GLUCOSE AND GLYOXAL MODIFY THE DIFFUSION OF GENTAMICIN THROUGH THE PERITONEAL MEMBRANE IN VITRO

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The intraperitoneal delivery of gentamicin is not rare, because peritonitis still remains a major cause of peritoneal dialysis complication. Gentamicin is an aminoglycoside antibiotic with a strong positive charge and a molecular weight of 463 Da. The purpose of the in vitro study was to compare the diffusion rate of gentamicin (40 mg/dL) under the control conditions, and, after the application of glucose (1.8 g/dL) or glyoxal (10 mg/dL), in the separate experimental series. Glucose is usually added to the dialysis solution for the development of sufficient ultrafiltration during peritoneal dialysis. Glyoxal is one of the aldehyde forms of glucose degradation products generated during the heat sterilization of glucose fluids. The experiments were performed on the rabbit peritoneal membrane in a modified Ussing chamber, and the results were expressed as a diffusive permeability coefficient \( P \) (in cm/s). In the control study (15-120 min), the diffusion rate of gentamicin from the interstitial (I) to the mesothelial (M) side of the peritoneum and in the opposite direction diminished with time by about 50% (n=22). In the experiments with glucose (n=24) and glyoxal (n=21), the decrease in the level of gentamicin transport (I\( \rightarrow \)M and M\( \rightarrow \)I) through the peritoneal membrane was only 26%. In conclusion, in vitro glucose and glyoxal modify the diffusive permeability of the peritoneum for gentamicin. These modifications may be observed in vivo during peritoneal dialysis, and it can be important from the clinical point of view.