Properties of human peritoneal macrophages from continuous ambulatory peritoneal dialysis (CAPD) patients

S.J. McGregor 1, J.H. Brock 1, J.D. Briggs 2 and B.J.R. Junor 2

1 Department of Immunology and 2 Renal Unit, Western Infirmary, Glasgow, U.K.

Patients undergoing CAPD are prone to episodes of peritonitis caused principally by infection with Staphylococcus epidermidis. Since macrophages are believed to be of prime importance in protection of the peritoneal cavity we have examined certain activities of CAPD peritoneal macrophages and compared them with normal peritoneal macrophages and blood monocytes. CAPD macrophages were obtained from spent overnight dialysis fluid and normal cells from patients undergoing laparoscopy.

The ability of macrophages to ingest and kill S. epidermidis was measured by a radiometric assay in which incorporation of [3H]-uridine into viable bacteria was used to determine these two parameters simultaneously. The degree of ingestion of a test dose of S. epidermidis by CAPD macrophages (81.6%) did not differ significantly from that of normal peritoneal macrophages (89.8%) but the proportion of ingested bacteria that were killed was reduced in CAPD cells (88.3% versus 99.9%, P < 0.001). Release of H2O2 by CAPD macrophages following triggering with opsonised zymosan was determined and also found to be reduced (6.4 μmol/10 μg DNA) in comparison with normal peritoneal macrophages (10.6 μmol/10 μg DNA: P < 0.01) but analogous to that found for blood monocytes (7.1 μmol/10 μg DNA). Similar results were obtained when expression of HLA-DR was examined by direct immunofluorescence: the proportion of positive CAPD cells (38%) was significantly lower than that of normal peritoneal cells (59%; P < 0.01) but similar to that of blood monocytes (39%). In contrast, when expression of transferrin receptor was examined by indirect immunofluorescence, 17% of CAPD peritoneal macrophages were positive but normal peritoneal macrophages and monocytes were always negative.

The lowered intracellular killing, H2O2 release and HLA-DR expression suggests that the peritoneal macrophages from CAPD patients are, as proposed by Goldstein et al. [1] relatively immature cells which more closely resemble blood monocytes. This may be a consequence of the dialysis procedure itself, which results in a rapid turnover of cells. This immaturity will not only weaken their phagocytic activity, but may also impair other functions, such as interactions with T-lymphocytes.

Although the expression of transferrin receptors is normally associated with cell proliferation, CAPD macrophages did not take up appreciable amounts of [3H]-thymidine. An alternative explanation may be that the expression of the transferrin receptor is increased due to the relatively transferrin-deficient environment present in the peritoneum of CAPD patients, as levels are only 1–2% of those in plasma or normal peritoneal fluid [2].
REFERENCES
