



# Stem Cell Therapy: A Reparative Approach in Veterinary



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## Abstract

Stem cell therapy is a growing field in veterinary medicine and has created a lot of hope for developing treatments for diseases that otherwise cannot be treated by traditional medical approaches. Clinical studies in animals show promising results indicating that stem cells may facilitate tissue repair and improve quality of life in pets, cats and horses. In this mini review, summarizes the current status of stem cell therapies in veterinary medicine describing the procedures used for isolation, characterization, administration of cells and treatment of various diseases that affect dogs, cats and horses.

**Keywords:** Mesenchymal Stem Cells; Veterinary Medicine; Cell Therapy

## Introduction

The field of stem cell research has attracted many investigatories in the past several years. Although stem cells have been known for some time, the biology of stem cells and their manipulation for therapeutic purposes have become the subject of intense reserach only in the last decade. At present, is clearly that every tissue and organ in this body has its own reservoir of stem cells, namely mesenchymal stem cells, that provide the homeostatic maintenance of the body. The aging process no doubt reflects a numerical or funcional degradation in these stem cells. Mesenchymal stem cells have emerged in the literature as cells with marked potential in the realm of immunomodulatory and reparative medicine. Originally isolated form bone marrow, the mesenchymal stem cells can be found in numerous tissues including skin, adipose tissue, synovial membrane, umbilical cord blood, dental pulp, lung, as well as from fetal/neonatal tissues. For veterinary medicine, adipose tissue, umbilical cord blood and bone marrow are commonly used [1]. Mesenchymal stem cells can be characterized by their spindle-shaped, long and flattened cells exhibiting a fibroblastic morphology, ability to adherence, high proliferative capacity and miltilineages differentiation potential able to regenerate all the mature cells in the tissue from their origin along the lifespan of na individual. These cells must express > 95% of cell-surface markers such as cluster differentiation CD105, CD73, and CD90 as week as < 2% of expression of CD14, CD19, CD34, CD45, and HLA-DR. Although Mesenchymal stem cells can be expanded in vitro, they are capable to self-renew for limited time in vitro, and their lifespan can also vary from species

to species. The aim of this mini-review is to present the use of stem cell therapy in animals and focuses on provide a guide for the therapeutic use in animals.

## Discussion

Mesenchymal stem cells can be obtained from dog and cats using an aspiration needle such as a jamshidi, to collected form the femur, tibia or humeral head and from horses by the sternum and the tuber coxae [2,3]. In adipose tissue, mesenchymla stem cells can be obtained from inguinal, abdominal and thoracic wall fat in dogs and cats. In horses can be obtained from the superficial gluteal fascia [4]. Dog, cat and horse umbilical cord blood was collected in a bag with anticoagulant [5]. All samples following delivery to the laboratory where mesenchymal stem cells will be isolated and characterized. Once mesenchymal stem cells are isolated and characterized, the method used for the administration of cells (direct or intravenous injection), depends the patient's disease and condition. For the treatment of osteoarthritic joints, an intra-articular injection is used and for damaged tendons, ultrasound guidance permits direct implantation of mesenchymal stem cells. Although, delivery mechanisms that direct the maximum number of cells to the diseased area are essential, in some cases intravenous injection have been successfully used in the treatment of some disease as feline chronic gingivostomatitis. Each route bas advantages and disadvantages. The best route is the easiest to perform, less invasive and traumatic, has minimal side effects and enables a high survival rate of transplanted cells.

Animals in their course of life suffer from different diseases which are treated by different therapeutical approaches. The therapeutic application of stem cell technologies in veterinary medicine was first used to treat equine suspensory ligament desmitis that involved direct injection of bone marrow aspirate obtained from the sternum into an injured ligament [6]. Now, there are multiple disease conditions that are being treated with stem cells. Dogs with osteoarthritis that were treated with intraarticular injection of stem cells demonstrated statistically significant improvement in lameness, pain, and range of motion. This shows that stem cell therapy decreases patient discomfort and increases patient functional ability [7]. Dogs affected by keratoconjunctivitis sicca had stem cells implanted around the lacrimal glands that proved to be safe and effective with a significant improvement of tears production and in all ocular clinical signs associated with the disease [8]. Dogs, suffering from atopic dermatitis for at least 12 months, not responding to conventional therapy, received an intravenous dose of mesenchymal stem cells. A single systemic administration produces positive results in the remission of clinical signs of canine refractory atopic dermatitis without adverse events [9]. Cats diagnosed with feline chronic gingivostomatitis, not responded to conventional therapy, were recruited to the study. Each cat received a mesenchymal stem cells transfusion by Intravenous [10]. Cats affected by asthma were treated with mesenchymal stem cells that proved to be safe and effective with a significant reduction of airway inflammation, airway hyperresponsiveness and remodeling without adverse effects [11]. Cats with stable chronic kidney disease were received an intravenous dose of mesenchymal stem cells that proved to be safe and effective with adverse effects, clinical improvement, greater disposition, appetite and healthful weight gain [12].

Stem cell therapy for animal are using for the treatment of different diseases in valuable animals like horses, cats and dogs with multiple benefits. Because of this several companies like VetStem in the United States and CELLTROVET in Brazil were offering commercially stem cell therapy for pets and horses. For this reason, we can say that stem cell therapy for animal is not just research, it's a reality.

### Conclusion

Currently, the clinical application of stem cell therapy in veterinary medicine has been resulting in improved quality

of life for dogs, cats and horses. Although studies related to the treatment of various diseases have yet to be performed, the future of this field will be promising.

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