

# Abstract

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## **Selenium supplementation improves antioxidant capacity in vitro and in vivo in patients with coronary artery disease The SElenium Therapy in Coronary Artery disease Patients (SETCAP) Study.**

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**BACKGROUND:** Selenium is a central determinant of antioxidative glutathione peroxidase 1 (GPx-1) expression and activity. The relevance of selenium supplementation on GPx-1 in coronary artery disease (CAD) needs to be established. We assessed the effect of selenium supplementation on GPx-1 in cell culture and on endothelial function in a prospective clinical trial.

**METHODS:** Human coronary artery endothelial cells were incubated with 5.78 to 578 nmol/L sodium selenite, Se-methyl-selenocysteine hydrochloride, or seleno-L-methionine. Glutathione peroxidase 1 mRNA and protein expression and activity were measured. Coronary artery disease patients (n = 465) with impaired endothelial function (flow-mediated dilation [FMD] <8%) were randomly assigned to receive 200 or 500 microg sodium selenite daily or matching placebo during a 12-week period. We tested the effect on red blood cell GPx-1 activity and brachial artery FMD. Furthermore, differences in biomarkers of oxidative stress and inflammation were measured.

**RESULTS:** Sodium selenite and Se-methyl-selenocysteine hydrochloride increased GPx-1 protein and activity in a dose-dependent manner ( $P < .0001$ ). The intention-to-treat groups comprised 433 CAD patients. Glutathione peroxidase 1 activity increased from 37.0 U/gHb (31.3-41.7) to 41.1 U/gHb (35.2-48.4) ( $P < .0001$ ) in the 200 microg and from 38.1 U/gHb (33.2-43.8) to 42.6 U/gHb (35.0-49.1) ( $P < .0001$ ) in the 500 microg sodium selenite group treated for 12-weeks. No relevant changes were observed for FMD or biomarkers of oxidative stress and inflammation.

**CONCLUSIONS:** Sodium selenite supplementation increases GPx-1 activity in endothelial cells and in CAD patients. Future studies have to demonstrate whether long-term CAD outcome can be improved.

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