

Creatinine transport across chemically modified peritoneal membrane in vitro – influence of hyaluronan

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Hyaluronan is an essential component of peritoneal extracellular matrix. Its high molecular fractions participate in restoring of peritoneal integrity and remodeling of peritoneum, which have been changed by prolonged peritoneal dialysis and returning incidents of peritonitis.

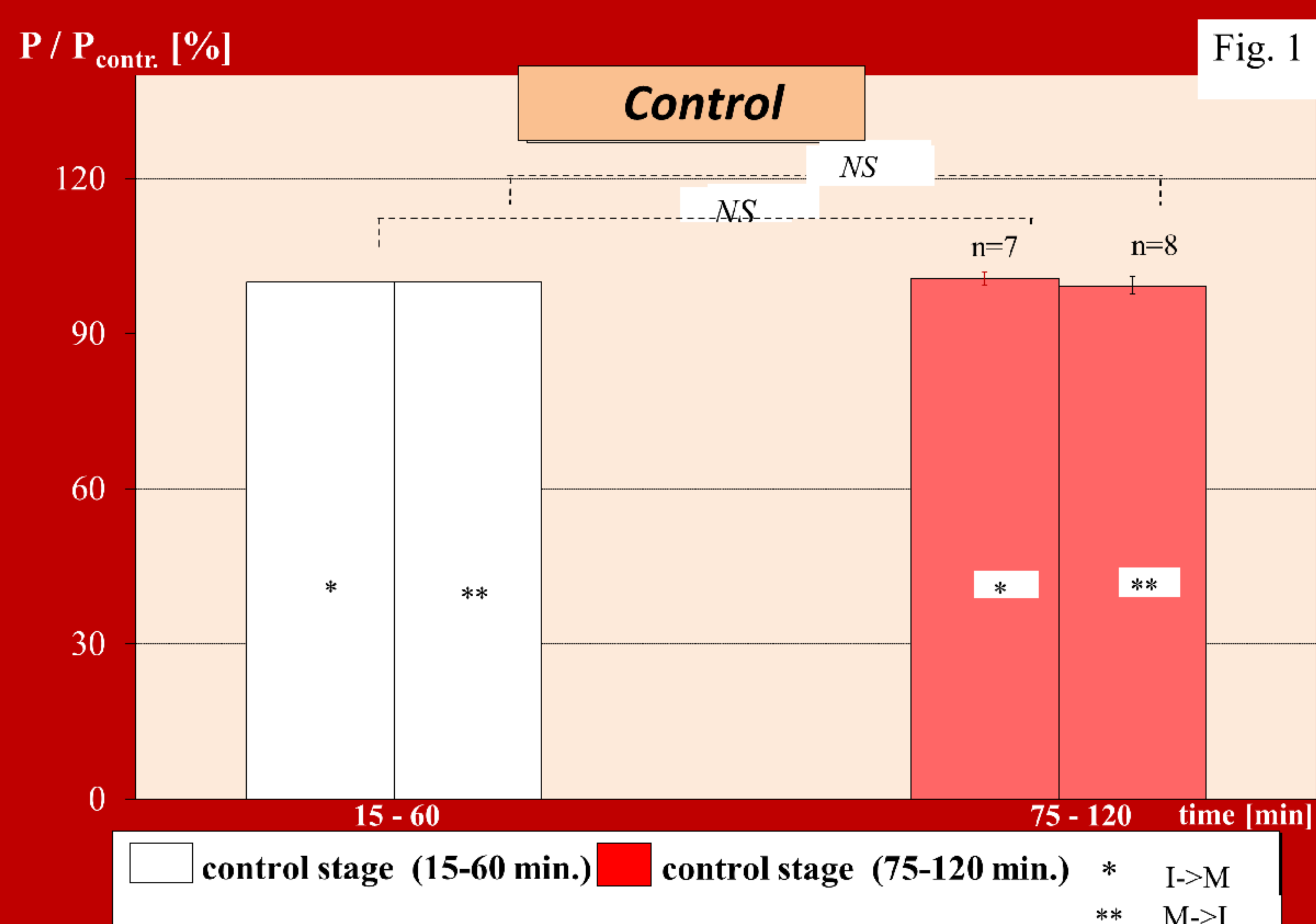
METHODS

We performed in vitro experiments with the isolated rabbit parietal peritoneum (placed inside a modified Ussing-type chamber), taken from the anterior abdominal wall of white Hyplus 59 rabbits to evaluate the importance of chemical modification of mesothelium and interstitium to the peritoneal transport of creatinine in the present or absent of exogenous high molecular hyaluronan. Values for transfer from the interstitial (I) to the mesothelial (M) side of membrane (I->M) and in the opposite direction (M->I) were calculated using the mathematical model of mass transport and are expressed as a coefficient of diffusive permeability [P (in centimeters per second)]. Two separate series of experiments were done with the applying chemically modified tissues (due to three minutes long 0.104 g/dL deoxycholate sodium acting on the mesothelial side of peritoneal membrane. In the first series, we examined creatinine (0.1 g/dL) transfer across the chemically modified tissue (for 120 minutes). In the second series, transport of this uremic toxin was measured before (15-60 min) and after (75-120 min) hyaluronan (0.1 g/dL, molecular weight 2,000 kDa) application in to the experimental system from mesothelial side of the membrane.

