Ozone in Complementary Medicine

Possible Mechanism of Ozone in Rheumatic and Inflammatory Diseases

Mechanism of Action in Rheumatic Pain Syndroms

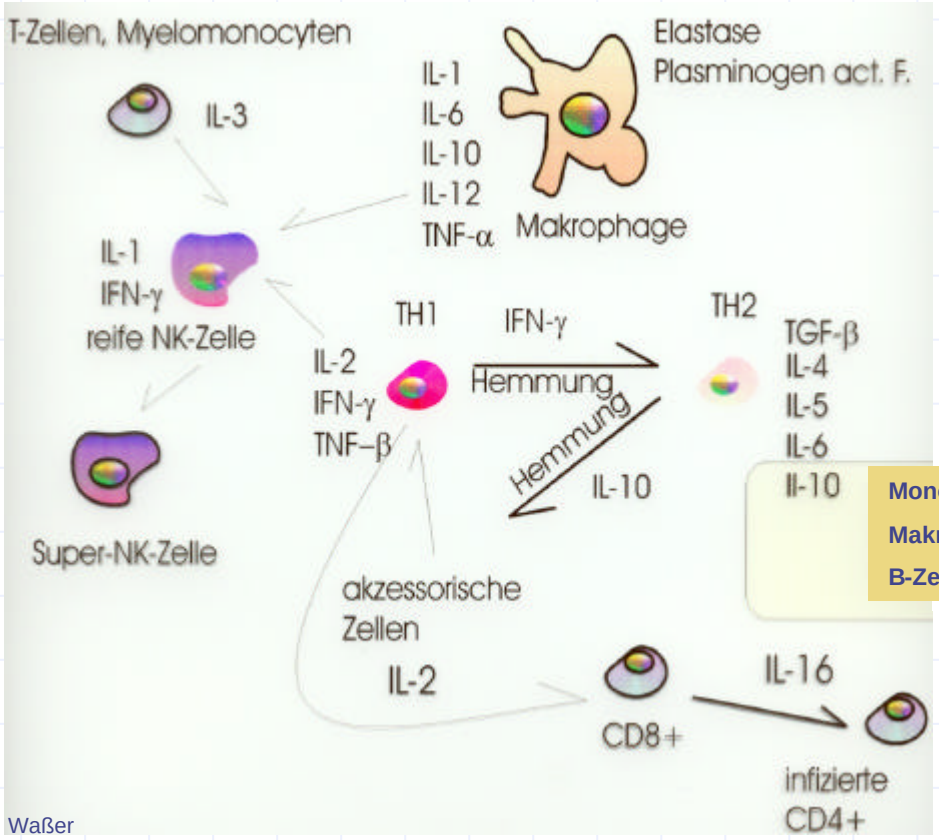
- Acute stage:

  Activation of cell metabolism, ATP-increase: rapid subsidence of edema

- Chronic inflammatory processes:

- Immunomodulation, endogenous cytokin therapy on physiological release of eg IFN-ß and TGF-ß,
- Activation of biological antioxidants and radical scavengers

Immunocompetent cells



- **Activated immunocompetent cells release their specific cytokines**
- **e.g. TH_1-cells: IL-2 and IFN-y**
- **TH_2-cells: IL- 4 and IL-10 as antagonists of**

