Sequential Variations of Renal Function Parameters and Oxidative Status after Surgical Ablation of 5/6 of Renal Mass in Wistar Rats

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Introduction: In rats with subtotal nephrectomy occurs progressive changes on renal function, oxidative damage to lipids and proteins and antioxidant defenses.

Objective: to evaluate the progressive changes on renal function, oxidative damage to lipids and proteins and antioxidant defenses in renal tissue after subtotal nephrectomy in rats.

Methods: The surgical ablation of 5/6 of the renal mass was performed by tying two branches of the left renal artery and removing the right kidney to 30 Wistar rats which were divided into three study groups and followed over a period of two, four, and six weeks. The remaining group of 10 rats was used as control. Functional remainder state of the renal mass was evaluated by measurement of the Glomerular Filtration Rate (GFR) and effective Renal Plasmatic Flow (RPF) through renal plasmatic clearance methods. Weekly measurements of plasma creatinine and excretion of proteins, sodium, and potassium and urine osmolality were performed. Oxidative status was assessed based on four markers in renal tissue homogenate. Malonildialdehyde (MDA) and Advanced oxidation protein products (AOPP) were determined to assess oxidative damage to lipids and proteins respectively and measurement of reduced glutathione (GSH) and superoxide dismutase activity (SOD) were used as indicators of antioxidant defense. One way ANOVA was conducted to analyze the sequential changes of the study variables and lineal correlation was used to analyze correlations between progressive functional changes and oxidative markers; considering a *P* value lower than 0.05 significant. The research was conducted in conformance with the Ethical Principles for the use of animals in research with approval by the Ethical Research Committee of the Institution.

Results: Significant reduction of GFR was found two weeks after nephrectomy and continue reducing together with RPF up to week 6; when FF was also significantly low compared to control group. Plasma creatinine increased over threefold by week four in the experimental groups while significant increase of proteins excretion was noted by week two to continue rising slightly up to week six. Sequential changes on sodium and potassium excretion were observed. Lipid peroxidation significantly increased at 4th week and continues this trend throughout the time. Oxidized proteins were higher over the nephrectomized rats and significant change of AOPP was found by week two. SOD activity diminished initially, followed by a super induction at 6th week and GSH levels started to decrease markedly at 4th week after nephrectomy.

Conclusions: the sequential increase of lipids and proteins oxidation together with the variations of antioxidant defenses on renal tissue suggest that oxidative stress increases in the remainder kidney as the renal function is progressively reducing.

Key words: renal tissue, oxidative stress, renal function