


Abstract

Effect of Preservative Solution Modified by the Addition of Magnesium and Manganese on the Nephron Functions of Isolated Perfused Porcine Kidneys [†]

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Abstract: We present another paper in a series of studies on the effectiveness of preservation solutions modified with bio-elements in protecting ischemic organs for transplantation. Bio-elements as components of organ perfusion and preservation solutions can potentially increase the efficiency of graft preservation. Macro- and micronutrients are involved in biochemical reactions and metabolic processes of the cell. Many of them exhibit antioxidant properties, protecting against oxidative damage. The aim of this study was to evaluate the effectiveness of manganese (Mn^{2+}) and magnesium (Mg^{2+}) as components of Biolasol solution. The study was conducted in a model of isolated porcine kidneys collected from Polish Large White pigs. Approval was obtained from II Local Ethics Committee Krakow: number 1046/2013. Kidneys were preserved through static cold storage (SCS) using Biolasol (control) and modified Biolasol (A: Mn^{2+} /1 $\mu g/L$; B: Mg^{2+} /1 $\mu g/L$ and Mn^{2+} /1 $\mu g/L$). Kidneys were flushed with solutions after 48 h of storage. Potassium, urea, and creatinine concentrations were highest in the Biolasol + Mn^{2+} group after 48 h storage ($[K^+]$: up by 50% vs. Biolasol and 119% vs. Biolasol + Mn^{2+} + Mg^{2+} ; urea: up by 18% vs. Biolasol and 300% vs. Biolasol + Mn^{2+} + Mg^{2+} ; creatinine: up by 250% vs. Biolasol and 240% vs. Biolasol + Mn^{2+} + Mg^{2+} ; $p < 0.05$). Protein concentration was lowest in the Biolasol + Mn^{2+} + Mg^{2+} group (by 81% vs. Biolasol and 67% vs. Biolasol + Mn^{2+} ; $p < 0.05$). The simultaneous introduction of Mn^{2+} + Mg^{2+} ions into the Biolasol composition improved renal function indices.

Keywords: magnesium; manganese; solution preservation; kidney



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