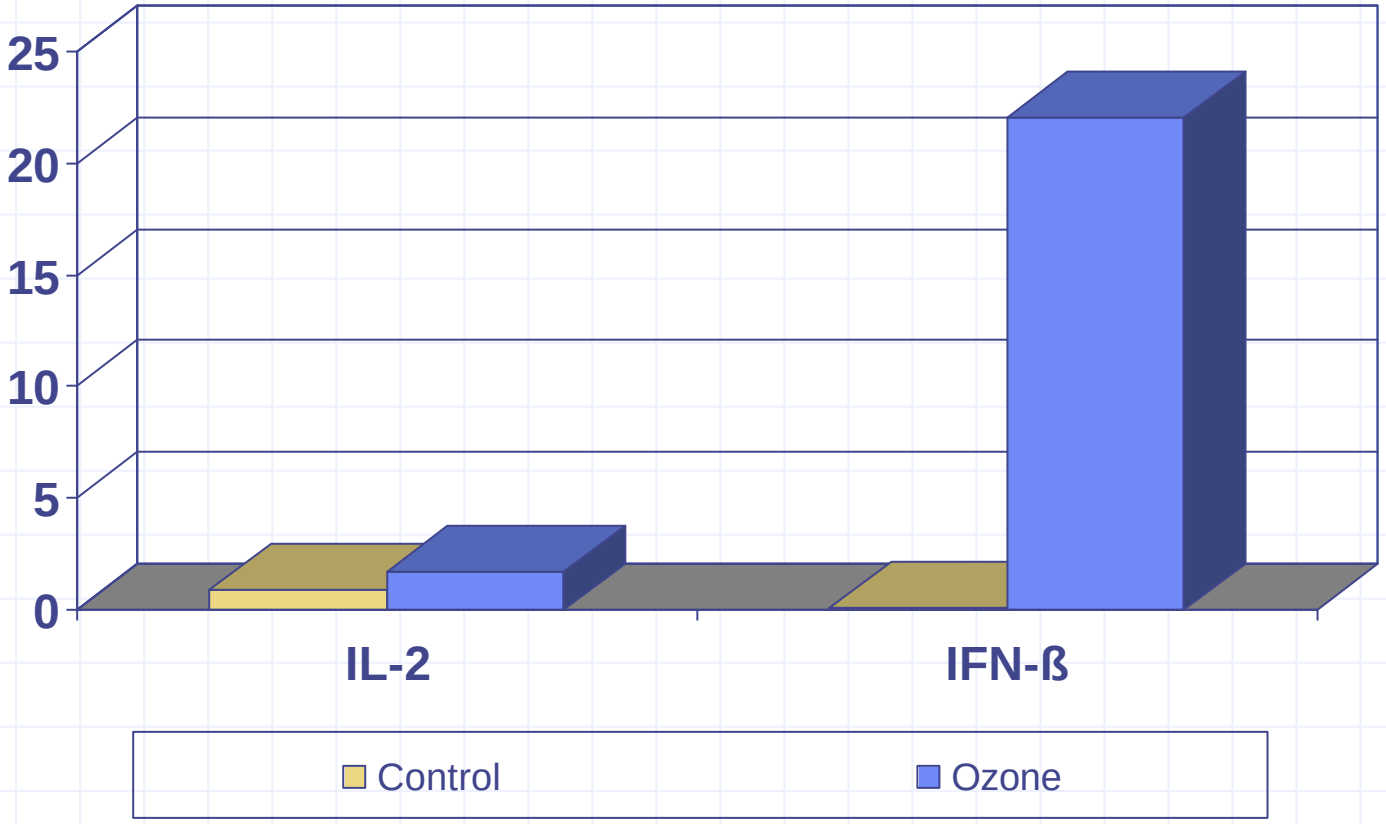
Monocyten
Makrophagen
B-Zellen

IL-2 and IFN-y

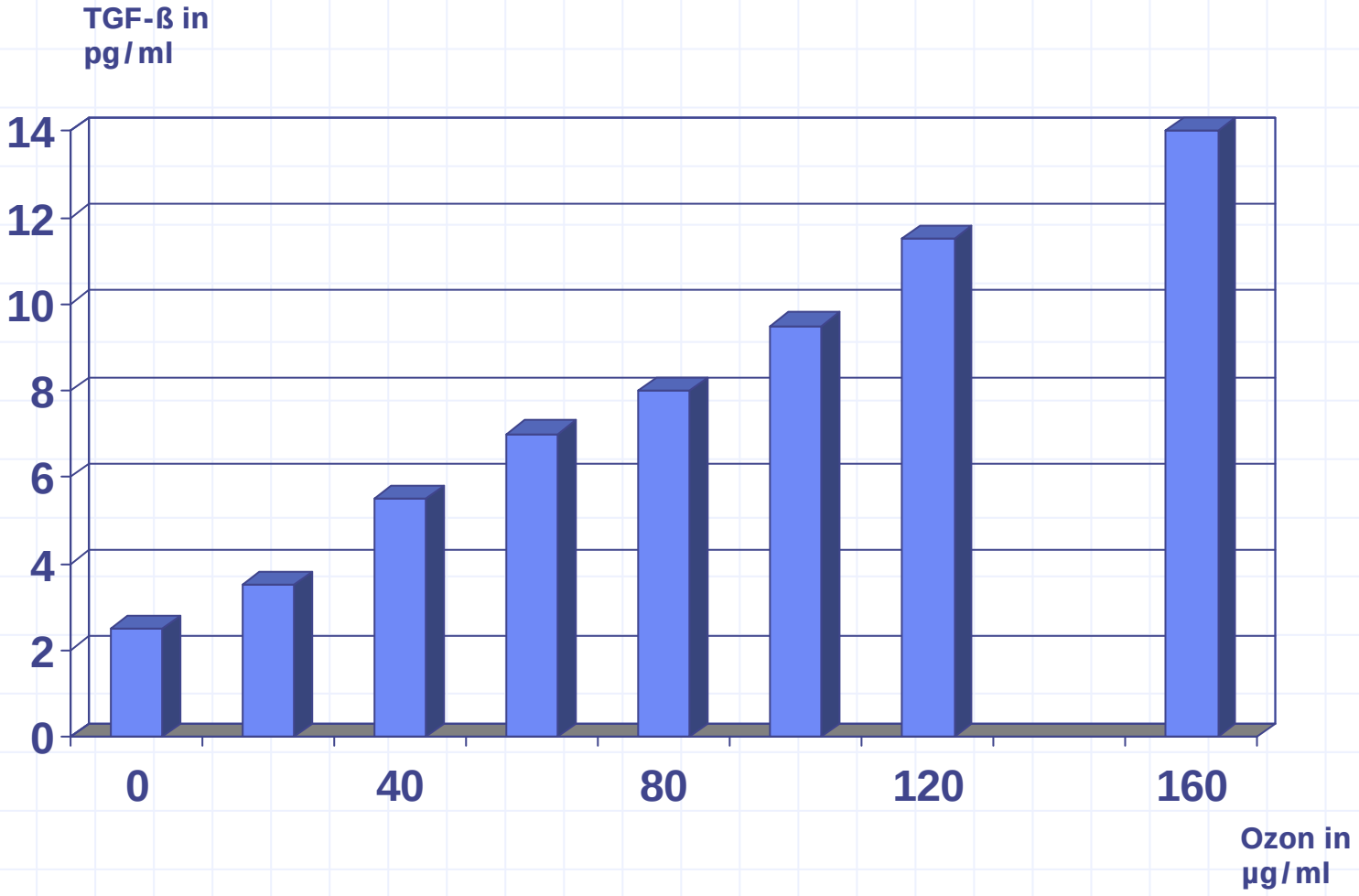
The activation by ozone thus means an IMMUNMODULATION

Induction of IFN-ß (in iu/ml at 42µg/ml O_3)

as antagonist and suppressor of the TH_1cell function



Induction of TGF-ß in full blood
under Ozone application



Transforming Growth Factor TGF-ß

- Concentration dependent increase under Ozone
- released from macrophages and platelets at the site of damage/inflammation,
- produced from cartilage cells, autoinduction

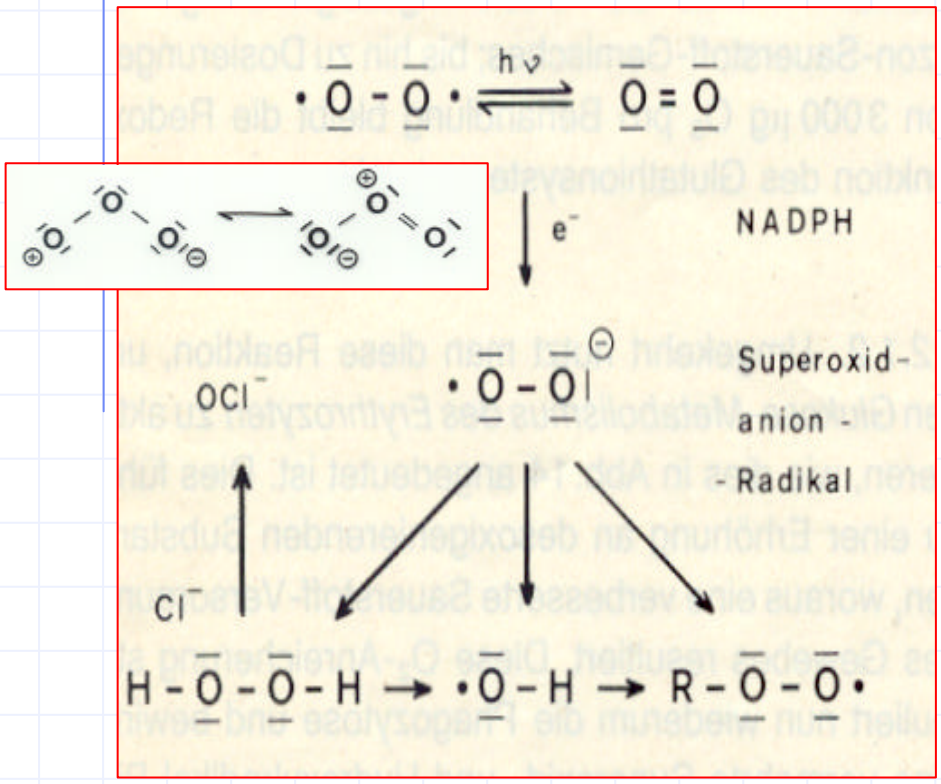
TGF-ß is Responsible for Improved Wound Healing

