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Theme : Basic Research on Biocompatibility, Immunology, Inflammation and Fibrosis

Conversion of Innocent GDPs Into Toxic Counterparts

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Background: Glucose degradation products (GDPs) are produced in Peritoneal Dialysis (PD) fluids during sterilization and storage. During the dwell, the GDPs disappear from the peritoneal cavity. Reactive GDPs may disappear through binding to the peritoneal membrane, while others such as 3-deoxyglucosone (3-DG), enter the circulation along with the glucose molecules. 3-DG has been suggested as the substance responsible for adverse effects, not only in PD, but also in diabetes. But as 3-DG is a rather none-reactive molecule the mechanism is unclear. Another possible candidate for the adverse effects was recently identified in the highly reactive 3,4-dideoxyglucosone-3-ene (3,4-DGE).

Aim: The aim of this study was to investigate interrelations between 3-DG and 3,4-DGE in PD fluids.

Results: When a conventional PD-fluid was subjected to a temperature challenge the concentration of 3,4-DGE increased and concomitantly the concentration of 3-DG decreased [Fig. 1]. However, the decrease in 3-DG was less than the increase in 3,4-DGE indicating the presence of at least one more precursor, with 3-deoxyaldose-2-ene (3-DA) as main candidate.

Conclusions: Toxicity of GDPs present in PD fluids will depend not only on the actual concentration of 3,4-DGE but also on the amount that may be recruited from the pool. As the concentration in the pool is much higher than that of 3,4-DGE, only a small part has to be converted, in order to produce considerable amounts of 3,4-DGE. The less bio-reactive molecules (3-DG and 3-DA) may be transported into the circulation and thereafter converted to 3,4-DGE, which can cause systemic effects.

Figure:

Fig. 1

