Co-effects of EGCG, Curcumin, TGF-β, PDGF-β and Retinoic Acid in MSCs' regeneration of ALLC Induced Mesangium Damage

J. Teng[1], M.E. Yassa[1], G.A. Herrea[1]

[1] Department of Pathology, University of South Alabama College of Medicine.

Abstract

Mesangial injury represents a crucial event in the pathogenesis and progression of many renal diseases. Previous observations from our laboratory have shown that MSCs migrate to the damaged mesangial areas and phagocytose apoptotic mesangial cells (MCs), debris and amyloid fibrils to repair the injured mesangium. The present study aimed at finding factors to accelerate the repair process and to figure out the mechanisms involved.

Mesangial cells (MCs) were treated with ALLC to produce amyloid fibrils and related mesangial damages and subsequently labeled MSCs were added. EGCG, curcumin, TGF-β, PDFG-β, and retinoic-acid were added in the medium. Samples were collected after the introduction of the MSCs (day 7 /14) and processed for light and transmission electron microscopy. In addition, sequential photos were taken with the aid of the 6D Life Cell Imaging System. Identification of MCs transformed from MSCs was also provided.

In EGCG treated group, cytoplasmic to nuclear translocation of c-fos was inhibited and amyloid formation was significantly decreased. MSCs actively clean ALLC affected glomeruli areas by phagocytosing apoptotic cells and amyloid fibrils. Once the cleaning process was completed, MSCs differentiated into MCs. Curcumin enhanced the migration of MSCs to the damaged sites and stimulated the apoptotic process. PDFG-β acted as a proliferative factor for the residual MCs and MSCs while TGF-β increased new matrix deposition. Retinoic-acid enhanced differentiation of MSCs into MCs.

The process of MSCs regeneration has been improved / enhanced / accelerated by "cocktail" enabling more effective mesangial repair, remodeling and regeneration.