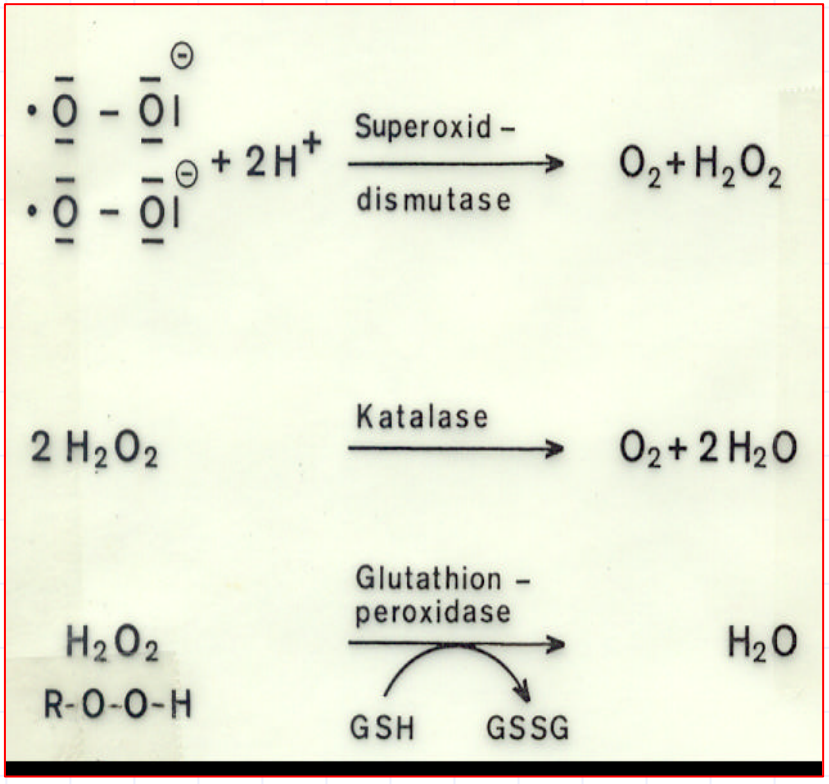
- TGF-ß stimulates the production of matrix proteins such as collagen,proteoglycans and hyaluronic acid
- modulates the ratio protease/protease-inhibitors
- activates the surface integrines
- improves the cell/matrix interaction and the arrangement of matrix molecules
- has an inherent self-induction through the activation of different cells eg cartilage cells

Ozone Activates the Biological Antioxidants and Radical Scavengers

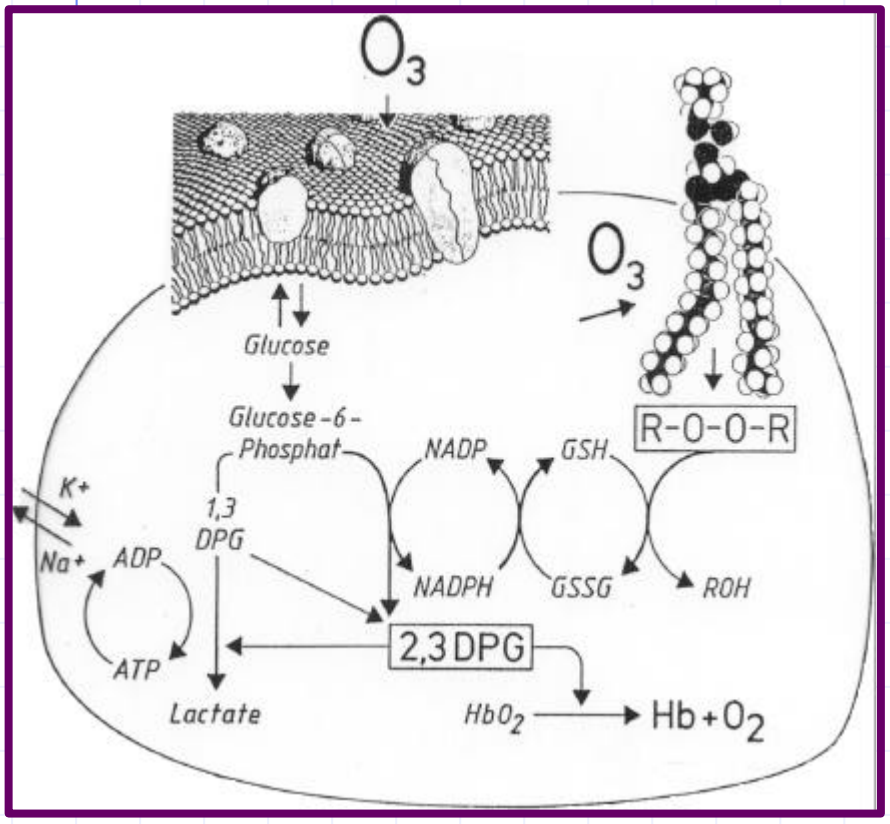
- and improves the antioxidative capacity of the biological system
- by increase and activation of superoxidedismutase SOD, catalase, gutathionperoxidase and –reductase or glucse-6-phosphate dehydrogenase
- removing superoxide radicals and OH-radicals, which are responsible as inflammation mediators for the degenerative sequels occurring eg in the cartilage

