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In This Issue

Editor's Summaries of the Articles Published in This Issue of Molecular Medicine Communications

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In this issue, Ekram and colleagues carried out a pharmacological investigation of human umbilical cord-derived mesenchymal stem cells in reducing pain and inflammation of degenerated intervertebral disc; Ali and Khan reviewed noncoding RNAs as emerging modulators of β-globin regulation and β-hemoglobinopathies, Ali and colleagues reported a study to determine *in vitro* efficacy of horizontal transfer of plasmid-mediated carbapenem-resistant genes from *Klebsiella pneumoniae* to *Escherichia coli*, Khan and colleagues conducted a cross-sectional analytical study to investigate HDV influence on HBV replication, Ahmed and Khan reviewed the effects of COVID-19 on the mental health of different sections of our society, and Riaz and colleagues reported a study which investigated the effects of thiazolidinone derivatives (T1 & T2) against buprenorphine (opioid)-induced increased pain sensitivity using a mice model.

Pain and Inflammation Profile of a Degenerated Intervertebral Disc

Ekram and colleagues used a rat needle punctured intervertebral disc degeneration (IVDD) model, established under a fluoroscopically guided system, followed by human umbilical cord-derived mesenchymal stem cells (hUC-MSCs) transplantation to investigate MSCs effect on pain reduction. Their experiments reveal that there is strong radiographic imaging evidence for the hUC-MSC group restoring the nucleus pulposus (NP) region and the significant presence of proteoglycans in contrast to the degenerated group. When compared to healthy IVDs, the molecular expression of pain and inflammatory genes was significantly increased on days 2 and 5, resulting in an immunomodulatory response and a marked IVDD. Conversely, the hUC-MSC group at 2 and 5 days showed significantly downregulated expression of *C-*, *C-FOS*, *RANK*, *TLR4*, and *IL1-β*, compared to the IVDD group. MSCs transplanted group also showed significant upregulation on days 2 and 5 in the anti-inflammatory marker AKT expression. Moreover, the hUC-MSCs-treated group indicated significant NP hydration. The authors state that preclinical transplantation of hUC-MSCs can potentially reduce the pain and inflammation caused by disc degeneration.

Noncoding RNAs: Emerging Modulators of β-Globin Regulation and β-Hemoglobinopathies

Ali and Khan reviewed recent research findings about the role of ncRNA in *globin* gene regulation and β-hemoglobinopathies and their potential as therapeutic targets or prognostic and diagnostic biomarkers. β-Hemoglobinopathies, including β-thalassemia

and sickle cell anemia, are the most common autosomal recessive disorders globally. Noncoding RNAs (ncRNAs) are derived from exons or introns of protein-coding genes or intronic regions of noncoding genes. There is significant evidence that these ncRNAs may act as protein decoys to impact a variety of biological functions, signaling, transcriptional regulators, cell differentiation, morphogenesis, and developmental regulation. The aberrant regulation of ncRNA expression serves as a hallmark of many hematological disorders, and there is solid evidence that these RNA species can play key roles in the pathogenesis of β-hemoglobinopathies.

Horizontal Transfer of Plasmid Mediated Carbapenem Resistant Genes from *Klebsiella pneumoniae* to *Escherichia coli*

Ali and colleagues designed a study to determine *in vitro* efficacy of horizontal transfer of plasmid-mediated carbapenem-resistant genes from *Klebsiella pneumoniae* to *Escherichia coli*. They collected a total of 30 gram-negative rods from different clinical samples. After preliminary antimicrobial susceptibility screening, isolates that showed a resistance zone were included in the study. These isolates were then subjected to the Modified Hodge test to confirm carbapenemase production. Out of 10 isolates, four were positive for carbapenemase production. The plasmid from these resistant strains was transformed into DH5α. RFLP (restriction fragment length polymorphism) analysis was carried out to evaluate these transgenic cells, resulting in horizontal gene transfer of resistant plasmid DNA from *Klebsiella pneumoniae* to *Escherichia coli*.

Differential Viral Load Indicates HDV Influences HBV Replication in HBV/HDV Co-Infected Patients

Khan and colleagues conducted a cross-sectional analytical study with 907 samples to investigate HDV influence on HBV replication. HBV DNA was detected and quantified by the Abbott HBV Quantification kit, and HDV RNA was detected and amplified by *RoboGene*®. Screening of HDV RNA and HBV DNA by PCR and results were analyzed using SPSS. Out of 907 patients, 33% were HBV/HDV co-infected, 35% were HBV, 18% were infected with HDV & 14% were HBV/HDV negative. Out of these, 75.7% were males, and 24.3% were females. The patients were divided into three age groups: 5-20 years, 21-40 years & 41-80 years. Overall levels of HBV DNA PCR < 1000 IU/ml were found in 74% of HBV/HDV co-infected patients as compared to 30.8% of HBV mono-infected. The authors conclude that the absence or the low viral load of HBV in HDV-positive patients might be due to a possible subdue of HBV by HDV in HBV/HDV co-infected patients. The age group of 20-40 years and the male gender is comparatively at high risk for these viral infections.

Implications of COVID-19 for Mental Health among Different Sections of the Society

Ahmed and Khan reviewed the effects of COVID-19 on the mental health of different sections of our society and painted a very grim picture. With COVID-19, people worldwide had to completely shift their lifestyles and adapt to an entirely new way of living. Following new rules and protocols has not been easy for everyone and has created new obstacles for people already suffering from mental health disorders. People have watched their loved ones suffer and surrender to their end. During such times, human connection becomes an important coping mechanism for people. Still, this connection is also lost with social distancing and lockdowns coupled with rising unemployment,

fear, and paranoia. As this virus has spread across the world, people are facing another pandemic of depression and anxiety parallel to COVID-19, and it is affecting every single person, whether it's a doctor, a student, a parent, or a patient suffering from COVID-19. The authors conclude that with an alarming increase in mental health, it is imperative that governments across the world pay more attention to the psychological consequences of the pandemic while fighting the virus.

Effects of Thiazolidinone Derivatives Against Buprenorphine-Induced Pain Hypersensitivity in Mice

Riaz and colleagues designed a study to investigate the effects of thiazolidinone derivatives (T1 & T2) against buprenorphine (opioid)-induced increased pain sensitivity using a mice model. They also investigated the effects of thiazolidinone derivatives on the expression of IL-1β within the spinal cord. Thiazolidinone derivatives were injected 30 minutes before buprenorphine injection. Behavioral tests such as thermal hyperalgesia, mechanical allodynia, and tail flick tests were performed on days 0, 1, 4, 8, 12, and 16. Mice were sacrificed immediately after behavioral testing, and ELISA was performed to measure the expression of IL-1β in the spinal cord. Their results showed that thiazolidinone derivatives increased latency time during hot plate and tail flick test and increased paw withdrawal threshold compared to control. Moreover, thiazolidinone derivatives reduced the expression of IL-1β in the spinal cord in mice, indicating the involvement of IL-1β in the mediation of increased pain sensation. The authors concluded that thiazolidinone derivatives might decrease allodynia and hyperalgesia associated with chronic use of buprenorphine due to reduced expression of IL-1β.

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