Jiamin Teng, J Cell Sci Ther 2015, 6:2
http://dx.doi.org/10.4172/2157-7013.S1.032

OMICS International
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5th World Congress on
Cell & Stem Cell Research

March 23-25, 2015 DoubleTree by Hilton Chicago - North Shore, USA

Experimental platforms to address mesangial repair: What has been accomplished?

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The human kidney has about 500 000 nephrons made up of different cell types. Mesangial cells (MCs) and the mesangial matrix was first described in the mid-nineteenth century, as important components of a region called glomerular mesangium. Unlike smooth muscle phenotype cells, mesangial cells are strategically located, directly involved in biological phenomena governing renal embryology, physiology and pathology. Many pathologic glomerular processes begin and are centered in mesangial areas. Immunoglobulin light chains producing glomerular damage (so-called glomerulopathic light chains) interact with mesangial cells resulting in different pathological events. Focused on mesangial repair and restoration of the mesangium after homeostasis has been altered, various experiment models including *in vitro, ex vivo* and *in vivo* have been used in our laboratory in the last 30 years. The most recent animal models have recreated the various mesangiopathies that are characteristic of glomerulonephritis. These experimental platforms have allowed us to correlate in-vitro data with animal results and have shown that the sequences of events participating in the pathological processes are identical. Each platform offers specific advantages and disadvantages to answer different questions. The talk will address these and will highlight the value of each of the research platforms. Combining the data that has been obtained has resulted in a full appreciation of what is involved in the genesis of the mesangial damage. The use of stem cells to repair and restore the damaged mesangium has provided insights into how mesenchymal stem cells do so offering a promising new therapeutic avenue to treat conditions such as diabetic nephropathy and thrombotic microangiopathies among others.

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