Reactive Oxygen Spezies ROS in the biological System

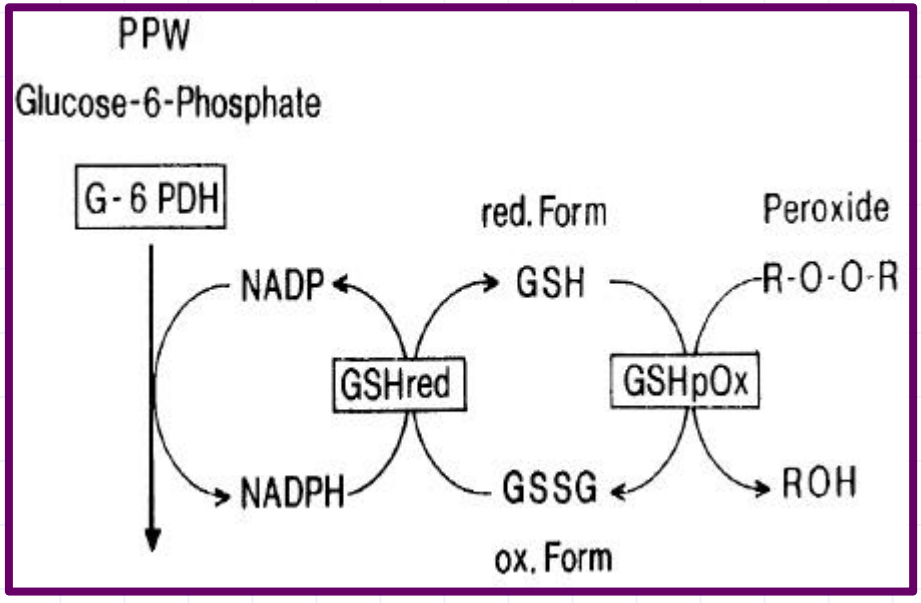




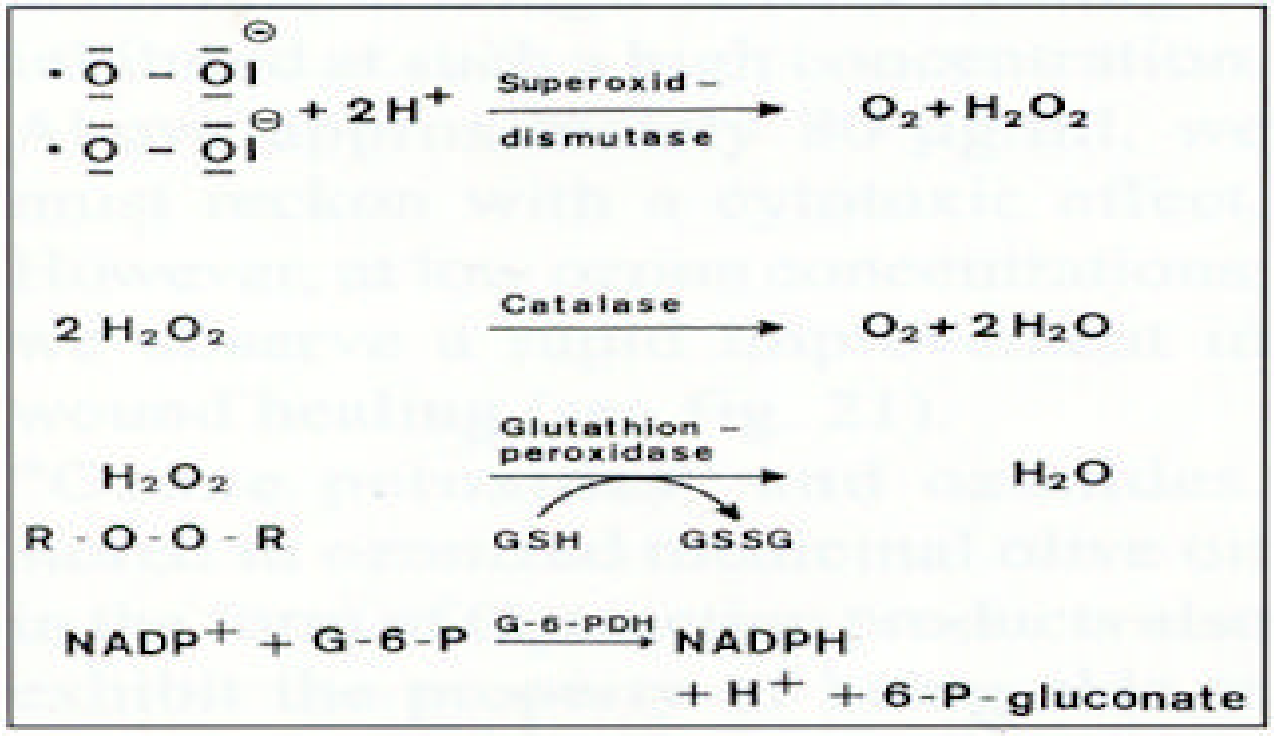
3.1 Upregulation of the biological antioxidans system



