Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Background: Chronic kidney disease (CKD) can progress to kidney failure and the need for dialysis or even kidney transplantation. Due to high cost of dialysis treatments and to the lack of available organs for transplantation, there is an imminent need for the development of new therapies. Mesenchymal stem cells (MSC) are excellent candidates for stem cell-based therapy because of their ability to reduce renal damage through regenerative mechanisms. Mitochondrial dysfunction is a common feature of injury to numerous tissues. However, if MSC have a role in regulating mitochondrial function in diseased renal tissue remains elusive. To evaluate the effects of bone marrow-derived MSC transplantation on mitochondrial dynamics (fusion and fission) and quality (biogenesis and mitophagy) in the diseased kidney in the two kidneys-one clip (2K1C) CKD animal model.

Material and Methods: Male Wistar rats (n=24) were divided into the following groups: Sham (control), 2K1C, and 2K1C+MSC. The 2K1C+MSC received cell transplantation after 4 weeks of clipping surgery. After 7 (2K1C+MSC7d) and 15 (2K1C+MSC15d) days of MSC transplantation, the animals were euthanized and the clipped kidneys were processed for immunohistochemical and western blotting analyses to detect the mitochondria-related proteins DRP-1 (Dynamin related protein-1), MTF-1 (Mitofusin-1), MTF-2 (Mitofusin-2), PGC-1a (Peroxisome proliferator-activated receptor-gamma coactivator-1 alpha) and Parkin, and the renal enzyme Renin. ANOVA tests were performed and differences between groups were considered statistically significant when $p<0.05$.

Preliminary results: Clipped kidneys of 2K1C rats had increased renin ($p<0.05$), DRP-1 (mitochondrial fission; $p<0.001$) and MTF-2 (mitochondrial fusion; $p<0.05$) expression when compared to Sham group. This group showed DRP-1 and MTF-2 staining in both the cortex and medullary renal tubules, while Sham kidney showed scarce staining for these proteins. After 7 days of MSC transplantation, the animals showed reduction of renin ($p<0.01$), DRP-1 ($p<0.001$) and MTF-2 ($p<0.01$) expression and staining, compared to 2K1C group. After 15 days of treatment, the animals also showed reduction of renin ($p<0.05$) and DRP-1 ($p<0.001$) expression, and a tendency to decrease MTF-2 expression, compared to 2K1C group. Immunohistochemical analyses also showed a reduction of DRP-1 and MTF-2 staining 15 days after MSC transplantation. Expression of MTF-1 (mitochondrial fusion), PGC-1a (mitochondrial biogenesis), and Parkin (mitophagy) in all groups are under investigation.

Partial conclusions: Preliminary results show that PGC-1a expression were restored after MSC transplantation. These results suggest that MSC transplantation may rescue mitochondrial dysfunction through regulation of mitochondrial quality and dynamics. These findings provide insights into cellular mechanisms of MSC-based therapy in CKD setting and may have important implications for the advancement of cell therapy to manage renal failure.

Keywords: Chronic kidney disease; Mesenchymal stem cells; Mitochondrial dynamics; Mitochondrial Quality.

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SARS-COV-2 INFECTION AND REPLICATION KINETICS IN DIFFERENT HUMAN CELL TYPES: THE ROLE OF AUTOPHAGY, CELLULAR METABOLISM AND ACE2 EXPRESSION

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COVID-19 has emerged as a life-changing pandemic in many ways (health, economics and society behavior. SARS-CoV-2 is easily airborne transmitted, affecting more severely individuals with comorbidities, such as diabetes and hypertension. The main viral target in host cells is ACE2 (Angiotensin-converting enzyme 2), and TMPRSS2 (Transmembrane protease serine 2) which cleaves the Spike and allow virus invasion. Once inside the cells, SARS-CoV-2 hijacks protein production machinery for its replication, which cross-talk with autophagic machinery and mitochondrial metabolism. The invasion and replication of SARS-CoV-2 have been studied in several cell lines. Therefore, characterization of cell lines affected by SARS-CoV-2, as well creation of an in vitro ACE2 and TMPRSS2 overexpression models has a great relevance for academic and clinical researches. Analyze the SARS-CoV-2 replication in human cell lines and investigate the molecular mechanisms related to susceptibility to viral infection and replication. SARS-CoV-2 replication in BEAS2B, A549, HEK-293T, HuH7, SH-SY5Y, MCF7 and Caco-2 was monitored by RT-qPCR, expression levels of ACE2 and TMPRSS2 were analyzed by RT-qPCR and Western Blot. Uninfected cells were analyzed for cellular metabolism proteins related to autophagy and mitochondrial metabolism. The effect of overexpression of ACE2 on viral replication was studied in pulmonary. Viral kinetics in the cell lines VeroE6, HuH7, MCF7 and Caco-2 showed a much higher capacity for viral replication over time than BEAS-2B, A549, HEK-293T and HUVEC. Calls respectively, “high viral profile” and “low viral profile”. Cytopathic effects by the virus indicated reduction of formazan in Vero-E6, no changes in viability between the control in HuH7, MCF7, SH-SY5Y, HUVEC, HEK-293T, Caco-2, A549 and higher level in the initial times of infection in BEAS-2B. MCF7 presented higher expression of ACE2 mRNA compared to the other cells and no differences were observed in ACE2 protein levels, except BEAS-2B which presented the lowest expression. A549 showed the lowest quantity of TMPRSS2 protein when compared to all other cell types. TMPRSS2 mRNA expression was high in Caco-2, HuH7 and MCF7, cell lines with a high capacity of viral replication. Vero-E6 and HEK-293T showed the highest ACE2 activity when compared to all cell lines. HuH7, Caco-2 and MCF7 presented a relatively higher level of ATP Synthase and Citrate Synthase than other cells, while the levels of COX and NDUFS2 were lower. BEAS-2B and A549, showed drastically increased capacity of SARS-CoV-2 replication when ACE2 was overexpressed. cellular energy metabolism can be an important factor for the cell tropism and replication of SARS-CoV-2 and indicate that HuH7, MCF7 and Caco-2 are suitable models for mechanistic studies of COVID-19. Moreover, pulmonary cells with ACE2 overexpression can be used to understand mechanisms related to the respiratory system, the primary organ affected by SARS-CoV-2.

Keywords: SARS-CoV-2, COVID-19, ACE2, TMPRSS2, Cell lines, Overexpression, Mitochondria, Autophagy

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CD90 UPREGULATION-CONDITIONED MEDIUM OF BREAST CANCER CELLS INFLUENCE THE WOUND HEALING PROCESS OF PROGENITOR ENDOTHELIAL CELLS

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Introduction: Regenerative medicine aims to replace, and supplement harmed tissues using material or biological scaffolds supplemented with cells and cells-derived elements. To provide a functionalized tissue is fundamental to have vascularization and high angiogenic stimuli. Also, this property is shared as a tumor