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Regulation of the Cell Culture Environment enhanced Mesenchymal Stem Cells' Ability to repair the Glomerular Light Chain induced Renal Mesangial Cell damage

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Background: Glomerulopathic light-chain (G-LC) induced glomerular damage could hardly be reversed. Our previous studies however have shown the potential for human mesenchymal stem cells (HMSCs) to repair and remodel the G-LC damaged mesangium especially the human mesangial Cells (HMCs).This study is to further facilitate the HMSCs ability to repair the G-LC induce mesangium damage by modifying the Cell Culture Environment.

Method: HMCs and HMSCs were cultured with medium either glucose or Betahydroxybutyrate under room temperature condition (5% O_2, 5% CO_2 and 26°C) or incubator condition (21% O_2, 5% CO_2 and 37°C). HMCs were first treated with G-LC and then with or without HMSCs. HMCs and/or HMSCs (GFP labeled) were video recorded by a 6-dimention live cell imaging system for up to 22 days of the treatment and the ultrastructural morphology were identified with electron transmit microscope (TEM) at the end of experiment. Culture medium in different time spot were tasted for the LDH as the cell toxicity index.

Result: LDH test showed that LDH of all groups under the room temperature condition were lower than that under the incubator temperature conditions. All groups of the medium with ketone but without glucose showed much higher LDH level than that of the ones with glucose. LDH were also higher in the D22 than that in D12. Both 6-D live cell imaging and TEM showed that the apoptogenic environment could cause the G-LC treated HMCs have more apoptosis and the extra cellular matrix (ECM) is more likely desolved with the HMSCs treatemtn.

Conclusion: This study showed that by changing the incubation condition that enhance the apoptosis in the HMCs would facilitate the repair and remodeling of the HMSCs for the G-LC induced mesangium damage.

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