

## SUMMARY

Over the past decade, stem cell research has become an area of great interest given its potential application in regenerative medicine. The possibility to repairing damaged organs or creating in vitro tissues for transplanting is now a reality. Caring for the health of pets, such as horses, dogs and cats, and the related products used to preserve their health and longevity, have a strong economic impact worldwide. For these reasons, regenerative medicine is arousing increasing interest also in the veterinary field, given that, compared to traditional methods. In particular, it is able to guarantee a shorter hospitalization period and a greater possibility of recovery, bringing benefits to the animal. Chronic diseases and injuries are often serious in pets and in particular in elderly subjects, whose owners increasingly require new and more sophisticated treatments and prevention strategies.

In this study, a first goal is the development of isolation of mesenchymal stem cells protocols from bone marrow, adipose tissue, cartilage tissue and nervous tissue were developed. For all the cell lines studied, their differentiation capacities were verified in an osteogenic, chondrogenic and adipogenic sense. Cells isolated from bone marrow, adipose tissue and cartilage tissue have been used for the treatment of orthopedic lesions, while cells isolated from adipose tissue have also been used for the treatment of degenerative diseases.

Thanks to the differentiation potential demonstrated in vitro, isolated cells, in particular those from adipose tissue, bone marrow and cartilage tissue, seem to hold great promise in the field of orthopedic application. This hypothesis has been confirmed by the success obtained in the clinical application of the same cells, even if these results will have to be confirmed by tests carried out on a significant number of subjects.

A further objective of this project was the creation of new biocompatible matrices, with osteoinductive activity, for engineering applications of bone tissue. These resorbable structures, which replace natural bone tissue, were prepared starting from biopolymers, such as gelatin and poly-(D, L) -lactic acid, and, enriched with bio-glass nanoparticles (RKKP), using the electrospinning technique. These matrices were structurally and chemical-physically characterized, evaluating the biocompatibility tests on mesenchymal stem cells isolated from dog fatty tissue.

