

LEVELS OF SELECTED BIOCHEMICAL PARAMETERS IN HOMOGENATES OF ISOLATED PIG KIDNEYS FLUSHED WITH PRESERVATIVE SOLUTION SUPPLEMENTED WITH SELENIUM AND PROLACTIN

Aneta Ostróżka-Cieślik¹, Barbara Dolińska^{1,2} and Florian Ryszka^{2†}¹Department of Pharmaceutical Technology, Faculty of Pharmaceutical Sciences in Sosnowiec, Medical University of Silesia, Kasztanowa 3, 41-200 Sosnowiec, Poland²“Biochefa” Pharmaceutical Research and Production Plant, Kasztanowa 3, 41-200 Sosnowiec, Poland

†In the memory of Professor Florian Ryszka

1. Introduction

Selenium in the human body exhibits strong antioxidant and immunomodulatory properties. This bio-element is found in the active centers of antioxidant enzymes, which participate in the elimination of damage caused by free oxygen radicals. It enters into the composition of some proteins that build cell membranes, performing stabilizing functions. Its involvement in catalyzing redox reactions helps reduce oxidative stress and potentially minimize ischemia-reperfusion damage in the kidney during ischemia.

The aim of this study was to determine whether supplementation of preservative fluid with selenium in the presence of antioxidant prolactin affects the levels of selected biochemical indices in homogenates of isolated porcine kidneys. The work is part of a series of our team studies to develop the optimal fluid composition for organ perfusion and preservation [1,2].

2. Materials and Methods

Biolasol preservation fluid was modified by adding Se⁴⁺ (1 µg/L) and prolactin (0.1 µg/L). The study was conducted on 30 isolated kidneys of Polish Large White pigs. The kidneys were randomly divided into 3 groups (n=10 in each) and washed with preservative fluids: Biolasol - control kidneys (C), Biolasol+Se (A1), Biolasol+Se+PRL (A2). After 48h of preservation and perfusion, kidney sections were excised. Selected biochemical markers were determined in the tissue homogenates: protein and creatinine concentration. The study was performed in accordance with the recommendations of the II Local Ethics Commission for Animal Experiments in Cracow, Poland (number 1046/2013) and in accordance with the European Union Directive (EU guideline 93/119/EC).

3. Results and Discussion

Supplementation of Biolasol solution with selenium and prolactin caused a statistically significant reduction in protein and creatinine levels compared to the control group in homogenates of isolated pig kidneys. Protein concentrations were: 2.5±0.1 mg/g (group C) vs 0.9±0.2 mg/g (group A2) (P<0.05); creatinine concentrations were: 2.5±0.1 mg/g (group C) vs 1.9±0.2 mg/g (group A2) (P<0.05). In contrast, the use of selenium alone (without PRL shielding) resulted in a statistical increase in marker concentrations. Protein concentrations were 20% higher compared to Biolasol (P<0.05); creatinine concentrations were 16% higher compared to Biolasol (P<0.05). Presumably, there was an accumulation of selenium in the organ, exacerbating the resulting damage.

5. Conclusion

Selenium and prolactin added to Biolasol fluid show protective effects on nephrons. Selenium (IV) as a component of Biolasol solution adversely affects renal protection during ischemia.

6. Acknowledgements

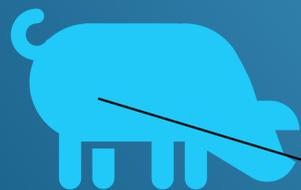
The research was financed by the Medical University of Silesia in Katowice (grant No. PCN-1- 043/N/1/F).

7. References

- Ostróżka-Cieślik, A.; Dolińska, B.; Ryszka, F. Therapeutic Potential of Selenium as a Component of Preservation Solutions for Kidney Transplantation. *Molecules* 2020, 25, 3592. <https://doi.org/10.3390/molecules25163592>
- Ostróżka-Cieślik, A.; Dolińska, B.; Ryszka, F. Biochemical Studies in Perfused and Homogenates of Isolated Porcine Kidneys after Flushing with Zinc or Zinc–Prolactin Modified Preservation Solution Using a Static Cold Storage Technique. *Molecules* 2021, 26, 3465. <https://doi.org/10.3390/molecules26113465>

Table 1: Composition of preservation solutions.

Component	Biolasol
Electrolytes (mmol/l)	
Potassium	10
Sodium	105
Calcium	0.5
Magnesium	5
Chloride	10.5
Colloids (g/L)	
Dextran 70	0.7
Buffers (mmol/l)	
NaHCO ₃	5
Impermeants (mmol/l)	
Citrate	30
Glucose	167
Additives (mmol/l)	
EDTA	5
Fumarate	5
pH	7.4
Viscosity	Low
Osmolality mOsm/kg H ₂ O	330



4. Figures

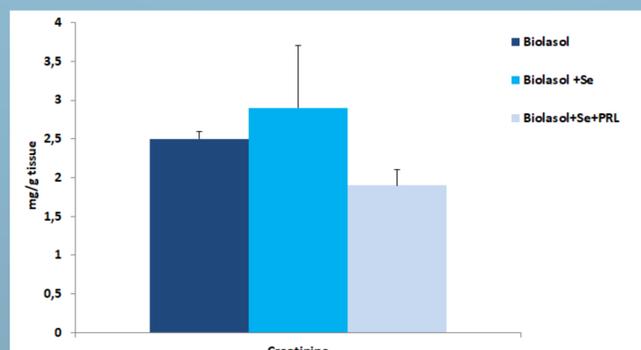
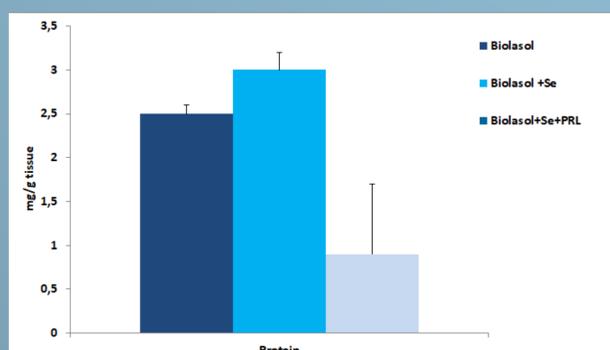


Figure 1. Protein and creatinine concentrations in the kidney homogenates in model of storing isolated porcine kidneys.