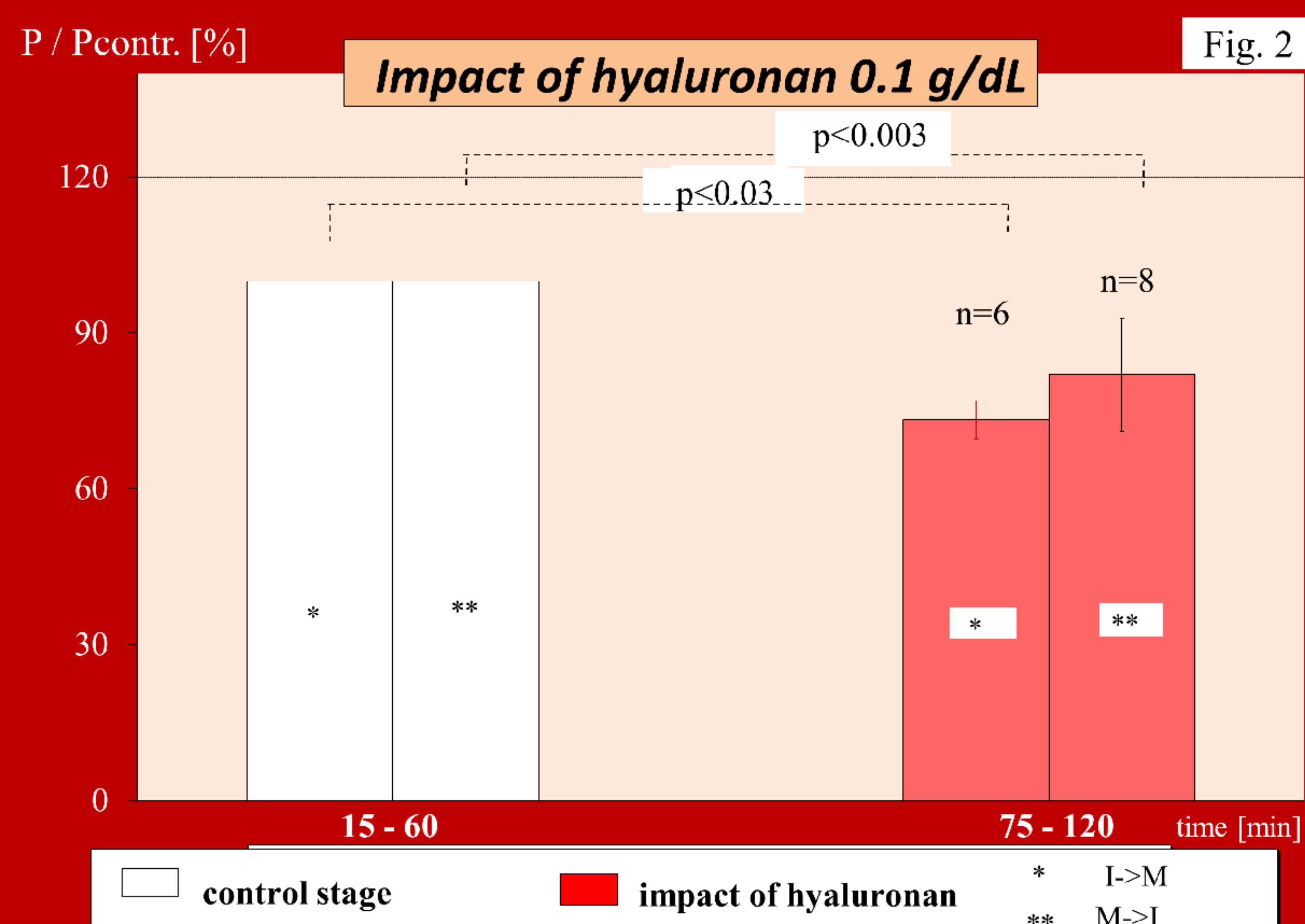
RESULTS

In the first series the rate of creatinine transfer remained constant, and no differences were observed for I->M transport and in the opposite direction (M->I).

The mean value of P (standard error of the mean) was 2.667 ± 0.162 [$p < 0.0001$, cm/s] for bidirectional transport (n=15, Fig.1).



Application of hyaluronan sodium on the mesothelial side of membrane (n=14) lowered I->M transfer of creatinine by a mean of 27% ($p < 0.003$) and in the opposite direction by a mean of 18% ($p < 0.03$, Fig. 2).



CONCLUSIONS

The obtained results show, that in vitro, high molecular fraction of hyaluronan decreases bidirectional creatinine transport across the chemically modified peritoneal membrane. These observations may have clinical importance, especially in patients with disorders of peritoneal permeability, such peritonitis.