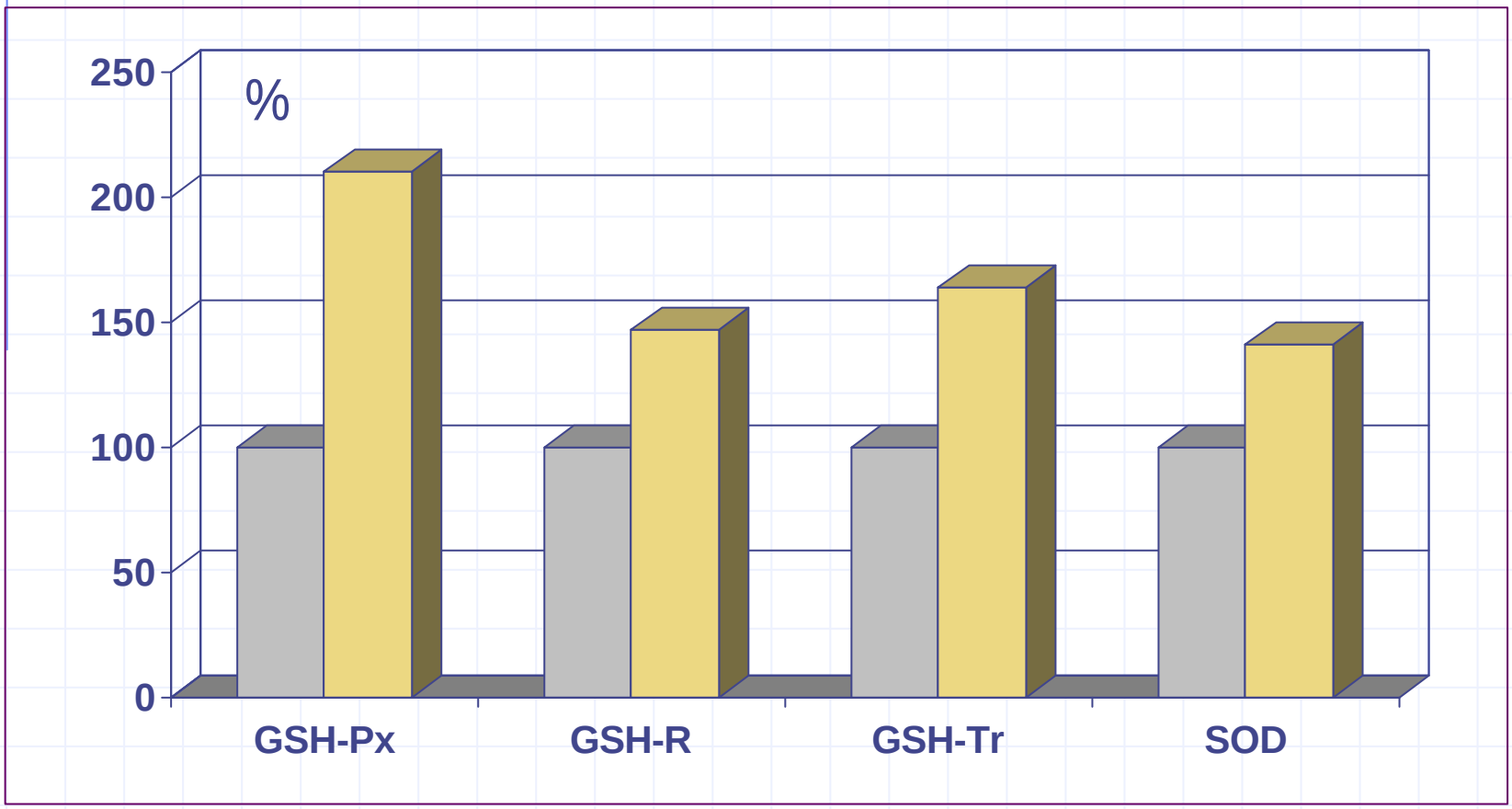
Pentose-Phospatepathway:
production of antioxidative enzymes to protect the cell from oxidative dysstress



Enzymatic antioxydants in the biological system and their functions



3.1 Upregulation of the biological antioxidans system (Bocci 2004)

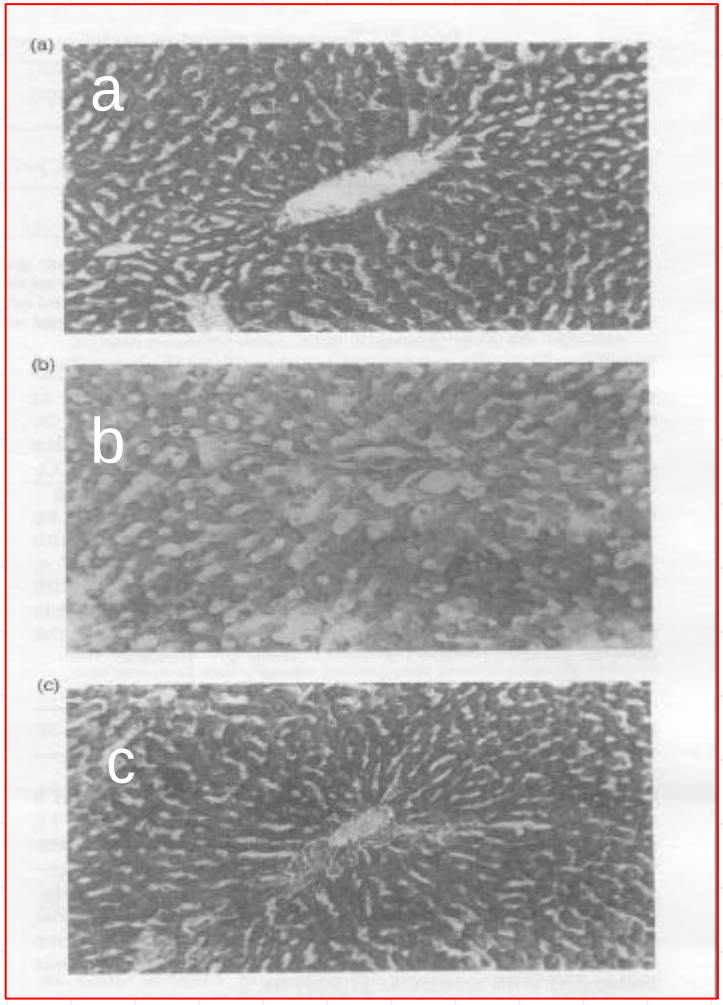


Mechanism of Action 3
Enzymatic Antioxydants and Radical Scavengers

- -such as SOD, GSH-peroxidase and GSH - reductase ...-
- are induced and activated by Ozone-formed peroxides,
- thus increasing the organism`s antioxydative capacity.

OZONE and Prevention (León et al. 2002)

Histological results correspond completely to biochemical measurements



Rectal Ozone Insufflation in an animal model. Glycogen Depletion in Liver Cells.

