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Stem cell therapy in treating osteoarthritis

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Osteoarthritis (OA) is a common joint disorder caused due to ageing, wear and tear of joints. Classified under degenerative joint disorders, it occurs in the cartilage which provides cushion effect in the joints causing pain, swelling and stiffness. General characteristics of OA: hereditary, expresses in middle age (around 55 years), more common in women than men. Hemophilia, avascular necrosis and rheumatoid arthritis also known to cause OA. Though the general medical methods seem to have little effect in the curing process, stem cell therapy in caprine model of osteoarthritis proves to be an effective method for reducing the pain and easing movement. Mesenchymal stem cells (MSC) play a major role in tissue repair mechanism and regeneration of the injured joint by an autologous preparation of stem cells to caprine knee joints. MSC(s) have capacity to differentiate into a variety of connective tissue cells: bone, cartilage, tendon, muscle and adipose tissue. Adult stem cells are isolated from the bone marrow, expanded in culture and transduced to express green fluorescent protein. OA is unilaterally induced into the knee joint of the specimen using medical meniscus and resection of anterior cruciate ligament. After 6 weeks, a single dose of 10 million autologous cells suspended in a dilute solution of sodium hyaluronen (SHA) was delivered to the injured knee by direct intra-articular injection. The control specimens receive only SHA and not OA so as to make a comparative study. Results showed evidence of regeneration of medical meniscus, implanted cells detected in newly formed tissues. This infection-free mode of therapy prevents progressive destruction seen in normal OA and effect observed 1-2 hours within implementation, hence proving to be an effective therapy with fairly successful results.

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Computational study of novel target protein RA1 for Rheumatoid arthritis - Design of new lead

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Rheumatoid arthritis (RA) is an autoimmune disease, a systemic inflammatory disorder which affects tissues and organs, mainly by attacking synovial joints. Chemokine proteins of intercrine beta (chemokine CC) family play a major role in RA. These proteins are secreted by the dendritic cells and macrophages present in synovium. The chemokines play an important role in trafficking of T-cells and B-cells to lymphoid organs, lead to excess production of synovial fluid in inflamed joints causing RA.

In the present study the chemokine protein, RA1, is targeted for designing a new lead compound against RA. RA1 protein sequence of 98 AA length, was used to generate 3D model by comparative modeling using Modeller 9v10. The generated 3D-structure of the protein RA1 was evaluated and active site was identified using Castp and SiteMap. The active site was considered for structure based virtual screening of small molecules using an in-house library. Insilico screening of the molecules against RA1 was carried out using of Schrodinger suite. The new leads are identified as potent RA1 antagonist for RA therapy.

Keywords: Rheumatoid arthritis, Chemokine, Synovial joints, Lymphoid organs, Virtual screening.

Biography

V. Santhiprada is working for her Doctoral Degree at The Department of Chemistry, Nizam College, and Osmania University. She had completed her M.Sc (Organic chemistry) from P.G.College of Science, Saifabad, Osmania University, Hyderabad and worked for Narayana Jr. College as a faculty in Chemistry. Later worked as Group leader in R & D Department and Sr. Executive in IPM Department for Symed Research Centre (Hetero Groups). Her research interests include Computational Chemistry and its applications to Drug Designing with particular reference to Rhematoid arthritis.

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