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SURGICAL TRAUMA INDUCES ELEVATED H₂O₂- AND LPO-LEVELS, DETECTABLE IN BLOODPLASMA AND PERITONEAL LAVAGE FLUID IN RATS

Polymorphonuclear cells play an important role in the healing process after damage of the peritoneum. Indirect evidence shows that ROS produced by PMN are a sequela of the inflammatory reaction caused by surgical trauma. Besides beneficial effects, the oxidative potential can result in additional tissue destruction. The amount of peritoneal damage is correlated to post-operative adhesion formation as well as to local tumor recurrence, and various studies have shown that administrating ROS scavengers leads to less adhesion-formation and tumor-recurrence. Surprisingly, the actual levels of the various ROS in vivo have never been reported.

According to our previously optimised adhesion-model, 7 animals (female Wag/Rij rats) were operated. In brief: a laparotomy was performed using a midline incision of 5 cm. A small oval was then excised on both lateral sides of the parietal peritoneum, simulating surgical trauma, after which the abdomen was closed in two layers. After 5, 24 and 48 hours, and in a second experiment after 5, 12 and 24 hours, peritoneal lavage was performed and blood samples were obtained. Samples of 3 non-operated animals were used as baseline values. After adding Butylated HydroxyToluene to all samples they were analysed spectrophotometrically.

Baseline-values of H₂O₂ in non-operated animals in lavage fluid and plasma were 1.265 ± 0.093 nmol/l and 1.875 ± 0.370 nmol/l respectively; baseline-values of LPO in lavage fluid and plasma were 2.799 ± 3.316 nmol/l and 1.362 ± 2.942 nmol/l, respectively. Five hours postoperatively the level of H₂O₂ rose to a maximum of 6.672 nmol/l and 7.391 nmol/l, in lavage fluid and plasma respectively. Animals which received scavengers showed decreased levels compared to baseline. The levels of LPO showed no change after 5 hours. The levels of LPO showed no change after 5 hours; After 24 hours all levels had returned to baseline value.

This experiment shows that it is possible to measure levels of ROS in plasma and lavage fluid. After surgical trauma these levels increase and this increase is avoidable by administration of ROS-scavengers.