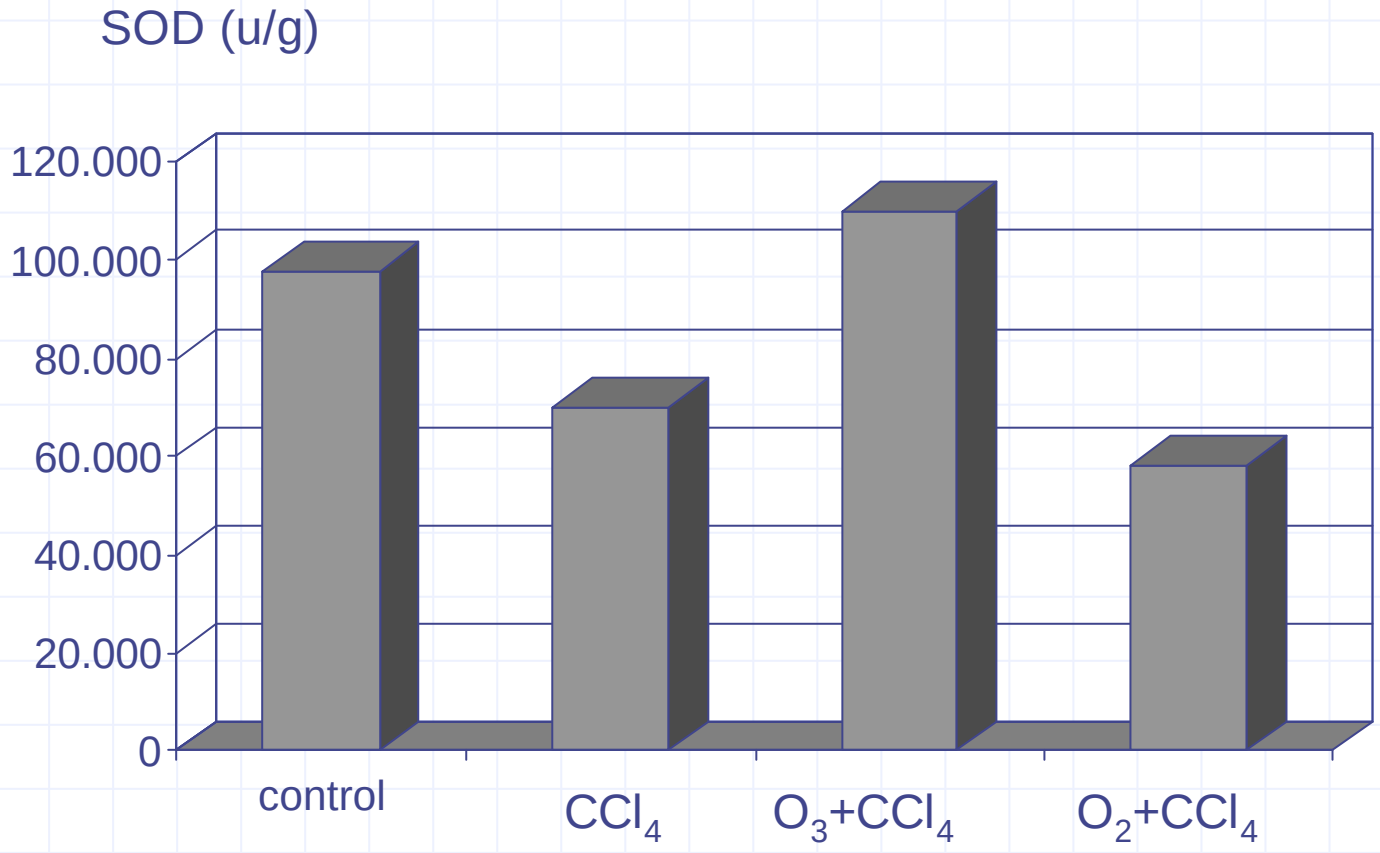
a) Control

b) CCl_4-induced Glycogen-Depletion

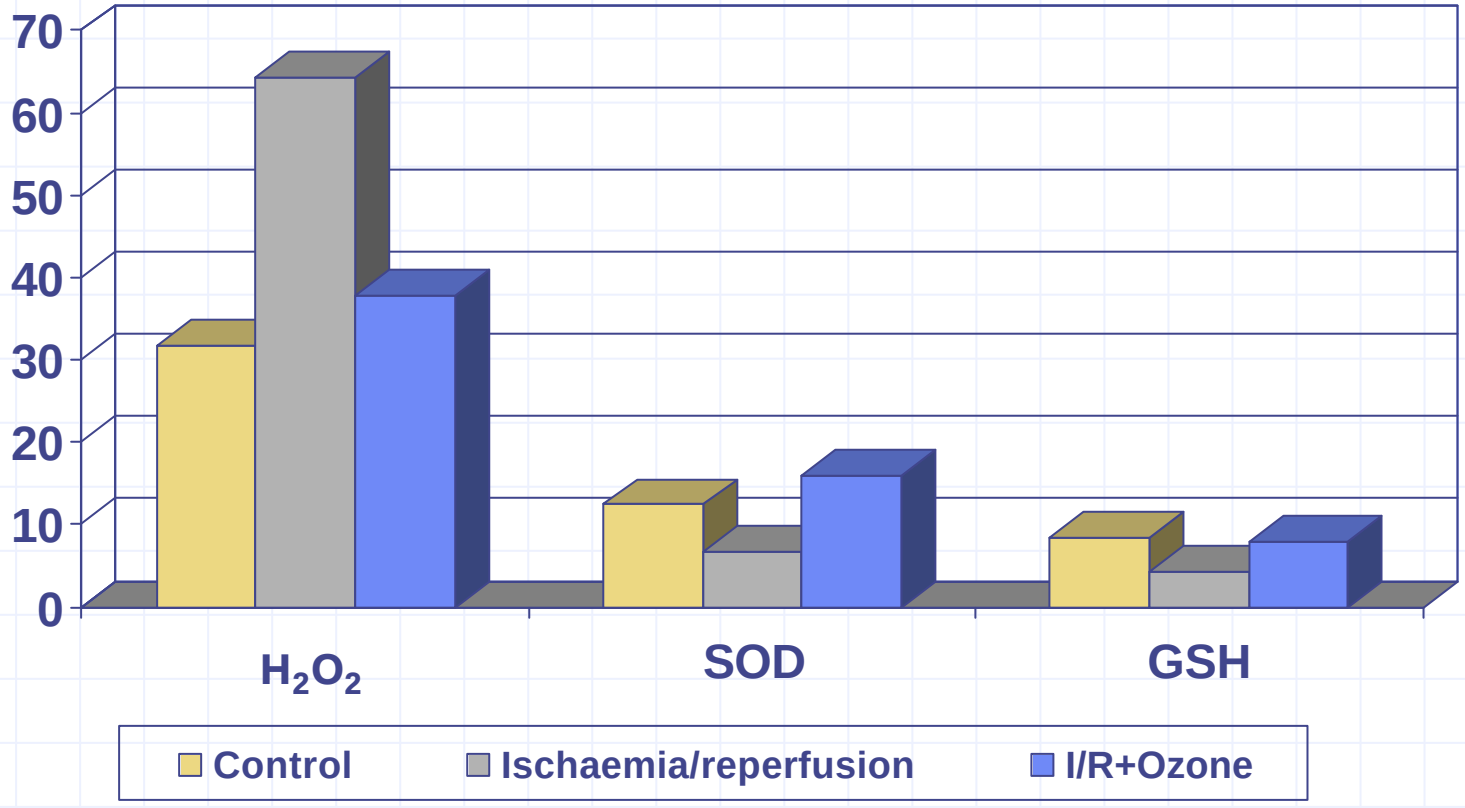
c) 15 preventive Ozone Application

Protection Against Hepatic Cellular Damage induced by Carbontetrachloride in an Animal Model

