musculoskeletal system and the haematic cells eventually migrated or stravasated. Any of these elements may lead, directly or indirectly, **to reduction of the performances both in subjects used to practice normal fitness training and in professional athletes.**

The results of the available studies indicate that the level of free radicals increases as a consequence or physical exercise. **Anyone practicing sport activities should regularly undergo an evaluation of oxidative stress** with the goal of optimizing and personalizing their own training program and reach better performances without being at risk of free radical lesions. This goal is easily at reach by sport doctors and trainers thanks to the new system FRAS 4 Evolvo, allowing to determine in "real time" both free radicals and antioxidant defenses.



FINAL GOAL: THE SOLUTION OF THE PROBLEM

FRAS 4 Evolvo

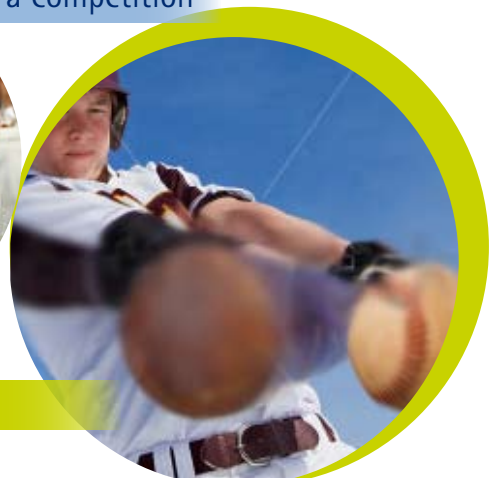


PREVENTION AND HEALTH FOR HIGH PERFORMANCES

Free radicals constitute an important risk factor. It is fundamental to keep their levels at normal values, or suffer the onset of cellular damages. In order to intervene it is indispensable to know the values of free radicals, but up to today their measurement was very difficult in the clinical practice.

This was until the arrival of FRAS 4 Evolvo which measures the level of oxidative stress in any place **IN FEW MINUTES AND AT LOW COSTS** using a drop of capillary blood taken from the finger tip.

KNOW • the level of oxidative stress after a competition

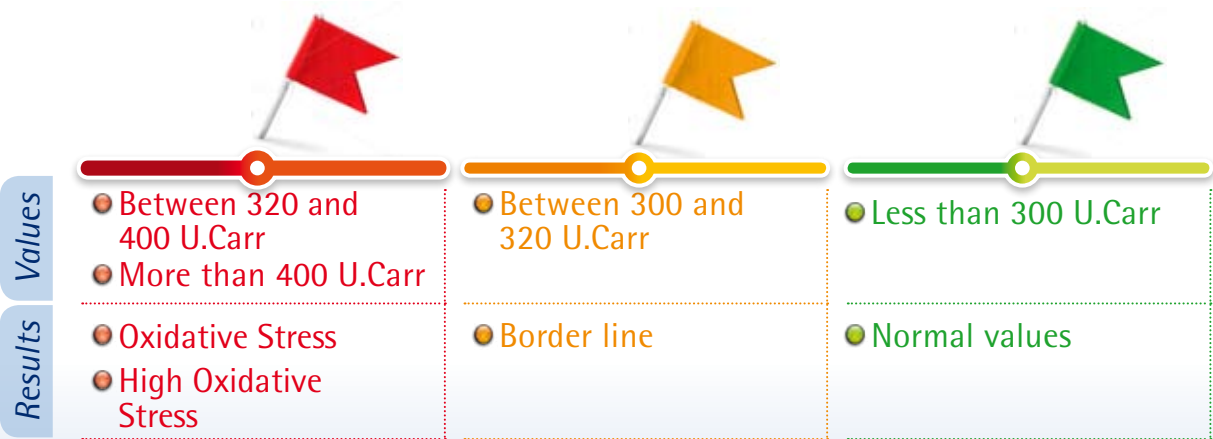


ADVICE • several dietary habits and eventually an antioxidant

MONITOR • the recovery after competition

REMARKABLE EXAMPLES OF FRAS 4 EVOLVO USERS

- ✓ *Italian cycling Tour (Giro d'Italia) 2011: verification of oxidative stress step after step*
- ✓ *Sidney Olympic Games: verification of oxidative stress in the Italian National Baseball team*
- ✓ *Serie A (football) in Italy*
- ✓ *Italian National Softball team*
- ✓ *Italian National Golf team*



VERIFY • the possibility of over training



ADAPT • the training



HIGHLIGHT • the psycho-physical well being of the athlete

USEFUL SUGGESTIONS



A moderate physical activity contributes in varying degrees to reduce morbidity and mortality related to vascular pathologies and to other various pathologies.

There is no doubt that strenuous, or however non-appropriate, exercise favors the onset of oxidative stress lesions at musculoskeletal system level and also at systemic level. Therefore everyone undergoing physical activity, and in particular the athletes, should periodically carry out an evaluation of the oxidative stress levels, with the goal of preventing pathologies and troubles connected to an excessive quantity of free radicals by means of a more "physiological" training regime, a more rational usage of their own antioxidant capacities and a proper use of antioxidant supplements.

THE UTILITY OF THE OXIDATIVE STRESS MEASUREMENT MAY BE SUMMERIZED IN 5 POINTS:

- ✓ *It highlights in basal conditions the level of psycho-physical wellbeing of the athlete*
- ✓ *It highlights the level of oxidative stress after the competition and it allows to monitor the recovery after the physical effort*
- ✓ *It allows to verify if the work loads are appropriate, if the athlete is in overtraining and it allows the optimizing of the training*
- ✓ *It allows to advise, in case of oxidative stress, several dietary habits and eventually an antioxidant therapy*
- ✓ *It allows to monitor the efficacy of antioxidant therapies*



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