Peritoneal Dialysis Induces a Local Sterile Inflammatory State and the Mesothelial Cells in the Effluent Are Related to the Bacterial Peritonitis Incidence

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Dear Sir,

Bacterial peritonitis is still the most frequent complication in patients with chronic kidney failure treated with continuous ambulatory peritoneal dialysis (CAPD). In healthy women undergoing laparoscopy [1, 2] and in peritonitis-free CAPD patients [1–3], the mononuclear phagocyte is the predominant cell type and therefore seems to be the first line of defense in phagocytosis and digestion of contaminating microorganisms.

We studied peritoneal cells (PC) from patients undergoing CAPD, which were nearly equally distributed by sex, ranging in age from 28 to 69 (mean 54) years with a mean peritonitis incidence (PI) of $(2.0 \pm 0.5 \text{ mean} \pm \text{SE})$ per year. The patients were examined, if they were peritonitis free at 1 month after their first start of peritoneal dialysis and thereafter every 6 weeks for a period of at least 6 to a maximum of 12 months. No data obtained within 1 month of a peritonitis episode were used. PC were collected from the complete dialysate effluent volume (1–2.5 liter), of an overnight dwell time. As a control, PC of healthy women undergoing laparoscopy, ranging in age from 25 to 40 (mean 33) years, were used as reported before [3]. All cell samples were counted and the differentiation, immunocytochemistry, chemotaxis, percentage of Fc-receptor-positive PC and immunophago-cytosis were determined as previously described [4–6].

In CAPD patients, the PC consisted of a higher percentage of neutrophils and a lower percentage of mature (RFD7 positive) macrophages, as compared with control PC (table 1). The changed composition of PC in CAPD patients confirms our previous results in the rat, where we showed an influx of neutrophils and young inflammatory macrophages after a single intraperitoneal injection of commercial dialysis fluid [4]. In our earlier studies this sterile inflammatory state was also found in CAPD patients concerning the endogenous peroxidatic activity of

Table 1. Comparison of peritoneal leukocyte populations (means $\pm$ SE)

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c Sanbio, Uden, The Netherlands. **d** FMLP= N-formylmethionyl-leucyl-phenylalanine.

Statistical analysis was performed using the Wilcoxon test.

PC in CAPD Patients

509

peritoneal macrophages [3] and the detection of a chemotactic agent in the peritoneal effluent [6]. Additionally, a lower percentage of peritoneal macrophages in CAPD patient expressed HLA-DR, HLA-DQ or CD68, and a higher percentage showed chemotactic activity, reflecting an immature stage of differentiation [1–3, 7] or alternatively a changed state of activation [2, 3, 7]. Remarkably, the peritoneal lymphocyte population of CAPD patients consisted of a higher percentage of B cells (CD22 positive cells), which might indicate a local activation of the humoral immune system.

The PC population of CAPD patients always contained mesothelial cells, which were only scarcely detected in control PC (table 1). The presence of these cells in the effluent could be affected by the changed peritoneal membrane [8] induced by cytotoxic effects of commercial dialysis fluid on mesothelial cells [9]. However, these cells seemed viable and healthy as determined on the ultrastructural level and therefore might reflect the replenishment rate of damaged mesothelial cells.

In the parameters shown in table 1, no differences were seen between patients when divided according to sex, age, underlying kidney disease or PI. Most remarkably, however, in CAPD patients with a low PI (< 2 per year) the percentage of mesothelial cells was significantly higher (2.7 ± 0.6 vs. $1.2 \pm 0.2\%$ in patients with a high PI, > 2.0; $p < 0.04$). This finding might indicate an increased turnover rate of damaged mesothelial cells which may prevent a microbial invasion of the peritoneum.

In conclusion CAPD induces a local sterile inflammatory state, and the mesothelial cells in the effluent are related to the bacterial PI. Both findings must be taken into consideration for the prevention of peritonitis and the development of new dialysis fluids.

Acknowledgment

This work was supported in part by the Dutch Kidney Foundation, grant No. C85.553, Bussum, The Netherlands.

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