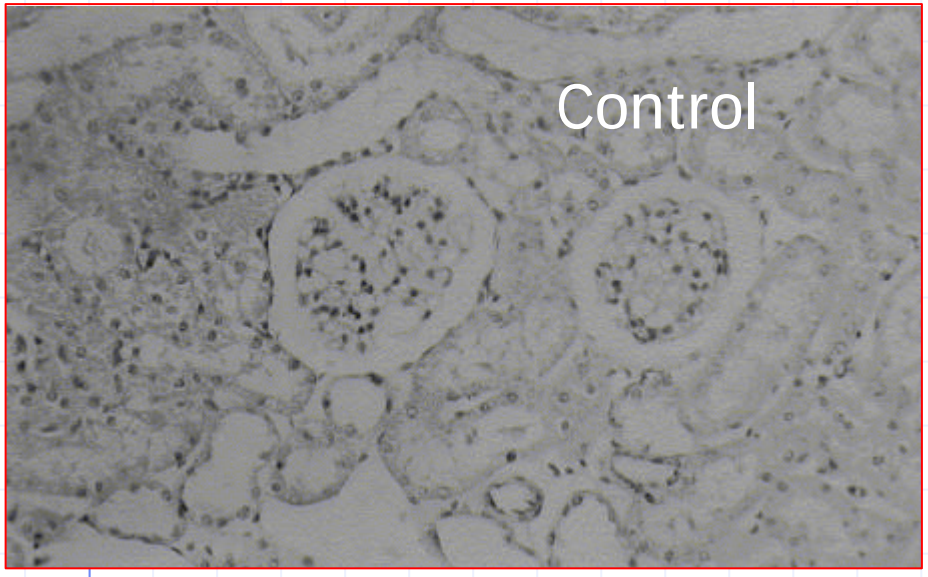
through 10 rectal Insufflations before CCl_4 –Application. (León et al. 1998)

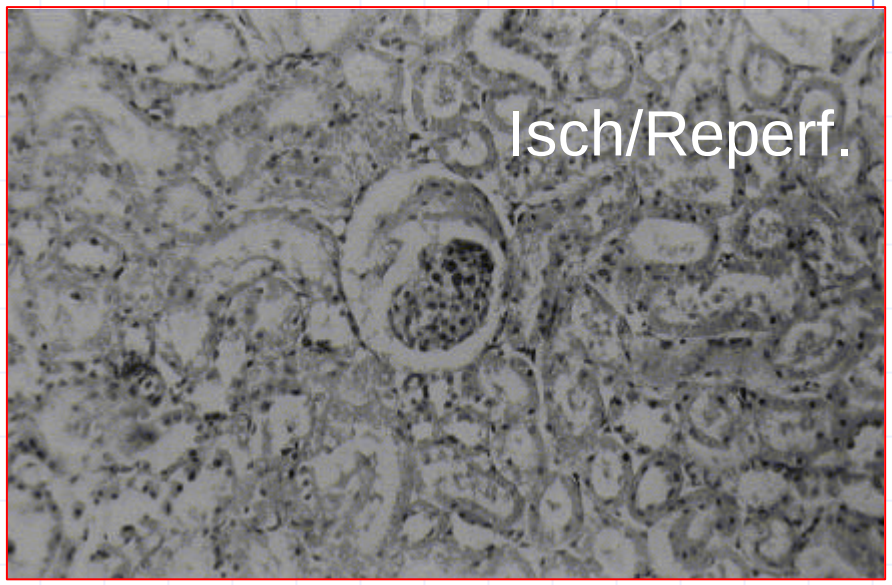


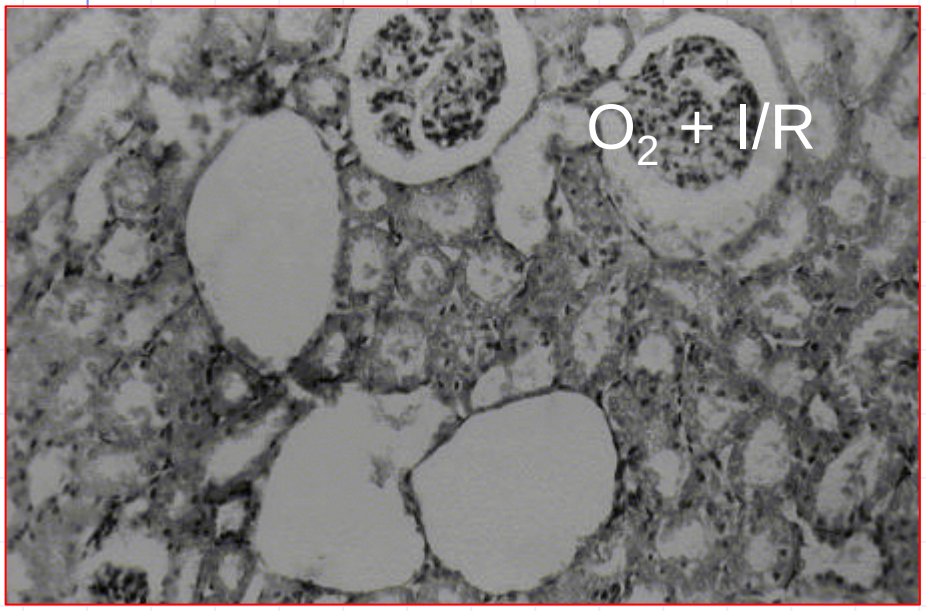
Hepatic Ischemia-Reperfusion and Ozone pretreatment

