

## **Serum Oxidizability Potential of Ischemic Heart Disease Patients Predicts Exercise Test Results and Disease Severity**

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**Aim**-To find out whether serum oxidizability potential correlates with exercise test parameters and predicts its results in chronic ischemic heart disease (IHD) patients.

**Background** – Oxidative stress leading to modification of low-density lipoprotein is a central paradigm of atherogenesis and plaque destabilization. The thermochemoluminescence (TCL) assay measurement is based on heat induced oxidation of any biological fluid and provides a kinetic curve pattern and a ratio which reflects residual oxidative capacity due to prior in vivo molecular oxidation (i.e. lower curve slope, lower oxidative potential, indicating higher oxidative activity before test)

**Methods** – 54 chronic IHD patients underwent a symptom limited exercise test (EXT) upon initiation of a cardiac rehabilitation program; prior to the EXT a venous blood sample was drawn for TCL assay. This assay is based on heat-induced oxidation of biological fluids which leads to the formation electronically excited species in the form of unstable carbonyls, which further decompose into stable carbonyls and light energy (low chemiluminescence). Photons emission is measured for 300 sec and the obtained curve is described mathematically as the amplitude of the kinetic curve and its slope (= ratio). TCL ratio correlations with exercise duration (ED), metabolic equivalents (METS), maximal heart rate (maxHR), maximal systolic BP (MBP), >1mm S-T depression, Diabetes, Hypertension, Smoking, LV ejection fraction (LVEF) > or < 40%, previous infarction, and coronary by pass surgery were assessed and compared to the TCL ratio of 11 normal controls.

**Results** – High TCL ratio (%) correlated well with METS,  $r = 0.84$ , with maxHR,  $r = 0.79$ , and with exercise induced S-T segment shift,  $r = 0.87$ .

A lower serum oxidizability potential expressed as low TCL ratio, thus, a previous high oxidative stress, was found in IHD patients compared to normal controls, and in patients with low LVEF% in particular. The TCL ratio (%) among IHD patients was  $193 \pm 21$  compared to  $215 \pm 13$  in control group,  $p < 0.05$ , in patients with  $< 40\%$  LVEF =  $188 \pm 14.7$  vs  $200 \pm 11.9$  in patients with  $> 40\%$  LVEF,  $p < 0.01$ . A trend for lower TCL ratio (%) was found in diabetic, hypertensive, and post- CABG patients. A paradoxically low TCL ratio (low oxidizability potential) observed in patients without S-T depression compared to patients with S-T depression ( $189 \pm 22$  vs  $201 \pm 15$ ,  $p = ns$ ) is due to the fact these patients had a much lower exercise capacity as well as a much lower LVEF%.

### **Conclusions:**

Serum oxidizability potential is associated with exercise test parameters, results, and CAD severity.

TCL ratio an "easy to measure marker" might be incorporated into risk assessment and prediction in chronic ischemic heart disease patients.