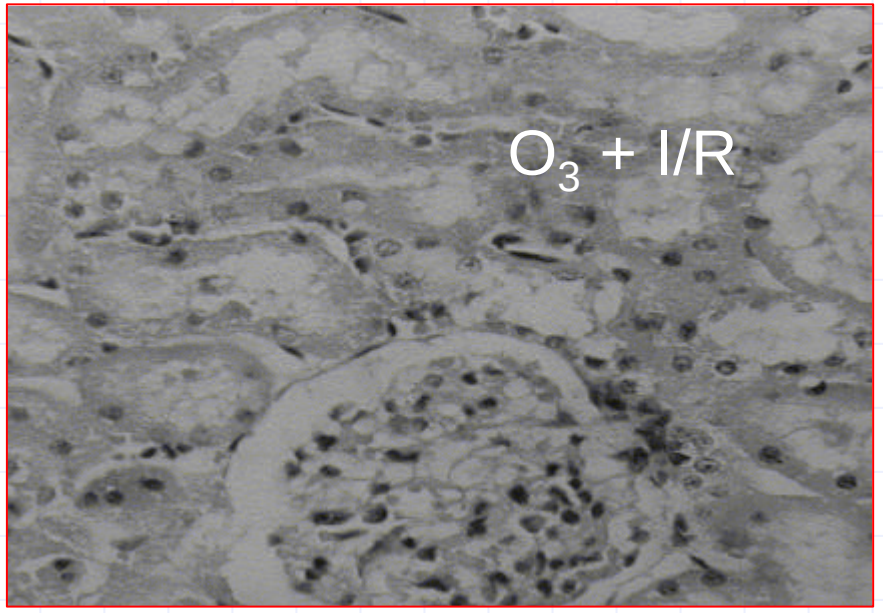


Reperfusion Damage in Renal Cells (Calunga et al.2001)

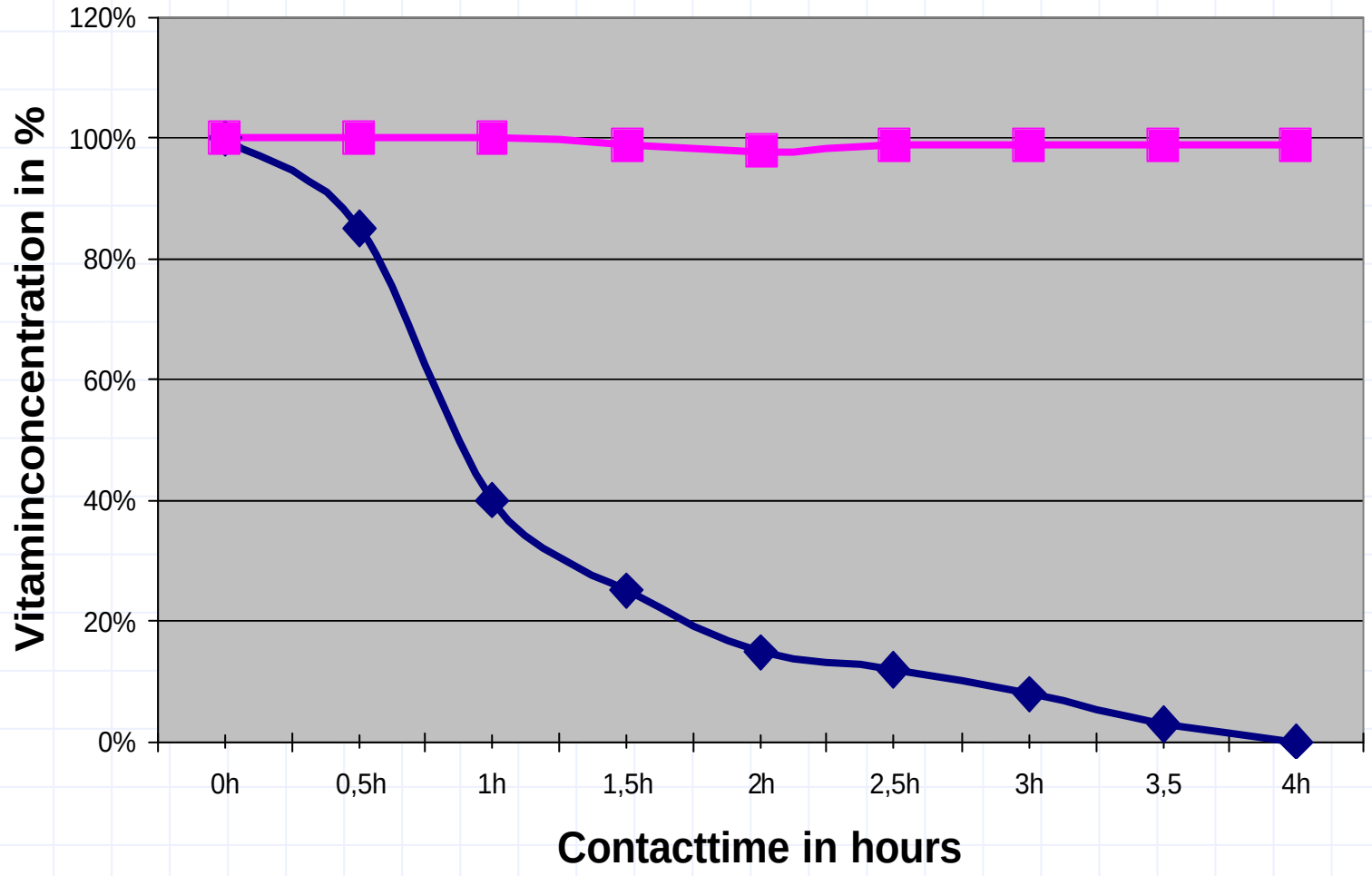








Ozone effect on the antioxidants Vitamin E and Vitamin C



Mechanism of Action in Rheumatic Pain Syndroms

- Acute stage:

  Activation of cell metabolism, ATP-increase: rapid subsidence of edema

- Chronic inflammatory processes:

- Immunomodulation, endogenous cytokin therapy on physiological release of eg IFN-ß and TGF-ß,
- Activation of biological antioxidants and radical scavengers


Thank you
for your attention